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Oral Abstracts

Pathophysiology and severe malaria – from basic knowledge to new therapeutic approaches

T2P1-01

Endoglin in African children with *Plasmodium falciparum malaria*: a novel player in severe malaria pathogenesis?

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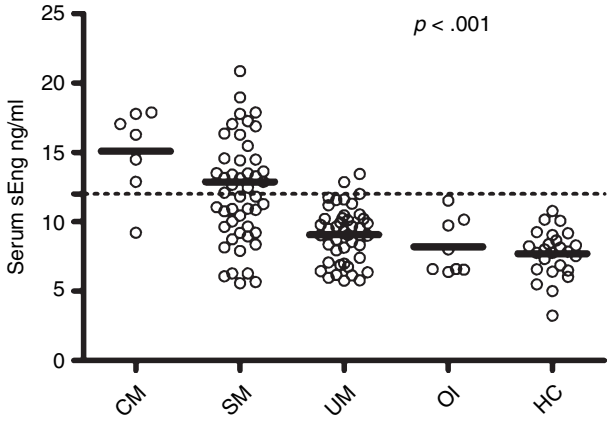
Molecular mechanisms involved in the pathogenesis of severe *Plasmodium falciparum* (*P.f.*) malaria (SM), specifically cerebral malaria (CM), are still unclear. Transforming growth factor beta (TGF-β) family members are important regulators of inflammation, influencing malaria pathogenesis. The soluble form of the auxiliary receptor endoglin (sEng) may play a role in malaria pathogenesis. Serum levels of sEng were measured using enzyme-linked-immunosorbent-assay (ELISA), in Gabonese children with cerebral (CM, $n = 7$), severe (SM, $n = 43$) or uncomplicated malaria (UM, $n = 43$) and compared to healthy controls (HC, $n = 25$) and to another infectious disease group (OI, $n = 8$). Serum sEng levels were higher in CM and all SM patients when compared to OI and HC. Furthermore, sEng correlated significantly with disease severity. Whereas only 7% of UM and none of control patients (OI or HC) showed serum levels higher than 12 ng/ml, this was found in 85.7% of CM and 46.5% of SM patients. High sEng levels may attenuate anti-inflammatory response resulting in clinical deterioration of *P. falciparum* malaria. Our results further corroborate the role of the vascular compartment, especially the endothelium, in severe malaria pathogenesis.



T2P1-02

Cerebral malaria and epilepsy

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Cerebral malaria (CM) is a potential cause of epilepsy in malaria-endemic regions of the world, primarily sub-Saharan Africa. Three recent African studies suggest a modestly strong association between CM and epilepsy, with little doubt that this association is causal. Speculative considerations that may explain this causal association are discussed. We have conducted two studies to assess the association between cerebral malaria and epilepsy: a cohort study in Mali involving patients exposed or not to CM, compared 101 children with CM to 222 children with noncerebral malaria, and revealed that there was 9.4 times higher risk for epilepsy to occur after CM (OR = 9.4; 95%CI: 1.3–80.3; $P = 0.02$).; In Gabon, in a case control study, we compared 296 cases (patients suffering from epilepsy) and 296 controls (patients who were not suffering from epilepsy). The risk for epilepsy to occur was higher in cases (OR = 3.9; 95%CI: 1.7–8.9; $P = 0.001$). The risk of sequelar epilepsy was significantly higher after CM. The possible role of convulsion, notably febrile convulsion due to CM and the physiopathological mechanism, remains to be elucidated.

T2P1-03

Neuroprotective roles and *in vivo* significance of neuroglobin in cerebral malaria

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Cerebral malaria (CM) is a life-threatening complication of *Plasmodium falciparum* malaria and is presently without treatment apart from anti-parasitic drugs and intensive care. The pathogenesis of CM is associated with the sequestration of red blood cells in the brain microvasculature, blood brain barrier dysfunction, and damaging inflammatory mediation. Neuroglobin (Ngb) is a recently discovered globin thought to function as an endogenous neuroprotective protein in the brain. This study was designed to investigate the *in vivo* significance of Ngb in the pathogenesis of CM. C57BL/6j mice were infected with parasitized red blood cells of the *Plasmodium berghei* ANKA strain. CM was diagnosed by the clinical presentation of specific neurological symptoms. In CM mice infected mice the expression profile of Ngb was different from that in control mice. In mice with CM, Ngb was found for the first time to be expressed in astrocytes. Subpopulations of astrocytes expressed Ngb in CM mice predominantly in the rhinencephalon where CM pathology is particularly intense. To date this is the first study on the role of Ngb in CM, and the first report of Ngb being expressed in astrocytes. Our results suggest that Ngb responds to the pathology associated with experimental CM in a novel way not yet reported in other *in vivo* Ngb studies. Moreover, this reponse seems to be associated with the intensity of pathology. Further characterization of the mediators involved in this response is necessary and may reveal potential therapeutic targets for the treatment of CM.

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T2P1-04

Cardiac function impairment in malaria

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Plasmodium falciparum malaria affects several organ systems. The handling of fluid substitution remains subject of controversy respecting the risk of effusions and oedema complicating this highly febrile disease. Understanding the role of myocardial and circulatory function may contribute to clarify this issue. Yet, very few data are available. We have assessed cardiac function parameters in cases with imported malaria using a non-invasive method based on a re-breathing technique and correlated these data with cardiac enzymes. Pro-inflammatory cytokine levels were established from peripheral blood to assess a potential pathophysiologic association with cardiac function. Findings were compared with a healthy control group. The cardiac index as a measurement of cardiac output in relation to the body surface was significantly lowered in malaria patients while peripheral resistance was increased. This differs from high output-failure seen in septic conditions, and may be associated with myocardial damage as well as increased afterload. We present our data on the association of cardiovascular parameters and myocardial enzymes with pro-inflammatory cytokines and parasitic parameters and discuss possible pathophysiologic associations and potential implications for clinical management.

T2P1-05

Intermittent preventive treatment of malaria decreases the anti-*Plasmodium* schizont antibody response of Senegalese children

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Preventive distribution to children less than 5 years old of a sulfadoxine-pyrimethamine + artesunate combination three times at monthly intervals during the transmission season (Seasonal Intermittent Preventive Treatment in children = sIPTc) resulted in an 86% reduction of malaria clinical attacks. We tested its short-term immunological impact by measuring anti-*Plasmodium* schizont IgG antibodies on a sub-sample of 338 children eight months after the last drug administration, just before the start of the next malaria transmission season. Specific IgG median antibody titre was significantly lower, by one-third, in the sIPTc group compared to controls (0.649 vs 0.970, $P = 0.039$). Levels of endemicity, age and *Plasmodium* asexual stages parasitaemia – but not gender – had strong effects on the antibody titres in control children but had no significant impact on the difference in IgG antibody titres between IPT and placebo groups. In addition, whatever the group, IgG titres before the start of the transmission season were twice as high in children who subsequently experienced at least one malaria attack. Since similar morbidity data were recorded in both groups during the following rainy season (i.e. no rebound effect), these data support that delivery of a preventive treatment against malaria during one malaria transmission season results in a lower specific antibody response with no negative clinical consequences. The data suggest that anti-*Plasmodium* schizont IgGs are a marker of infection rather than of protection.

Removing barriers to access to quality care: successes and failures

T1P1-01

Reducing mortality in Mali through free health care for children and pregnant women and enhanced malaria care

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In August 2005, MSF began supporting health centres in the western part of Kangaba health zone, in the south of Mali, to ensure that more patients in need receive treatment by using the new medical tools available (RDTs + ACTs). The malaria management in the health centres was based on an integrated package including use of rapid diagnostic tests (RDTs) and treatment with artesunate combination therapy (ACTs). Initially, MSF reduced the cost for patients by subsidising malaria drugs only and, in December 2006, MSF extended its support to abolish all patient fees for children under five and for pregnant women. In addition, during the rainy season, malaria care was decentralised to isolated areas where malaria village workers (MVWs) were trained to diagnose and treat malaria patients under the age of 13, for free. Health centres located on the eastern side of the river, not supported by MSF, provided primary care, including malaria treatment, under a system of cost recovery. At the time of the study, these non supported health centres had ACTs that were delivered for free to children under five. Payments for consultations and other treatments were in place. In this study, we compared mortality results between MSF and non-MSF intervention areas in Kangaba health zone. In July/August 2008, MSF carried out two two-stage, cross-sectional surveys measuring mortality on both sides of the river Niger. Routine medical data and general context information were also collected in the two sites. There were no major differences other than health intervention between the two sites. In the MSF-intervention area, utilisation of services more than tripled compared to those at the start of MSF intervention: from 0.22 new cases per inhabitant per year in 2005 to 0.84 in 2007 and confirmed cases of malaria were increased four times over the same period. In the non-MSF intervention area, utilisation of services varied from 0.08 to 0.3 new cases per inhabitant per year in 2007 and 2008. In the MSF-intervention area, crude mortality rate was 0.21 deaths/10 000/day (95% CI, 0.16–0.27) compared to 0.44/10 000/day (0.37–0.51) in the non-MSF intervention area. Under-5 mortality rate was 0.71 deaths/10 000/day (0.43–0.99) in the MSF-intervention area compared to 1.47 deaths/10 000/day (1.23–1.72) in the non-supported area. Results showed major differences between the two areas, both in terms of utilisation of basic health services and in terms of mortality. This study contributes to the evidence that increased coverage of essential intervention is key to mortality reduction. It demonstrated that the MSF subsidy for full free care package for the patients, combined with the management of malaria by use of RDTs, ACTs and MVWs has contributed to better coverage and reduced mortality. This has broad implications for health care planners in Mali and elsewhere: free health care and implementing effective malaria treatment can substantially contribute to reduce mortality.

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TIP1-02

Impact of performance based financing on maternal health service in Rwanda: a quasi-experimental study

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Economically poor countries, particularly in sub-Saharan Africa, face many challenges improving maternal health due to financial and human capital constraints, lack of motivation among health providers and lack of physical resources. One of the key policies implemented in Rwanda in response to these issues is performance based financing (PBF). PBF provides bonus payments to providers for improvements in performance measured by indicators of specific types of utilization (e.g. prenatal care) and quality of care. We examined the impact of the incentives in the Rwandan PBF scheme on prenatal care utilization, the structure and process quality of prenatal care, institutional delivery, and modern contraceptive use. The analysis used data produced from a prospective quasi-experimental design nested within the program's rollout (2006–2008). Baseline and endline data were collected from all of 165 facilities and a random sample of 2159 households facility's catchment area. Using a different approach, PBF had a large and significant impact on the quality of prenatal care measured by process indicators of the clinical content of care and deliveries in facilities. However, no such effect was found on prenatal care visits or on the use of modern contraceptives. The results provide evidence to support the hypothesis that financial performance incentives can improve both the use and quality of maternal health services. Policy recommendations include increasing incentive for prenatal care service, complementary training to increase quality and combining PBF with a demand-side intervention such as conditional cash transfer involving community health workers.

TIP1-03

Comparison of medical treatment between community-based insurance members and non-members in primary health care in Nouna, Burkina Faso

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Since 2004, a community based health insurance (CBI) has been in operation in Nouna Health District (NHD) Burkina Faso. Like many others in Africa, the CBI in Nouna suffers from low enrolment rates and has not achieved financial viability. In addition, the drop-out rate is high and CBI enrolees complain that they are treated with disrespect and that they are not given necessary medications when they go to the health centre. Since the level of quality of care has been identified as an important factor for motivation to enrol in an insurance scheme, this study seeks to evaluate the offered level of quality of care in NHD in general, and with regard to possible differences of care delivery between CBI enrolees and non-enrollees. The time frame of the study was calendar year 2007. Medical data were collected from the consultation registers of ten health facilities. Standard for comparison were the national guidelines for diagnosis and treatment (GDT). We focused on three pathologies – malaria, diarrhoeal diseases and lower respiratory tract infection – and conducted exit interviews with insured and insured patients. They were questioned on their perception of consultations and treatment received. 22 461 consultations in 10 health facilities were analyzed. 9.4% of malaria, 16.6% of respiratory tract infection and 36.2% of diarrhoea patients did not receive adequate medical treatment as a function of disease. Nurses were less adherent to the guidelines for insured than uninsured: 82.1 vs 83.7% for respiratory tract infection ($P = 0.011$) and 62.2% vs 64.1% for diarrhoea ($P = 0.015$). The 270 patients interviewed had a perception that insured patients received fewer injections (34.2%), did not get drugs as part of the benefit package (28.8%), received smaller quantities of drugs (21.5%). The results suggest poor performance and motivation of the health workers with regard to documentation, diagnostic and prescription skills. GDT compliance is much lower but these guidelines are also outdated with regard to malaria and diarrhoea treatments. In contrast to patients' perception, we did not observe any significant differences between insured and uninsured. Insured patients must be sensitized to the quality of care they receive. Urgent action and prioritization of investments is also recommended to raise the quality of care, motivation of health workers and their identification with the goals of CBI.

TIP1-04

Health sector reforms and quality of care at the district level in Tanzania

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In 1998, the Tanzanian Ministry of Health and donors agreed to introduce sector-wide approach to health reforms increasing coordination with donors and government. They developed a clear strategy for one comprehensive and coherent health sector programme to improve availability and quality of essential health service delivery. Our research assessed the success of the reforms. The study was a cross-sectional survey and data were collected through qualitative and quantitative techniques, using semi-structured questionnaires, focus group discussions, in-depth interviews, observations, local reports and literature review. We selected four rural districts in different medical zones. The survey was conducted in 2007 and covered 33 facilities, 279 health workers, 537 patients, 53 health managers and 54 groups of community representatives. The sampling approach was based on targeted variables, interviewed people and required information. The main issues, to see improvements for 1999–2006, were planning and management, human resources, essential drugs, supplies and equipment, accessibility, referral system, infrastructure and health indicators. We compared proportions and medians (Fisher exact, Mann-Whitney test) and we investigated causes of changes through transcriptions analysis. Positives change in health service delivery were reported by most respondents (90%). Compared to few years ago, improvement concerned drugs and supplies availability (although reported to be far from satisfactory), buildings, broader community participation, district autonomy, improved planning, better supervision and staff motivation (higher salary, better supervision, trainings and seminars). More than 90% of patients found services affordable. The population coverage by community health funds was poor (1% in three districts) but respected payment exemption for under-5 children (around 90% of exemptions). Sectors that did not improve were referral system, working equipment and conditions, shortage of staff, incentives (house, transport) and health information system. Major health indicators did not significantly change, except increased immunization coverage and reduced infant- and under-5 mortality rates. The study showed improvements in the quality of health services delivery between 1999 and 2006, which coincide with the adoption of a SWAp that has financed the decentralisation process, improved sector coherence and strengthened the previous reforms. However it remains difficult to correctly identify what can be attributed to policy changes, a health system being affected by different forces. Despite our encouraging results, additional field research is a need to make experience accessible to policy makers, and strategic advocacy is necessary to promote system changes.

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T1P1-05

Abolish user fees: a major difference in increased coverage of essential reproductive health care

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\Recently several low income countries have abolished user fees for essential health care, in particular for children and pregnant women. Within MSF this policy of free access to health services to beneficiaries – by paying *instead of the patient* – has been in existence since 2003. When negotiation with authorities fails, fees are reduced to the lowest possible level, combined with wide exemptions for patients unable to pay. This study shows the evolution of utilisation rates for reproductive health in several LIC, after abolition or reduction of user fees. Data in clinics and maternity wards in Haiti (Petite Rivière), Rwanda (Ruhengeri) and Burundi (Karuzi) were monitored systematically during the period of intervention in several public health structures with MSF support, allowing linkage to specific changes over time in tarification and/or other improvements in maternal health care. Important improvement in financial access was obtained when user fees were strongly reduced or abolished. This was the case for overall health care utilisation rates (over 1–2 contacts per inhabitant per year), but also the number of supervised deliveries doubled (Rwanda), resp. tripled (Haiti & Burundi). Caesarean sections also increased significantly. In Haiti and Rwanda coverage for preventive services such as antenatal care and family planning improved. Significant coverage increase due to abolition of user fees, contrasts positively with alternative schemes. Increased coverage is essential to reduce maternal mortality and morbidity. Subsidising reproductive health interventions without abolishing user fees has limited effect on increased coverage and limits potential impact. Any funding to improve access to RHC care services should be accompanied by measures to abolish financial barriers linked to user fees.

T1P1-06

Ensuring access to first line care in a changing environment: the experience of the Dragones-area in CentroHabana, Cuba (2004–2007)

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Accessible, qualitative, holistic and integrated first line care is an essential contribution of the Cuban family doctor program to ensure the right to health (care) for the whole population. We analyze how the local health authorities of the densely inhabited health area of Dragones in Centro Habana, a municipality of Havana city, reacted on a series of external events that, during the period 2004–2007, impacted on the health services organization and put the objective to ensure the population's right to health under strain. A prospective study of first health services utilization was organized, using a registration form filled out by family doctors in Dragones. Semi-structured interviews with local health authorities and health workers deepened the insight on how Cuba's public health system adapted to these evolutions. From 2004 onwards an important increase in the country's international health collaboration program was implemented, which meant that in a very short time, 20 000 family doctors from all over the country – including Dragones – left the country to work in underserved neighborhoods of Venezuela and other countries. In 2006 a hurricane severely damaged the recently renovated policlinic of Dragones, forcing it to close and be rebuilt. In 2007 further decentralization and reorganization of the health system at municipal level was launched at national level. The local health authorities took this 'municipalization' initiative as an opportunity to respond to the challenges and developed a strategy to stabilize and improve health services functioning: (1) the number of family doctor practices was diminished and team work was reinforced among family doctors working in the same location. (2) The task division within the basic health team – mainly doctor and nurse – was redefined, and efforts were made to ensure the permanent presence of a family doctor in the practice. (3) Technical and specialist backup of family doctors at policlinics was reinforced. Thus Cuba's public health system, in spite of inevitable tensions, was able to maintain the accessibility and quality of its services. Ensuring the long term presence of the family doctors in their neighborhoods remains an important challenge to establish a permanent link between family doctors and the families under their responsibility, and to support community involvement in the development of a healthy neighborhood.

T1P1-07

National health insurance and socioeconomic status in a rural district in Ghana

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Ghana aims for nationwide implementation of community based health insurances to cover basic health care costs and to protect individuals and families from economically catastrophic health payments. If this insurance scheme is to provide equitable and universal access to healthcare of acceptable quality, high subscription rates especially among the poor are needed. We explored the association between socioeconomic status (SES) and health insurance membership in Ghana. We collected data on asset variables (e.g. electricity, housing conditions) and on health insurance subscription on the household level. Using principal component analysis we classified the households into 20% rich, 40% middle and 40% poor. Odds ratios for having insurance were calculated for each of the three socioeconomic status categories using the category poor as Reference group and adjusting for distance to health facility measured as estimated travelling time on a taxi bus. Among 7223 households, 38% were subscribed into a health insurance scheme, 21% among the poor, 43% among the middle and 60% among the rich households. Adjusted for time to health facility by taxi bus, SES was associated with insurance subscription (high SES: OR 4.9, 95%CI 4.3–5.7; middle SES: OR 2.5, 95% CI 2.2–2.9; low SES: reference). The fact that poverty is a barrier to subscribe for an insurance scheme, which among others was meant to facilitate access to health care especially for the poor, entails the risk that the national health insurance may increase disparities between rich and poor populations instead of diminishing them.

HIV treatment and prevention

T3P1-01

Adverse events associated to HAART in Burkina Faso

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We examined prevalence and graded adverse events (AE) potentially associated with antiretroviral treatment (HAART) in resource-limited settings, by analysing clinical and laboratory AE occurring during HAART from December 2001 to April 2009 in 1087 patients coming from two urban and one rural areas by Epi-Info 3.5. 289/1087 (26.6%) patients presented AE for a total of 354 events over 1465

treatments (24.2%): 1198 (81.8%) of these were treated with 2NRTI + 1NNRTI, 200 (13.7%) with 2NRTI + PI boosted, 67 (4.6%) with 2NRTI + non-boosted PI. Respectively 295/1198 (24.6%), 45/200 (22.5%), 14/67 (20.9%) showed AE. The total AE were: 151 peripheral neuropathy (42.7%), 33 anaemia (9.4%), 58 CNS toxicity (16.4%), 58 GI intolerance (16.4%), 14 liver toxicity (4%) and 30 skin rush (8.4%). 143/354 (40.4%) occurred within 30 days from starting HAART, 206 (58.2%) in 90 days and 148 (41.8%) later than 3 months. Average190.4 days. Toxicities grade I AE (WHO grading) were found in 117 patients (33%): 49 (41.1%) males and 68 (28.9%) females; grade II in 157 (44.4%) patients: 49 (41.1%) males and 108 (45.9%) females; grade III in 54 (15.3%): 16 (13.4%) males and 38 (41.1%) females; grade IV in 26 (10.2%) patients: 5 (4.2%) males and 21 (8.9%) females. Impact of AE on treatment was as follows: continuation (208; 58.8%), switching (103; 29.1%), dose modification (10; 2.8%), interruption (33; 9.3%). In evaluating the HAART effectiveness and toxicity, it is important to take into consideration the frequency and severity AE in order to choose the most effective and less toxic drugs; thus, in resource-limited setting, we still have need lower toxicity antiretroviral drugs.

T3P1-02

Dyslipidaemia in patients on first-line ART in India – a prospective cohort study

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The effect of first line ART on the lipid profile of Indians who are, as it is, at increased risk for cardiovascular disease has not been studied. This study was planned with the hypothesis that combination antiretroviral therapy (cART), even without protease inhibitors, will significantly increase the occurrence of proatherogenic dyslipidaemia in Indians, and aimed to study the prevalence and pattern of dyslipidaemia in patients being put on ART and the factors affecting it. Volunteering adult HIV patients initiating first line ART were recruited as subjects in this prospective cohort study. Patients with pre-existing diabetes, chronic kidney/liver disease were excluded. They were followed up with serial weight recordings, CD4 cell count estimation and lipid profiles for a minimum of 12 months. The National Cholesterol Education Program-Adult Treatment Panel-III (NCEP – ATP III) recommendations were used to define dyslipidaemia. Statistical analysis was done using R 2.7.2 (R Development Core Team (2008). URL http://www.R-project.org). Analyses were done with ANOVA and Kruskal Wallis test, paired t test, chi square test and Fisher's exact test and multiple linear regression analysis (LRA). Seventy subjects were enrolled of which 87% were male with a mean age of 38.7 years and a mean body mass index of 20.5. They were followed up for an average of 18.1 months. Prevalence of dyslipidaemia before ART was 0.75 (95%CI 0.58–0.79) and 0.90 after ART (95% CI 0.81–0.95). Prevalence of different types of dyslipidaemia before and after ART was: high TC 4.3, 27.3%, high Tg 22.9, 30%, high LDL 35.7, 54.3% and low HDL 45.7, 78.5% respectively. Paired *t*-test for effect of treatment showed significant changes in lipid values after treatment: TC 4.3–22.9 ($P = 0.005$), Tg 1.9–32 ($P = 0.03$), LDL 4.2–25.8 ($P = 0.007$), HDL (-6.2)-(-1.9) ($P = 0.0003$). Linear regression analysis showed that confounding factors such as age, opportunistic infections, BMI and CD4 cell count did not significantly affect lipid levels. Only Tg levels were directly influenced by rise in CD4 count ($P = 0.04$). Analysis of temporal trends showed a consistent fall in HDL ($P = 0.0001$), and rise in Tg ($P = 0.051$). Dyslipidaemia is very common both before and after ART (0.75, 0.9) – commonest abnormalities being low HDL and high LDL. The treatment regimen did not influence dyslipidaemia but larger studies are required to conclusively exclude it. Temporal worsening of Tg and HDL values was seen. Only Tg values worsen with rise in CD4 count with treatment. The high prevalence of dyslipidaemia in AIDS patients in India necessitates further research into causes and preventive methods.

T3P1-03

How to improve women's and partner's participation to prenatal HIV counseling in rural and urban areas in Kivu, democratic republic of Congo?

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Prevention of mother-to-child transmission (PMTCT) programs began in South Kivu in 2005. Our objective was to improve the womens' and their partners' participation at HIV counseling and testing sessions during prenatal care, by having community education sessions. HIV community educational sessions began in September 2008 monthly in 5 health areas in two different health districts in South Kivu, Bagira and Miti-Muresha. HIV education was given by two midwives trained on these specific HIV topics into the village communities: this two midwifes worked on PTMCT programs. The 1-h session began by general information about HIV transmission and focused finally on the importance of the partner's implication on prenatal testing and on mother-to-child transmission prevention. After the beginning of educational sessions, the percentage of women accepting HIV testing increased from 92.00% (January 2008–August 2008, $N = 500$) to 100.00% (September 2008–February 2009, $N = 466$) in Miti-Muresha ($P < 0.001$) and from 89.02% ($N = 1575$) to 91.03% ($N = 1092$) in Bagira ($P = 0.09$). For the same periods, the "return for test result" rate increased from 83.91% to 93.99% in Miti-Muresha ($P < 0.001$) and from 89.02% to 93.96% in Bagira ($P < 0.001$). Also for the same period, the number of partners tested for HIV increased from 6.09% to 7.08% in Miti-Muresha ($P = 0.54$) and from 1.43% to 21.03% in Bagira ($P < 0.001$). HIV prevalence for 2008 among pregnant women was 1.6% in Bagira and 2.7% in Lwiro. Educational sessions on HIV/AIDS in the community can lead to greater involvement of the target public. Partner participation was more significant in the urban settings, which may be due to greater stigma of HIV/AIDS in a rural community such as Miti-Muresha.

T3P1-04

Viral and host factors associated with high HIV-1 viral load setpoint in adult seroconverters from Mbeya Region, Tanzania

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The primary objective of our study was to determine the HIV-1 viral load setpoint (VLS) among adult seroconverters from Mbeya

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Region in Tanzania. Furthermore we wanted to assess factors associated with the virus and the host that could possibly influence the viremia at setpoint. Initially HIV negative subjects of two different cohorts were enrolled and the participants were ollowed for up to 4 years. They were visited at regular intervals for collection of samples and data on socio-demographic background, health status and relevant behaviour. We calculated the VLS for 108 adult seroconverters. They belonged to three distinct participant groups: Females and males from the general population and female barworkers, who are considered a group at high risk for HIV infection. A series of laboratory analyses were performed to identify virus- and host-related factors that might have an impact on the VLS. Univariate and multivariate Poisson regression was used to assess associations of these factors with the VLS. Female barworkers had a median VLS of 69 850, general population females of 28 600 and general population males of 158 000 RNA copies/ml. Factors that were significantly associated with elevated VLS included multiple infection with different HIV subtypes (RR = 1.65, 95%CI = 1.03–2.66), male gender (RR = 1.83, 95%CI = 1.14–2.93) and the expression of ''harmful'' HLA class I alleles (RR = 1.73, 95%CI = 1.13–2.66). In summary our results suggest that multiple viral and host-related factors can influence the natural course of HIV-1 infection.

T3P1-05
AIDS in Bosnian children

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The global epidemic of HIV continues, with an increasing impact on children. Better access to antiretroviral therapy in Bosnia and Hezegovina needs to be coupled with better adherence. Children also had more illness, especially parotitis, otitis media, upper respiratory infections, and lymphadenopathy. Data from children and adolescents who were 15 years and younger were included in our analysis; neonates who were hospitalized in the first month of life and hospitalizations for conditions related to pregnancy and delivery were excluded. The demographics of this groups of participants (58) were similar to that of the study population as a whole: 77% were perinatally infected; 23% aquired infections, 33% were Bosnian; 17% were foreigners' children; 7% were Gypsies, 15% Serbs and 15% Croats, other ethnic groups comprised 13%; and 59% were boys. Treatment strategies for children with HIV disease need to be reevaluated so that they consider restoration of neuropsychological functioning in addition to lowering the viral load.

Table 1

In kids with HIV, the following opportunistic infections and conditions can frequently occur:

- Viral infections like a form of chronic walking pneumonia called lymphoid interstitial pneumonia (LIP), herpes simplex virus, shingles, and the cytomegalovirus infection
- Parasitic infections such as PCP, a pneumonia caused by *Pneumocystis carinii*, a microscopic parasite that can't be fought off due to a weakened immune system, and toxoplasmosis
- Serious bacterial infections such as bacterial meningitis, tuberculosis, and salmonellosis
- Fungal infections such as esophagitis (inflammation of the esophagus), and candidiasis or thrush (yeast infection)

T3P1-06
Behavioral aspects of HIV prevention and care in Indonesia: a plea for a multi-disciplinary, theory- and evidence-based approach

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Projections estimate 1 000 000 HIV infected by 2015 in Indonesia. Key behaviors to HIV prevention and care are determined by a complex set of individual/environmental factors. This presentation gives an overview of empirical data, local evidence and theoretical concepts to determine the role of social sciences in HIV prevention/care. Injecting drug use (IDU) is a social and very risky activity: 95% injected in the presence of peers and 49% reported needles sharing. 82% of IDUs do not use condoms consistently. Poor adherence to ARV treatment is related to a complex set of, mostly behavioral, factors beyond effective influence by standard professional skills of medical staff. Meta-analysis indicated that about 1/3 of the variation in changing behavior can be explained by the combined effect of intention and perceived behavioral control, the two cornerstones of the theory of planned behavior (TPB). It is advisable to adapt TPB in the light of the local cultural contexts. Current theories of behavior and behavior change give professionals of all disciplines working in HIV prevention and care effective tools to change behavior and to improve HIV prevention and access and quality of HIV care.

T3P1-07
Social networks and sustainable antiretroviral provision to displaced communities in northern Uganda

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This qualitative study examined the social networks necessary for the long term sustainability of antiretroviral treatment to treat HIV/AIDS in internally displaced communities. Research was conducted during the conflict and post-conflict situation in northern Uganda from 2006 to 2009. The study explored how community-based volunteers and social networks among people living with HIV/AIDS (PHAs) affect adherence monitoring, patient retention in programmes, and stigmatization in displacement camps. We used participative observation, semi-structured interviews, focus groups, social mapping and life histories. More than 100 health workers and people living with HIV/AIDS (PHAs) were interviewed in seven months from 2006 to 2009. The research was multi-sited to compare geographic positions and different programmes. Community based volunteers and health-workers have been effective in ensuring good adherence, as well as helping the formation of social support groups. Social networks have helped PHAs negotiate the difficulties of displacement and disease, as well as overcome barriers of stigmatization. The return phase has posed significant problems for the monitoring of patients: in particular programmes have faced increased problems with loss to follow-up, and missed appointments. Problems of geographical inaccessibility become more acute during this phase as displaced populations are scattered. The community based approach has been effective as both a medical and social strategy in northern Uganda; however, there has been inadequate planning for the return phase. Sustainable antiretroviral treatment to displaced communities is enhanced by community involvement. This involves conceptualizing programmes beyond an emergency medical relief paradigm. Long term developmental planning should be incorporated into programmes from the outset. Planning for the return phase involves training community based workers to monitor and report mobility of patients, as well collecting adequate data to pre-empt move-

ments of patients, and identify those who are lost to follow up. The decentralization of treatment is critical for ensuring treatment equity and continuity, but this requires adequate phasing to ensure secure supply lines, and adequate treatment education and monitoring. *The writing of this presentation was funded by the Foundation Philippe Wiener - Maurice Anspach, based at 'I' Université Libre de Bruxelles'*

T3P1-08

Assessing the knowledge and behaviour towards HIV/AIDS among youth in Northern Uganda: a cross-sectional survey

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Of the HIV-infected global population, about half became infected between the ages of 15 and 24. Attention is turning increasingly towards young people, who are not yet sexually active or who are just embarking on their sexual lives. As a result, prevention programmes are increasingly being assessed and measuring knowledge, beliefs and practices of young people towards HIV is of critical importance. The Northern Uganda Malaria, AIDS and Tuberculosis (NUMAT) program is using media campaigns, peers counseling, life skills training, and tailored interventions for particularly vulnerable individuals to reach youth with prevention messages in Northern Uganda. Data on youth is pertinent to inform and explain trends observed in HIV data so as to devise means of curbing the epidemic. The program employed the lot quality assurance sampling (LQAS) methodology to assess HIV-related indicators among youth in Northern Uganda. The survey is a feasible and cost-effective tool simple to use for providing population-based information otherwise not attainable. A total of 1781 youth were interviewed. 86% reported possessing knowledge on where they could go for HIV testing. About 63% reported having ever tested for HIV: more females (69%) tested than males (54%) but no association was found with their education. Additionally a half of young people reported having taken and received their HIV test results in the last 12 months prior to the survey. Though 77% reported being willing to disclose their HIV status, 42% would prefer the status of an HIV-infected family member not to be revealed. 51% of respondents mentioned the three major ways to prevent HIV infection and half of them were able to reject the major misconceptions about its transmission, only 29% possessed a comprehensive knowledge on HIV transmission. Male and respondents with higher education level were found to be significantly more knowledgeable. When asked if they knew of any place where they could obtain condoms, 76% of young people knew of one, with more males (85%) than females (71%) and the more educated respondents significantly able to mention one such place. Young people are important in determining the future of the HIV epidemic. Equipping them with the necessary knowledge and skills is vital for prevention interventions. Quick, simple and low-cost small scale surveys such as the LQAS can be utilized for assessing these valuable indicators.

Buruli ulcer, other tropical diseases

T4P1-01

Antimycobacterial efficacy of plants from Benin against *Mycobacterium ulcerans*

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The purpose of this study was to investigate the antimycobacterial activity against *Mycobacterium ulcerans* of plants used in traditional medicine in Benin to treat Buruli ulcer. Out of 49 plants identified in the traditional treatment of Buruli ulcer, 44 were selected and screened. The plants were identified by a botanist from the National Herbarium of Benin and voucher specimens are deposited at the same herbarium. Crude extracts of leaves, fruit seeds, and roots were prepared and the minimum inhibitory concentration (MIC) values were determined using the resazurin microtiter assay (REMA). Extractions are made at Louvain Drug Research Institute (Belgium) and at Laboratoire de Pharmacognosie et des huiles essentielles (LAPHE, Cotonou, Benin). *M. ulcerans* reference strain ATCC 19423 from the mycobacterial collection of the Institute of Tropical Medicine, Antwerp, Belgium, was used. Tests were performed at the Institute of Tropical Medicine (Antwerpen, Belgium) and at Laboratoire de Référence des Mycobactéries (Cotonou, Benin). Extracts of *Holarrhena floribunda* (G.Don) T. Durand and Schinz and *Jatropha curcas* Linn showed inhibitory activity against *M. ulcerans* at concentrations of 125 μg/ml and 250 μg/ml respectively. The REMA method used in this study to determine the MIC values of natural product is simple, sensitive, and rapid, and could be a method of choice to successfully assess antibacterial properties of plants extracts against *M. ulcerans*. Among plants tested, two showed promising activity.

T4P1-02

Cost-effective strategy for confirmation of *Mycobacterium ulcerans* disease (Buruli ulcer) in low-resource and endemic settings

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This study aimed to propose a simple and cost-effective algorithm for confirmation of BU diagnosis in low-resource and endemic countries. After setting up molecular diagnosis of BU by PCR in the Mycobacterial Reference Laboratory in Cotonou (Benin), we routinely performed both microscopy and PCR on specimens received from peripheral centres. From March to December 2008, 436 specimens (swabs, tissue fragments, fine needle aspiration) from suspected cases were analyzed. Of the 436 specimens, PCR was positive for 234 while microscopy was positive for only 126; thus, PCR has added 46.2% of positive specimens to microscopy. Almost all smear positive specimens were confirmed by PCR; only nine were smear positive PCR negative: there was good concordance between microscopy and PCR in smear positive specimens. PCR is expensive and can only be performed in reference laboratories, but microscopy can be performed in peripheral laboratory where patients are treated. Therefore, we propose a simple algorithm for confirmation of BU diagnosis in low-resource and endemic settings in which microscopy is used in peripheral laboratories for screening and PCR as a second test reserved only for smear negative specimens sent to the reference laboratory. However, the prerequisite of using this algorithm is an establishment of a network involving peripheral, national and supranational laboratories to ensure the quality of the diagnosis at each level of the network. In peripheral laboratories, the diagnostic test used for BU is also suitable for tuberculosis. If possible, an integration of the

diagnosis of these two diseases at the peripheral level can make the system more cost-effective.

T4P1-03

Features of the 2006 cholera outbreak in Pemba island, Zanzibar, Tanzania

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Since the first outbreak in 1978, Pemba experienced recurrent cholera outbreaks in the period 1983–98, then annually since 2000, except for 2005. In 2006 the Island Cholera Committee worked in close co-operation with technicians of PHL-IdC, DPHMV, and ZAWA to follow up the outbreak and assess its epidemiological features. Date of admission, sex, age-range (<5 years of age and >5 years), and living area for each patient admitted to the Primary Health Care Units and District Hospitals were derived from the registration forms; demographic data for each affected area have been obtained by a population survey. Patients' rectal swabs and water sources used for drinking and/or household practices were collected in and around the cholera treatment centres, respectively. Samples were analysed at PHL-IdC according to the traditional protocols for the detection of *V. cholerae*: suspected colonies were confirmed by serotyping with a polyvalent O1 antiserum. The 2006 outbreak started on the south-eastern cost (Mkoani District) on 13 March; later on, it moved further north affecting Wete, M'weni and Chake Districts and affecting four high risk areas along the east coast, involved also during each of the previous outbreaks. As the 2006 outbreak ended on 31 October, a total of 464 cases including 10 deaths (case-fatality rate 2%) were reported. The index case was a mobile fisherman travelling between islands and Tanzania mainland. A high peak has been reported during the heavy rainy season (March–June), accounting for 71% of all the cases and showing a weekly case-fatality rate up to 25%. The overall incidence rate on Pemba island was 1‰ and much lower as compared to the most affected areas, where it ranged from 8‰ (Kojani island in Wete) to 61‰ (Shamiani island in Mkoani). There was no difference between males and females; the incidence was higher among people older than 5 years, except for Kojani island (25‰ children vs. 6‰ other age groups). The PHL-IdC confirmed 65% samples positive to *V. cholerae* O1 on a total of 109 analysed specimens. In six out of nine affected areas, 45 out of 56 (80%) water samples were found positive for *Vibrio cholerae*. In Pemba it is still a challenge to ensure proper surveillance, health education activities, and adequate environmental management for safe water and proper excreta disposal. The results from this survey encouraged the Ministry of Health and Social Welfare, in co-operation with the WHO Global Task Force on Cholera Control, to envisage a new approach for cholera control in Zanzibar. The plan involved strengthening disease surveillance, and adding a mass vaccination campaign using oral cholera vaccines in addition to usually recommended control measures.

T4P1-04

Angiostrongiliasis due to *Parastrongylus (Angiostrongylus) cantonensis* in Ecuador. First report in South America

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Until 2007, no cases of angiostrongiliasis due to *Parastrongylus (Angiostrongylus) cantonensis* were reported in South America. In June 2008 seven related persons from the province of Los Rios, Ecuador, presented a clinical syndrome affecting the central nervous system with a raised count of eosinophils in cerebral spinal fluid. All had eaten raw snails. One of them died and the autopsy showed an L5 larva compatible with *P. cantonensis*. Four patients presented meningitis. During the same month, four more persons from a neighbouring area presented the same syndrome. In December 2008 a second outbreak was reported in the province of Santo Domingo de los Tsachilas. In March and April 2009 another three localized outbreaks occurred in the provinces of Guayas, Los Rios, Manabí, Santo Domingo and Quito. Up until April 2009 a total of 26 patients, including one death, were detected. At least eight presented severe neurological sequelae. The average age was 18 years. 17 cases were male. L3 larvae were observed in snails, and adult worms were observed in lungs of dissected rats. Hosts were captured from the sites where patients live. This is the first report of transmission of *P. cantonensis* in Ecuador and South America. Though these outbreaks were sporadic and localized, they do represent an important burden in terms of morbidity. Patterns of transmission as well as of consumption of intermediate hosts deserve further research.

T4P1-05

Epidemiology of the guinea worm disease at the threshold of its eradication

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In 2007, both Nigeria and Mali were caught off guard by unexpected outbreaks of dracunculiasis that occurred because of inadequate vigilance in known endemic or previously non-endemic areas, and are now suffering the consequences of costly setbacks in reaching zero cases. Series of studies conducted at different times in thirty-nine (39) villages between 1991 and 2005 in south-west Nigeria highlight variables responsible for the continued presence of the disease in the country. Safe water supply through boreholes was hampered by insufficiency of its water during dry season and faulty handpumps; some villages were not included in the borehole programme, and old villagers stated they prefer the natural taste of pond water. Global 2000 field officers did not visit some villages regularly and filters given to the villagers were used for sieving grounded maize rather than drinking water. Also the volume of water in ponds in some of the villages was not accurately calculated before the application of Abate. Village based health workers (VBHWs) were demotivated by lack of proper incentives. Traditional beliefs and herbal treatments further hampered their efforts. There is need for continued health education, more provision, sustainance, maintainance of accessible safe water sources in all endemic and at-risk areas.

T4P1-06

Field evaluation of clinical features during a Chikungunya outbreak in Mayotte 2005–2006: implications for community-based active surveillance purposes

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Chikungunya virus diagnostic relies on sophisticated laboratory support often unavailable in middle or low income settings. Despite this limitation, clinical diagnostic accuracy under field conditions remains poorly evaluated. As part of a cross-sectional serologic survey conducted in Mayotte between November and December 2006 after a massive Chikungunya outbreak, we examined the spectrum of clinical features of Chikungunya and assessed the performance indicators and accuracy of clinical case-definition criteria. Of 1154 participants included, 440 (38.1%) had Chikungunya-specific IgM or IgG antibodies by enzyme-linked immunosorbent assay (ELISA). Of 318 (72.3%) symptomatic participants with confirmed Chikungunya, dominant symptoms reported were incapacitating polyarthralgia (98.7%), myalgia (93.1%), backache (86%), feverishness of abrupt onset (85%) and headache (81.4%). There was a strong linear association of increasing symptomatic infection with age (X^2 for trend = 9.85, $P < 0.001$). Only 52% of persons with Chikungunya seek medical advice mainly at public primary health care facilities. The combination of fever and polyarthralgia had a sensitivity of 84% (95% CI: 79–87) and a specificity of 89% (95% CI: 86–91). This combination classified correctly 87% (95% CI = 85–89) of individuals against reference test, ELISA. The association of fever and polyarthralgia is an accurate and appropriate clinical pattern for operational use as a diagnostic tool in large epidemic context where lab-diagnostic is unavailable. These criteria provide a useful evidence base to support the development and the implementation of syndromic surveillance in epidemic settings.

T4P1-07

Trends in the seroprevalence of antibodies against HTLV-I among blood donors in a hospital of western Venezuela, 2004–2008

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To assess the time trends in the seroprevalence of antibodies against the Human T-Lymphothropic Virus type 1 (HTLV-1) among blood donors in a Western Hospital of Venezuela (Barquisimeto, Lara), 2004–2008, ELISA serological testing was done with 49 712 donors seen at our blood bank between 2004 and 2008. Samples that were repeat reactive (RR) with the ELISA underwent supplementary Western-blot confirming testing. During the study period the number of blood donors was steady (range from 8958 to 11132/year) with a mean of 9942 donors per year (829 ± 157 donors per month). Of the 49 712 blood donors, 246 of them (0.49%, 95%CI 0.44–0.56) were positive for HTLV-1 antibodies, with a stable seroprevalence along the time ranging from 0.24% to 1.13% per year ($r^2 = 0.233$; $P = 0.411$), but ranging from 0.00% to 2.22% per month, with no significant differences according the seasons or the years. Although proper studies to determinate the country seroprevalence for HTLV-1 have not been done, the need for systematic screening for such infection became imperative based on this and previous studies. In Caracas, 7 years ago, another study found in 23 413 donors, over one year, a seroprevalence of 0.11%, in our study this figure was at least more than four times higher. Every blood bank in Venezuela should be required to screen donations for HTLV-1. Given our and previous results we believe serious consideration should be given to implementing serological screening for HTLV-1 among blood donors throughout Venezuela.

Haemorragic fevers and dengue. New insights and preparedness to detect and control local outbreaks. Joint session FESTMIH – ESCMID

T6P1-01

Outbreak of Marburg hemorrhagic fever (MHF) in March 2005: a compromise between scientific methods and cultural beliefs; Uige province, Angola

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From March to November 2005, the northern rural province of Uige in Angola experienced an outbreak of Marburg haemorraghic fever (MHF). The declaration of the outbreak occurred against a background of a fragile and ill-functioning health system, crippled by 30 years of civil war. Prior to the declaration, an increasing number of patients, especially children died after presenting with fever, bloody diarrhoea and vomiting at the Uige provincial hospital. The non specific nature of the early stages of the disease and the lack of capacity of the health system to provide the rapid and effective response called for international efforts to contain the outbreak. In late March, a team of international health experts from MSF Spain, the World Health Organization (WHO) and the Canadian National Microbiology Laboratory arrived in Uige to assist the MoH. The main measures for the containment of the outbreak were: setting up an isolation unit, infection control and supplying protective clothing in the hospital, training of health staff for safe burials and health education, creation of mobile teams to respond to alerted cases and active contact tracing. Other measures included setting up a surveillance system, daily analysis of data and a mobile laboratory in Uige hospital. A Marburg technical committee consisting of MOH Angola, MSF, WHO, UNICEF, international and local NGOs and the Angolan Army was created in Uige to coordinate all its activities. CDC Atlanta confirmed the diagnosis before the arrival of the international team. According to figures, the outbreak of Marburg Hemorrhagic Fever in Uige in 2005 was the largest recorded: 374 cases, (158 laboratory confirmed) and 329 deaths (case fatality rate of 88%). The WHO and MoH Angola declared the outbreak over in November 2005. The international health experts failed to appreciate the importance of the belief systems of the population. The local communities therefore perceived the efforts of the international team as impositions on their traditional practices, resulting sometimes in aggression towards the team. However, in Songo hospital, 40 km from Uige, where we engaged the local community in dialogue, it was possible to win the cooperation of the people. Even though the weak health system contributed significantly to the challenges in containing the outbreak, the failure of the international team communicate with the communities became significant barriers in achieving their goals. This outbreak has demonstrated the importance of involving the community early in implementing containment measures.

T6P1-02

Mechanisms of vascular leakage and bleeding during dengue infections

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The number of patients with severe dengue disease continues to increase in South-East Asia, as well as in South Asia and several Latin American countries. Vascular leakage resulting in hypovo-

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laemic shock is a particular problem among children with dengue, while bleeding manifestations are seen more frequently in adults. To date however, the pathogenesis of both these major complications of dengue remains poorly understood. Several large prospective descriptive studies focused on dengue pathophysiology are in progress at the Oxford University Clinical Research Unit in Ho Chi Minh City. Results will be presented of studies comparing the clinical and laboratory features seen in children and adults with dengue, documenting the evolution of changes throughout the course of the acute illness. In particular, the evidence indicating a role for disruption of the endothelial cell / glycocalyx complex in the pathogenesis of both vascular leakage and bleeding will be discussed. Heparan sulfate levels are markedly elevated during the critical phase of the illness; interactions between viral particles and/or dengue NS1 immune complexes with heparan sulfate moieties within the endothelial surface layer may (a) alter the permeability characteristics of the layer and (b) contribute to the coagulopathy by virtue of the anticoagulant properties of heparan sulfate, a molecule very similar to the therapeutic anticoagulant heparin. The clinical significance of these findings will be explored.

T6P1-03

Education level and the risk of dengue infection and *Aedes aegypti* infestation in an endemic area

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We explored the association between education level and the incidence of dengue and the presence of breeding sites for *Aedes aegypti* in an endemic area, through a cross-sectional correlation study in three cities of the state of Colima on Mexico's Pacific coast. In total 556 adults, between 18 and 76 years of age, were randomly selected to answer a structured survey and for serum sampling. From this population, 121 households were surveyed for detection of containers positive for *Aedes aegypti* larvae and risk containers (RC) defined as uncovered, shaded recipients containing water, without any vector control. The dependent variables were prevalence of dengue infection (the presence of serum IgG determined by immunochromatography), positive containers per household and RC per household. The independent variable was the education level stratified as elementary, intermediate and superior level. Of the 556 individuals, 45 resulted positive for IgG (point prevalence of 8.0%). The dengue prevalence in relation to education level showed 6.4% for elementary; 9.26% for high school and 9.2 for university level ($X^2 = 1.53$, $P = 0.46$). The correlation between education level with containers positive for *Ae aegypti* per household by means of logistic regression showed an O.R. of 0.92 (CI: 0.83–1.03). Meanwhile the correlation with RC yielded an O.R. of 1.03 (CI: 0.94–1.11). Traditionally education level and literacy have been correlated with the risk for dengue transmission. Therefore preventive programs are mainly focused on the most uneducated populations. Our study, in contrast, shows that higher education level has no protective effect against the risk of dengue infection nor was associated with protective activities against *Ae aegypti* in homes. These findings emphasize first the need to incorporate preventive health topics into the educational programs in Mexico and second, the importance of extending the preventative campaigns to the whole community, not only to those people with lower educational levels.

T6P1-04

Randomised primary health centre based interventions to improve the diagnosis and treatment of undifferentiated fever and dengue in Vietnam

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Our aim was to investigate if educating primary health centre (PHC) staff members or introducing rapid diagnostic tests (RDTs) improve diagnostic accuracy for undifferentiated fever (AUF) and dengue and lower prescription of antibiotics and costs for patients. In a PHC randomized intervention study in southern Vietnam, the presumptive diagnoses for AUF patients were recorded and confirmed by serology on paired (acute and convalescence) sera. After one year, PHCs were randomized to four intervention arms: training on infectious diseases (A), the provision of RDTs (B), the combination (AB) and control (C). The intervention lasted from 2002 until 2006. In total 7654 patients were enrolled by 15 permanent PHC staffs. The frequency of the non-precise diagnosis AUF decreased in group AB, and – with some delay – also in group B. For dengue diagnoses increased in group AB, but only temporarily, although dengue was the most common cause of fever. A correct diagnosis for dengue initially increased in groups AB and B; but only for AB this was sustained. Antibiotics prescriptions increased group C. It strongly decreased in AB after intervention but with a tendency to increase; in B it gradually improved. There was a substantial increase in costs paid for in B. The introduction of RDTs for infectious diseases such as dengue, through free market principles, does improve the quality of the diagnosis and decreases the prescription of antibiotics at the PHC level. However, the effect is more sustainable when combined with training. Without such additional training RDTs lead to an excess of costs.

T6P1-05

Evidence for a revised dengue classification: a multi-centre prospective study across Southeast Asia and Latin America

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There has been growing concern regarding the applicability and usefulness of the current World Health Organisation (WHO) classification system for dengue. The terminology emphasises haemorrhage rather than vascular leakage as an indicator of severity, and the classification is misleading in a significant proportion of patients with shock. A consortium of experienced dengue clinicians and scientists therefore set out to carefully describe the breadth of clinical disease manifestations encountered in all age groups and across a wide geographical range, in order to provide a robust evidence base from which to develop a new candidate classification. We recruited children and adults with suspected dengue in seven countries across Southeast Asia and Latin America. Patients were followed daily with detailed case report forms, and subsequently categorised into one of three intervention groups according to the overall level of medical and nursing support required. Using an *a priori* analysis plan, the clinical and laboratory profiles characteristic of these intervention categories were explored to develop a revised system based on disease severity. 2259 patients were recruited between August 2006 and May 2007. A total of 230 (13%) of the 1734 laboratory confirmed patients required major intervention, with approximately 5% of patients progressing to this level of severity in hospital. Applying the current WHO system, 47/210 (22%) of patients with shock did not fulfil all criteria necessary for dengue haemorrhagic fever. Using the intervention category as a reference standard, shock and/or severe bleeding and/or severe organ dysfunction identified patients requiring major intervention with sensitivity and specificity greater than 95%. Identification of characteristics particular to patients requiring intermediate-level care proved to be more difficult, but warning signs for disease progression were identified. Based on these results, a revised classification system comprised of two entities, ''Dengue'' and ''Severe Dengue'', is proposed.

Tuberculosis

T3P2-01

The tuberculosis probability score as a helpful tool in the decision to treat for tuberculosis in smear negative and/or HIV positive patients

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The global HIV epidemic and the current threat of resistant strains has created an immense challenge to the diagnosis of tuberculosis (TB).We set out to identify a tool to help health care workers decide whether or not to start treatment in smear negative tuberculosis in a HIV endemic region. We introduce a scoring chart system, the TB probability score (TPS). It is developed by clinicians based on available pretest probabilities of symptoms, signs and radiological features and expert clinical experience. The final total score may be a helpful tool in decision making in daily practice. The score distinguishes a patient that is 'unlikely' to have TB (TPS 0-5) from patients that have 'definite, probable and possible' TB (TPS ranging from 20 to 5). Treatment should be initiated with a TPS >10. A patient with a score of 5–10 should be re-evaluated for active TB after two weeks. The TPS needs to be studied prospectively in HIV endemic regions. Our results showed that the TPS may be a helpful tool in decision making for TB treatment in smear negative TB patients. It needs to be studied prospectively in TB/HIV endemic regions in order to be validated in a following phase.

T3P2-02

Tuberculosis control: issues related to indigenous medical practitioners

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Indigenous medical practitioners (IMPs) practice in various parts of India, mostly in rural areas. They are not formally trained in any medical school but practice their family medical traditions. To elicit knowledge and practice of IMPs towards tuberculosis (TB) and propose remedial measures, we asked 86 IMPs to respond to a questionnaire focused on 10 items related to tuberculosis in a local vernacular. Data was analyzed statistically. All IMPs were males with age ranging from 46 to 70 and median 53 years. They acknowledged that TB is caused by germs and spreads by cough. It affects lungs (86) and no other systems (79). They diagnosed cases mostly by one or other symptoms (cough not clearing by two weeks or more without wheezing, thick phlegm, phlegm with blood, weight loss and declining appetite). Sometimes patients were asked to have blood test, sputum analysis and chest X-ray if they are willing and affordable. They did not look for co-existing illness. They prescribed medicines prepared by them and 40 mentioned that they gave injection streptomycin and anti-TB drugs sold in the market for speedy recovery. They have treated patients for one or two months and stopped after improvement of symptoms. If patients did not respond or symptoms worsened, they have asked them to go to nearest Government hospital. They were confident in their system of practice and people liked them because their treatment is affordable and easily available. Health care providers and management team should identify IMPs and familiarize them with TB management and Revised National Tuberculosis control Program (RNTCP). To achieve triumph in RNTCP, IMPs may be recruited as providers for directly observed tuberculosis short term therapy (DOTS).

T3P2-03

DOTS combined with social franchising as private public mix for the control of tuberculosis in Myanmar

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Myanmar is among the 22 countries with the highest burdens of tuberculosis (TB). DOTS was introduced in 1997. Population Services International (PSI/Myanmar) is an international NGO in Myanmar which in 2001 introduced a social franchise scheme under the brand named 'Sun Quality Health (SQH)' network. This network involves private GPs who provide quality controlled and highly subsidized TB diagnosis and treatment (social franchise PPM DOTS). We set out to determine the treatment success rates and notification rates of PPM DOTS between 2004 and 2008. We obtained data from the *Tuberculosis Laboratory Register* with regards to private and public laboratories in 52 townships in Upper Myanmar and data from the *Tuberculosis Treatment Register* with regards to general practitioners involved with social franchise in the same townships. We studied factors related to treatment success. There were 11 584 TB cases in the study period with an age range of 2 months to 91 years, and 7181 are (62%) male. The proportion of pulmonary versus extra-pulmonary TB was 63–37%. The proportion of re-treatment cases was 4.62%. The treatment success rate rose from 73% in 2004 to 87% in 2008. The notification rate of all TB cases increased from 405/100 000 before SQH was launched to 606/100 000 in the seven quarters after the launch (rate ratio: 1.50, 95% CI: 1.47–1.52),

while the increase in the control townships was from 285/100 000 to 395/100 000 (rate ratio: 1.39, 95% CI: 1.34–1.43). Notification rate of new smear positive cases increased from 143/100 000 to 188/100 000 (rate ratio: 1.31, 95% CI: 1.27–1.35) in SQH townships and from 94/100 000 to 115/100 000 (rate ratio: 1.22, 95% CI: 1.16–1.29) in the control townships. On multivariate analysis, we found the following factors to be associated with a poorer treatment outcome: male patients, old age groups and retreatment cases. The social franchise PPM DOT successfully increased the notification rate and treatment success rate. Factors associated with poor treatment success rate were male sex, older age and retreatment cases. There were no significant differences in treatment success among states and divisions in Myanmar.

T3P2-04

Treatment outcome of a cohort of drug resistant tuberculosis patients in Yerevan (Armenia)

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The objective of this study was to identify factors related to successful DR-TB treatment in Yerevan, Armenia. We conducted a retrospective cohort study of newly diagnosed MDR TB patients initiating treatment in Yerevan from September 2005 to December 2007, under *Médecins Sans Frontières* DR-TB programme. We calculated incidence risk ratios for non-successful treatment outcome as the measure of association to different clinical and therapeutic factors. Non-successful treatment was defines as death, default or failure. The null hypothesis of no association was tested using the Fisher exact test. In the study period, 99 patients were enrolled in the programme, of whom 72 (72.7%) were MDR and 7 (7.1%) were XDR. Median age was 39 years (IQR: 28–48), 79.8% (79/99) were male. The median BMI at treatment onset was 19.7 (IQR: 17.8–24.1). Among risk factors of DR-TB, the most frequent was being ex-prisoner (28.3%) and being a contact of a MDR TB patient (9.1%). By June 2009, 91 patients had finished treatment. The most frequent treatment outcome was cured (30.3%) followed by defaulter (26.3%), failure (15.2%), death (11.1%) and treatment completed (9.1%). Regarding variables associated with treatment outcome, the highest association was observed with the number of previous TB treatments. A statistical association was also observed for being migrant worker, contact of a MDR-TB case, number of anti-TB drugs received previously, being a previous defaulter, having a tuberculoma, number of drugs resistant to at initiation of treatment, number of treatment interruptions and clinical severity. The patients included in this analysis were the first patients recruited in the programme, and though treatment success was achieved in over 50% of the patients, the high percentage of poor-outcome can be due to the severity of the clinical presentation. The best predictor of failing treatment was the number of previous TB treatments. This association highlights the importance of high quality clinical management of susceptible TB.

T3P2-05

A ten-year experience of childhood tuberculosis control programme in a rural hospital in Ethiopia

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Tuberculosis (TB) is one of the leading causes of morbidity and death in adults in sub-Saharan African. The aim of this study was to describe the experience of tuberculosis according to the National Tuberculosis and Leprosy Control Programme in a rural zone in Ethiopia over a period of 10 years in childhood. This study was performed in Gambo General Hospital (GGH). It is a 135-bed rural general hospital located in West-Arsi zone, 250 km south of Addis Ababa. A retrospective data collection using TB registers and treatment cards was done. Information was collected on number of cases, type of TB and treatment outcomes using standardised definitions. Over the 10-year period from 1998 to 2007, 2225 patients with all forms of TB were registered for treatment, 1029 (46.3%) of whom were children (<15 years). The percentage of TB in children admitted to in GGH decreased significantly from 61% in 1998 to 38.5% in 2007 ($P < 0.001$). Of 1029 childhood TB, 12.9% had smear-positive pulmonary TB (PTB), 54% smear-negative PTB and 33% extra pulmonary TB (EPTB). The pattern of EPTB was TB lymphadenitis in 189 (55.4% of all EPTB cases), osteoarticular TB in 79 (23.2%), abdominal TB in 39 (11.4%), and TB meningitis in 26 (6.4%). Significant differences between paediatric and adult patients were found as regards more newly diagnosed TB cases (97.5% vs. 94.1%; $P < 0.001$), and there were fewer relapses cases (0.7% vs. 3.4%; $P < 0.001$) in paediatric than in adult patients. Both the number of patients tested for HIV and the number found to be HIV positive were less in paediatric cases than in adults (0.4% and 5.4% vs. 2.8% and 18.8%, respectively; $P < 0.001$). In childhood TB, smear-positive PTB was significantly less frequent (12.8 s. 43.5; $P < 0.001$), whereas smear-negative PTB (54 vs. 22%; $P < 0.001$) and TB meningitis (2.2% vs. 0.4%; $P < 0.001$) were more common. The number who defaulted from treatment was higher in paediatric (13.9%) than in adult patients (9.3%) ($P = 0.001$). The mortality rate was lower in paediatric patients (3.9%) than in adults (6.5%) ($P = 0.008$). The reported percentage of all TB cases occurring in children in this study was higher than in previous studies. The background of childhood TB is different from that of TB in adults.

T3P2-06

Human genetic factors in pulmonary tuberculosis: candidate genes and a genome-wide association study

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Human genetic factors in infectious diseases are of crucial interest as they may point to critical metabolic pathways and suggest intervention targets. In a case-control design, 2010 patients with sputum/culture positive tuberculosis and 2346 healthy controls from Ghana, West Africa, were identified and DNA samples were subjected to candidate genotyping. Likewise, mycobacterial isolates were characterized with respect to mycobacterial species and genotypes (spoligotyping, IS6110 typing). While the MCP-1 promoter variant -362C provided increased protection against pulmonary tuberculosis (OR 0.81) caused by all mycobacterial species studied, differential susceptibility patterns were observed for (i) the exonic ALOX variant 760A which was associated with susceptibility to infections caused by the mycobacterial lineage Mycobacterium africanum West-African 2 (OR 1.70), (ii) the promoter variant -261 of IRGM that was found associated with protection from mycobacteria of the *M. tuberculosis* EUAM lineage (OR 0.66) and (iii) the MBL G57E variant that was associated with protection from the species *M. africanum*. The latter association was confirmed functionally by demonstrating stronger binding of MBL to *M. africanum* than to *M. tuberculosis*. Distinct infection phenotypes, namely PPD negativity of controls and the severity of radiological findings, were associated with a "high-producer" IL10 haplotype and the CTLA4 CT60 variant, respectively. The results of a joint analysis of genome-wide association studies (Affymetrix SNP array 6.0 and 500 K) with inclusion of additional population controls and a case-control cohort from The Gambia revealed strong associations with markers on chromosome 18 ($P = 10–9$)

and on chromosome 2 (P = 10–8). The underlying causative variants are currently subject of further analyses and will hopefully lead to the identification of new targets for intervention.

T3P2-07

An antigen and adjuvant system dose ranging safety and immunogenicity study of the m72 candidate tuberculosis vaccines in healthy Filipino adults

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GlaxoSmithKline Biologicals' (GSK) prophylactic M72 candidate vaccine is being developed against pulmonary tuberculosis (TB). The M72 antigen is a recombinant fusion polyprotein made up of 2 highly immunogenic *Mycobacterium tuberculosis* (Mtb) antigens ($Mtb39_A$ and $Mtb32_A$) also expressed in BCG. This antigen has been formulated with GSK's Proprietary Adjuvant Systems (AS) containing MPL and QS21, either with an oil-in-water emulsion (AS02) or with a liposomal solution (AS01). $AS01_E$ contains half the active ingredients of $AS01_B$ whereas $AS01_E$ and $AS02_D$ contain equivalent concentrations of MPL and QS21. A dose ranging study in healthy PPD-reactive (3 mm–10 mm) adults was designed to select a vaccine formulation for further development (NCT00621322). 180 adults (18–45 years) were randomised (4:4:4:4:1:1) to receive either M72(10 μg)/$AS01_E$, M72(10 μg)/$AS02_D$, M72(20 μg)/$AS01_E$, M72(40 μg)/$AS01_B$, $AS01_B$ alone or M72(40 μg)/saline following a 0, 1 month schedule in a Phase II double-blind single centre trial in Sta Rosa City, Laguna, The Philippines. Solicited, unsolicited and serious adverse events (AEs), hematological and biochemical laboratory parameters were assessed. Antigen-specific immune responses were evaluated using intracellular cytokine staining (ICS) and ELISA. All formulations of the M72 vaccine candidate were well tolerated and no vaccine-related serious AEs were reported. Causally related AEs were mainly local, transient (median resolution time between 1 and 4 days) and resolved without sequelae. Two doses of each of the adjuvanted M72 vaccines induced strong antigen-specific humoral and CD4+ T cell responses. The humoral responses to the adjuvanted M72 vaccines were generally comparable. In terms of the magnitude of the CD4+ T cell responses, there was no statistically significant difference observed post dose 2 between M72(10 μg)/$AS01_E$, M72(20 μg)/$AS01_E$ and M72(40 μg)/$AS01_B$. Statistically significantly lower responses were observed with the M72(10 μg)/$AS02_D$ and M72/Saline compared to the other vaccine formulations; there was no response detected when the Adjuvant System $AS01_B$ was administered alone. This study justifies the choice of the M72(10 μg)/$AS01_E$ vaccine for further development.

Human African trypanosomiasis

T4P2-01

The atlas of human African trypanosomiasis

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The Atlas of human African trypanosomiasis (HAT) is an initiative of the World Health Organization (WHO), jointly implemented with the Food and Agriculture Organization in the framework of the Programme against African Trypanosomiasis (PAAT). The Atlas aims to map, at the village level, all sleeping sickness cases reported from endemic areas in sub-Saharan Africa, and to build the capacity at country level for future regular updates. The initiative's ultimate objective is to provide affected countries, the scientific community and policy advisors with a sound basis to elaborate control strategies, to carry out interventions and to monitor their impact on disease distribution. The widest possible range of epidemiological data is collected from national sleeping sickness control programmes, non-governmental organization and research institutes, with priority to data collected from the year 2000 onwards. Geographic coordinates of the locations of epidemiological interest are determined using Global Positioning Systems, existing databases of named locations and a variety of other cartographic products. Direct contacts and interviews with health workers in the field contribute to the efficiency of the process and the accuracy of the outputs. Data processing has been fully implemented for 17 endemic countries. Approximately three quarters of the cases these countries reported in the period 2000–2008 have been mapped. Preliminary outputs already represent a major step forward with respect to previous cartographic renditions of HAT distribution. Activities are ongoing to complete mapping of all endemic countries and to progressively improve the accuracy of the geographic database that underpins the Atlas. The Atlas of HAT is the first attempt ever to systematically map all sleeping sickness cases reported from sub-Saharan Africa. It is also one of the few examples among neglected tropical diseases of comprehensive, village-level mapping over so extensive a geographical area. The final outcomes as well as all input data used for the Atlas will eventually be released in the public domain through WHO and FAO/PAAT websites. Notwithstanding the hiatus between the real incidence and the detection and reporting of HAT, the Atlas is expected to become an essential tool for research and advocacy. Crucially, it will also provide the evidence base for targeting control activities in a rational manner and for monitoring impacts of interventions.

T4P2-02

A new format of the CATT test for the detection of Human African Trypanosomiasis, designed for use in peripheral health facilities

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The CATT test is the standard antibody detection test used in mass population screening for *Trypanosoma brucei* gambiense human African trypanosomiasis (HAT). In its current format the CATT test is not adapted to routine use at health centre level in endemic countries; it is packaged in 50 unit vials and requires a functional cold chain. We evaluated a new format of the CATT test (CATT-D10), designed to be thermo stable and packaged in 10 unit vials. We evaluated reproducibility as well as thermo stability. A population of 4217 from highly endemic villages was screened using the existing format of the CATT test on whole blood. All those testing positive (220) and a random sample of negatives (555) were re-tested with CATT-D10. Inter format reproducibility was assessed by calculating kappa. All samples testing positive on whole blood with either method were further evaluated by CATT titration of serum by two different observers at ITMA using both old and new format, Bland Altman plots were constructed. CATT-D10 test kits were incubated under 4 different temperature regimens (4 °C, 37 °C, 45 °C and fluctuating) with regular assessments of reactivity over an 18 month period. Inter format

reproducibility of CATT-D10 vs. CATT_R250 on whole blood performed by lab technicians in the field was excellent with kappa values of 0.83–0.90. Both inter and intra format reproducibility assessed by CATT titration were excellent, with 96.5–100% of all differences observed falling within the limits of plus or minus 1 titration step. After 18 months, reactivity of test kits incubated under all four different temperature regimens was still well above the minimum threshold considered acceptable. The CATT-D10 is thermo stable and can be used interchangeably with the old format of the CATT test. As such it is highly suitable for use in peripheral health facilities in HAT endemic countries.

T4P2-03

Multicentre clinical trial of nifurtimox-eflornithine combination therapy for second-stage sleeping sickness

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We evaluated the efficacy and safety of a nifurtimox–eflornithine combination therapy (NECT) for second-stage disease in comparison to the standard eflornithine regimen. A multicentre randomised, open-label, active control, phase III non-inferiority clinical trial was conducted at four sleeping sickness treatment centres in the Republic of Congo and the Democratic Republic of Congo. Adult patients were screened for inclusion and randomly assigned to receive IV eflornithine 400 mg/kg/d, every 6 h for 14 d (E); or IV eflornithine 400 mg/kg/d, every 12 h for 7 d + oral nifurtimox 15 mg/kg/d, every 8 h for 10 d (NECT). Patients were followed up for 18 months Outcomes were cure rates and adverse events attributable to treatment. 287 second-stage patients were enrolled. Cure rates per protocol were E = 91.7% and NECT = 97.7%. Non-inferiority of NECT was demonstrated. Drug reactions were frequent in both arms and severe reactions affected 28.7% of patients in the E group and 14.0% in the NECT group, granting nine and one treatment suspensions respectively. Three patients died in the E arm and one in the NECT arm. The efficacy of NECT is non-inferior to that of standard eflornithine. The combination therapy also presents safety advantages, while being easier to administer, more affordable and potentially protective against the emergence of resistant parasites.

T4P2-04

Perception of Human African Trypanosomiasis and participation in the control programme in the Kasaï Oriental province of D.R.Congo

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We aimed at identifying the socio-economic and cultural factors which influence the participation of the Kasaï Oriental population in HAT screening. In January 2008 we conducted 13 focus group discussions in the Kasaï Oriental province following classical procedures. The focus groups were divided into three categories: gender (men and women participated separately), geographic characteristics (endemic villages and diamond mine encampments), and according to the endemic health zones (Tshitengue, Kansasa, Miabi, Mukumbi, Tshilenge). They comprised of 6–9 persons selected at random after consultation with the local traditional authorities. They were conducted in the local language (Tshiluba), fully recorded, transcribed verbatim, translated in French and analysed with QSR NVivo8 software. HAT is well known amongst the Kasaï Oriental population and is perceived as a serious disease which affects a large number of people and often results in death. The disease has severe implications for individuals (persistence of manic periods and trembling hands, even after treatment), at family level (income loss, conflicts, separations) and communities (disruption of activities). Many barriers to screening and treatment were identified. (1) The timing of the HAT screening operations with mobile teams visiting the villages during daytime is at odds with the occupations of the village inhabitants who work in diamond mines and fields during the day; (2) fear of not being able to perform their daily livelihood activities when individuals are diagnosed with the disease; (3) the toxicity of the treatment and the lethality of the drugs; (4) fear and difficulties in not respecting a number of prohibitions and taboos which are perceived to be responsible for death and treatment failure (e.g. working, eating hot food, sexual intercourse); (5) lack of confidentiality of the screening procedures: people are ashamed to be tested in public due to stigmatisation; (6) fear of having to undergo a lumbar puncture; (7) finally, the perception exists that mobile screening teams inject the disease while testing individuals. A mobile screening calendar more adapted to the local conditions with more respect for privacy, the use of less toxic drugs, and a better understanding of the origin as well as better communication about the (alleged) prohibitions related to HAT treatment would have a positive effect on the participation of the population in screening and treatment activities.

T4P2-05

Stamp out sleeping sickness – an intersectoral approach to disease control

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Recent advances in diagnostic methods for assessment of sleeping sickness in humans and trypanosomiasis in animals have enabled researchers and policy makers to define and quantify the magnitude the animal reservoir of disease for human sleeping sickness in Uganda and to delineate policy implications for control options and facilitate training of medics, scientists and veterinarians. Outputs have influenced policy for disease control in Uganda and recently led to the formation of a Public Private Partnership aimed to 'Stamp Out Sleeping Sickness' (SOS). Phase 1 of the SOS campaign is being financed and supported by the veterinary pharmaceutical company CEVA Santé Animale and Industri Kapital (IK), a pan-European private-equity fund and is being implemented by Makerere University with inputs from the University of Edinburgh, the Co-ordinating Office for Control of Trypanosomiasis (COCTU) in Uganda and with support from WHO. New PCR based diagnostics helped identify accurately the reservoir of disease in cattle and demonstrate that restocking activities were responsible for the disease spreading around Lake Kyoga, Uganda. This led to development of a cattle-based approach to halt the spread of the acute form of sleeping sickness towards the Gambiense disease focus, complimenting efforts to trap tsetse flies or treat humans with the disease. In phase I, 220 000 head were targeted for trypanocide treatment in five districts in the overlap zone with follow on application of insecticide applied using restricted application technology (RAP) to prevent re-infection. The cost-effectiveness of this new approach attracted private funding from IK, to help underwrite Makerere University's veterinary program to prevent the disease in cattle using an inexpensive spray-on insecticide developed by CEVA.

Abstracts of the 6th European Congress on Tropical Medicine and International Health and 1st Mediterranean Conference on Migration and Travel Health

Antimalarial treatments: registration and beyond

T2P2-01

Artemisinin-based combination therapy deployment in sub-Saharan countries – antimalarial prescriptions: practices to improve

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Since 2001, the WHO has advocated the use of artemisinin-based combination therapy (ACT) for the treatment of uncomplicated malaria. However, the impact of this strategy depends in part upon the adherence to it by clinicians. The purposes of our study were to identify discrepancies between actual antimalarial prescriptions and the official guidelines and to research possible reasons for this. The study took place in Oussouye district hospital, in south Senegal, which was managed by a doctor and had laboratory facilities. Nurses were responsible for the prescription of antimalarials. Since 2003, dual therapy with Amodiaquine + Sulfadoxine-Pyrimethamine (AQ + SP) has been recommended. Consultation records from 2004 and 2005 were analysed retrospectively and semi-structured interviews with medical staff were conducted. Statistical analyses were undertaken using STATA 6.0. During the study period 4924 children consulted. The transition to AQ + SP was well respected, 74% (2063/2789) of children treated with antimalarials receiving this. Nonetheless, many prescriptions were inappropriate, given to children without fever, 65% (1055/1627), with a negative blood film, 80% (377/474), or with non-malarial diagnoses, 22% (591/2726). Our interviews revealed that the practical or clinical situations encountered daily by the nurses could determine also the choice of the antimalarial and result in the guidelines not being followed. To justify their inappropriate prescriptions, the nurses reported firstly their fear of missing a malaria diagnosis causing them to prescribe as a precaution, to protect their patients. The high workload of the laboratory technician, resulting in delay in reading blood films and pressure from patients also contributed to inappropriate prescriptions. Training and supervision of nurses as well as adequate management of antimalarials stocks constituted a favourable context in which to observe the transition to AQ + SP. Nonetheless, our study demonstrated that even when in a healthcare setting equipped to analyse blood films, this was not sufficient to ensure rational prescriptions. The use of ACT is an essential public health measure. Although the discrepancies between antimalarial prescriptions and official guidelines are known, their causes are less studied. These factors, linked to the healthcare system or to patients, show how difficult it is to integrate the guidelines into the daily practices of prescribers and constitute an obstacle to the success of ACT.

T2P2-02

A randomized trial to monitor the efficacy and effectiveness by QT-NASBA of artemether-lumefantrine versus dihydroartemisinin-piperaquine for treatment and transmission control of uncomplicated *Plasmodium falciparum* malaria in western Kenya

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Many countries have implemented artemisinin-based combination therapy (ACT) for the first-line treatment of malaria. Although many studies have been performed on efficacy and tolerability of the combination arthemeter-lumefantrine (AL) or dihydroartemisinin-piperaquine (DP), less is known of the effect of these drugs on gametocyte development, which is an important issue in malaria control. In this two-arm randomized controlled trial, 146 children were treated with either AL or DP. Both groups received directly observed therapy and were followed for 28 days after treatment (WHO protocol). Blood samples were analysed with microscopy and a quantitative nucleic acid sequence based amplification assay (NASBA), which can specifically detect gametocytes by detection of PFs25 mRNA. Microscopic follow-up revealed that both study drugs performed equally. One late parasitological treatment failure was observed in the AL treated group, but this was due to a re-infection as could be demonstrated by genotyping. However, in comparison with microscopy, NASBA detected much more gametocyte positive individuals. Moreover, NASBA showed a significant difference in gametocyte clearance in favour of AL compared to DP. The decline of parasitaemia was slower and persistence or development of gametocytes was significantly higher and longer at day 3, 7 and 14 in the DP group but after 28 days no difference could be observed between both treatment arms. Although practical considerations could favour the use of one drug over another, the effect on gametocytogenesis should also be taken into account and studied further using molecular tools like NASBA. This also applies when a new drug is introduced.

T2P2-03

Similar efficacy of artemether-lumefantrine and double dose chloroquine in Guinea-Bissau

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Our aim was to assess the efficacy of artemether-lumefantrine (AL) and to compare with double (50 mg/kg) normal dose CQ in Guinea-Bissau. Children aged 6 months–15 years attending three health centres in Bissau, Guinea-Bissau between December 2006 and October 2008 with *P. falciparum* mono-infection verified by microscopy were eligible for inclusion. Both drugs were given as six observed doses over 3 days. AL was given with milk. Children were seen on days 0, 1, 2, 3 and 7 and then weekly until day 70. Parasitaemia was assessed on all days except day 1. Haemoglobin values were assessed on days 0, 42 and 70. Reparasitemias were classified as recrudescent or re-infections using *pfglurp*, *pfmsp2* and *pfmsp1* sequentially. The primary outcome was adequate clinical and parasitological response (ACPR). *Pfcrt* K76T and *pfmdr1* N86Y genotypes were assessed. Survival analyses, regressions and fishers test were used. Children were randomized to receive AL (190) or CQ (188). Cumulative recrudescences on day 28, 42 and 70 were 6, 6 and 7 following treatment with AL and 9, 11 and 12 following treatment with CQ. Per protocol ACPR for AL and CQ was 97% and 95.7% (hazard ratio (HR) 1.57 [95% CI, 0.56–4.41], $P = 0.39$) on day 28, 96.4% and 93.5% (HR 1.93 [95% CI, 0.72–5.23], $P = 0.19$) on day 42 and 95.3% and 90.3% (HR 1.82 [95% CI, 0.72–64], $P = 0.21$) on day 70. Cumulative re-infections on days 28, 42 and 70 were 2, 3 and 10 following treatment with AL and 1, 4 and 10 following treatment with CQ. AL treatment resulted in more rapid parasite clearance ($P < 0.001$). Itch was more common in the CQ arm after the 3rd dose. Otherwise there were no differences in adverse events, fever clearance or haemoglobin values. Day 0 genotype proportions were; *pfcrt* 76T 30%, *pfcrt* 76K 76%, *pfmdr1* 86Y 36% and *pfmdr1* 86N 73%. In the CQ arm 10/10 recrudescent parasites carried *pfcrt* 76T ($P < 0.001$). In the AL arm 3/3

recrudescent ($P = 0.14$) and 10/11 reparasitaemias ($P = 0.22$) carried *pfmdr1* 86N. When only *P. falciparum* with *crt* 76T were analysed, CQ achieved a day 28 ACPR of 88%. AL and 50 mg/kg of CQ as six dose regimes are well tolerated and highly efficacious treatment options in Guinea-Bissau. It is probable that AL is marginally more efficacious than CQ. *P. falciparum* commonly resistant to normal dose CQ are usually effectively treated by 50 mg/kg of CQ. As CQ is always cheap and available, the efficacy and tolerability of higher total doses of CQ should be evaluated further.

T2P2-04

Efficacy and safety of artemether-lumefantrine dispersible tablet according to body weight in African infants and children with uncomplicated malaria: results of a multinational, randomised trial

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A sweetened and flavored artemether-lumefantrine (A-L) dispersible tablet (DT) has been developed to allow convenient administration to pediatric patients. Our objective was to confirm efficacy of DT vs crushed tablet (CT) in each weight category.

METHODS A randomized, multicenter, investigator-blinded study was conducted to confirm non-inferiority of DT vs. CT. Children ≤12 years (body weight [BW] ≥5 kg and <35 kg) with acute uncomplicated *P. falciparum* malaria were allocated to one of three body weight groups (BW1, 5 to <15 kg; BW2, 15 to <25 kg; or BW3, 25 to <35 kg) and randomized to DT or CT within each group. Patients received 6 doses of AL over 3 days, dosed according to BW: BW1, 1 tablet/dose; BW2, 2 tablets/dose; BW3, 3 tablets/dose. Our primary objective was to demonstrate non-inferiority (using a margin of -5%) of a DT 6-dose regimen vs. the 6-dose regimen of crushed commercial tablet at standard dosages. Results: 899 children were randomized: 547, 289 and 63 children were in the BW1, BW2 and BW3 groups, respectively. Age ranged from <3 months to 12 years. Cure rates were similar between formulations across the three BW groups (DT: 97.5%, 98.6% and 96.4% and CT 99.2%, 97.1% and 100.0%, respectively). In the BW3 group, a higher proportion of DT patients (93.1%) achieved parasite clearance within 48 hours compared to CT patients (85.3%). Median time to fever clearance was comparable between BW groups within and between treatment groups. Other than vomiting, which was more frequent with CT in the BW2 and BW3 groups, the overall safety profile of the two formulations was similar between and within BW groups. Incidence of pyrexia tended to decrease with increasing BW. There were three deaths, all in the lower BW group and none suspected to be related to study drug. In the DT group, one patient died of haemorrhage following scarification by a witch-doctor, and one from an unspecified infection accompanied by severe dehydration. One patient in the CT group died of severe *P. falciparum* malaria (new infection). Dispersible AL was similar to CT for day 28 PCR-corrected cure rate regardless of BW. No differences were observed between BW groups in response to treatment or in safety profile.

T2P2-05

Efficacy of a 3-day artesunate-mefloquine combination implemented for the treatment of uncomplicated falciparum malaria patients in 6 sentinel sites in Thailand

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Multidrug resistance malaria has been a major problem in malaria control in Thailand. A 2 day artesunate-mefloquine combination has been used over the country since 2006. The cure rate of this regimen in some areas of the country did not improve. In 2008, the national malaria control programme has adapted the treatment regimen by increase the given time to 3 day as recommended by World Health Organization. An *in vivo* drug efficacy study of a 3 day artesunate-mefloquine combination was conducted in 6 sentinel sites in Thailand January–December 2008. 305 patients with microscopically confirmed *P. falciparum* malaria, aged between 3 and 72 years, were treated with artesunate (12 mg/kg) and mefloquine (25 mg/kg) divided into 3-day dosage. Thirty mg of primaquine was given on day 3 to prevent malaria transmission. Clinical and parasitological parameters were assessed during the 42 day follow-up period. Genotyping of the parasite on day 0 and day of parasite reappearance was done to differentiate recrudescence from reinfection. A total of 281 (92.1%) of the study participants completed the follow-up. On enrolment, 84.1% had documented fever and 15.9 had a history of fever. The geometric mean parasite density of the patients was 12 770 parasite/microlitre blood. Among these, three patients had recurrent parasitaemia, one on day 28 and 2 on day 35. All of these were confirmed of recrudescence by parasite genotyping. Parasitaemia on day 3 was found in 0.7% of the patients. Three day regimen of artesunate-mefloquine improved the treatment efficacy of uncomplicated falciparum malaria patients in Thailand.

T2P2-06

Efficacy and safety of pyronaridine/artesunate fixed-dose combination compared with mefloquine plus artesunate in patients with acute uncomplicated *Plasmodium falciparum* malaria: results of a pivotal phase III trial

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A phase III comparative, open-labelled, randomized, multicentre trial was conducted to assess the efficacy and safety of a new fixed-dose oral formulation of pyronaridine/artesunate (PA) vs. mefloquine plus artesunate (M+A) in children and adult patients (3–60 yr, mean 25.1 yr; body weight 20–90 kg mean 47.6 kg) with acute uncomplicated *P. falciparum* malaria. 1271 patients from 6 sites in SE Asia and 3 sites in Africa were randomized in a 2:1 ratio to receive a 3-day course of either PA (180:60 mg) or M (250 mg) + A (100 mg) tablets once-a-day, with dose adjustment according

to body weight ranges. Presence of acute uncomplicated *P. falciparum* mono-infection confirmed with fever or history of fever in the preceding 24 h and positive microscopy for *P.falciparum* with a density between 1000 and 100 000 asexual parasites/mcL of blood. The primary objective of the study was non-inferiority (NI) of PA compared to M+A on the day 28-PCR-corrected adequate clinical and parasitological response (ACPR). Major secondary and exploratory efficacy endpoints included: day 42 PCR-corrected-ACPR, day 28 and 42 crude-ACPR, parasite clearance and fever clearance times. Safety was assessed with 12-lead ECG, vital signs measurements and clinical laboratory evaluations for hematology, biochemistry and urinalysis. In the efficacy evaluable population, the PCR-corrected ACPR was 99.2% in the PA group and 98.1% in the M+A group at day 28. NI of PA to M+A was demonstrated, using a 5% NI margin. At day 42, the PCR-corrected ACPR was 88.3% and 89.9% with PA and M+A respectively. The crude-ACPR was 98.7% and 96.7% at day 28 NI and 88.4% and 88.8% at day 42 NI with PA and M+A, respectively. NI of PA to M+A was demonstrated in the intent-to-treat population at all timepoints for both PCR-corrected and crude-ACPR. Median parasite clearance time was 31.8 h with PA and 32.1 h with M+A (log rank test on the Kaplan-Meier survival curves: $P = 0.025$). Treatment with PA or M+A was well tolerated. The adverse events profiles were overall similar with a majority of mild events. The number of serious adverse events (SAEs) was low (0.7% in both treatment groups), with two drug-related SAEs, both in the M+A-treated group. This pivotal trial comparing PA to M+A demonstrated high level efficacy, safety and tolerability of the treatments in *P. falciparum* malaria patients in Asia and Africa.

T2P2-07

Can treatment of malaria be restricted to parasitologically confirmed malaria? A school-based prospective, exposed/non-exposed to fever, study in Benin

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Applying the switch from presumptive treatment of malaria to new policies of antimalarial prescriptions restricted to parasitologically confirmed cases is a still unsolved challenge. Pragmatic studies can provide data on consequences of restricting antimalarials prescription to parasitologically confirmed malaria cases. We performed a prospective study, in order to assess the feasibility and safety of restricting antimalarials to rapid diagnostic test (RDT)-confirmed cases in children aged 5–15 years-old. Children in the index group (IG: exposed to fever and a negative RDT) and the control group (CG: not exposed to fever and a negative RDT) were not prescribed antimalarials and actively followed-up during 14 days. Blood smear and PCR data were collected at each assessment. Self medication with chloroquine and quinine was assessed with blood spots. The number of undiagnosed *P. falciparum* malaria at baseline was estimated by taking into account in the IG both baseline data (parasitemia >1000/μL) and follow-up data including 1) at least one test (including PCR) positive at enrolment, 2) fever occurring during follow-up 3) at least one test (including PCR) positive for a *P. falciparum* infection at the time of fever. 484 children were followed-up (242 in each group). Malarial infection at baseline detected with PCR was frequent in both groups (27% in the IG and 44% in the CG). Restricting antimalarials prescription to RDT-confirmed cases was safe. At day 3, fever had disappeared in 94% of children from the IG. The incidence of malaria was similar (5 cases in the IG and 7 cases in the CG) between groups. Self medication with chloroquine and quinine in this cohort was uncommon. We estimated the rate of undiagnosed malaria at baseline in the IG to 3.7%. Applying a policy of restricting antimalarials to RDT-confirmed cases is feasible and safe in this population.

T2P2-08

Massive reduction of antimalarial prescriptions during programmatic implementation of Rapid Diagnostic Test in Dar es Salaam, Tanzania

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We aimed to assess the effect of implementing malaria rapid diagnostic tests (RDTs) as first-line diagnostic tool in routine management of febrile patients living in a moderately endemic area on the prescription of first line antimalarials [artemether/lumefantrine (ALu) tabs and quinine vials]. RDTs were introduced after training of all health workers of three district hospitals, three health centers and three dispensaries. Three similar health facilities without RDT implementation were selected randomly as controls. Supervision, problem-solving and quality control of RDT performance took place every 3 months. Consultation processes were observed just before and 18 months after RDT initiation. Data on antimalarial use during a period of 15 months before and 18 months after RDT initiation were compiled from ledger books of storage places in each health facility. When comparing consumption of ALu during 3 months prior to RDT implementation with 18 months post-initiation, there was a mean of 6-fold (range: 2–26) decrease in intervention facilities and 1.7-fold decrease in control health facilities. When comparing consumption of quinine vials during 15 months pre- with eighteen months post-initiation, there was a mean of 3-fold (range:2–6) decrease in intervention facilities and no decrease in control health facilities. The overall proportion of febrile patients who were prescribed antimalarials decreased from 82% to 24%. For non-febrile patients, antimalarial prescriptions decreased from 37% to 5%. This decrease corresponded to: (a) more febrile patients tested for malaria (increase from 73% to 91%); (b) much better performance of routine RDT than routine microscopy (positivity rate decreases from 50% to 8%); (c) better adherence to test result (negative patients prescribed antimalarials decreased from 51% to 7%). In total, for 100 patients attending with medical problems, 57 antimalarial treatments could thus be saved. Programmatic implementation of RDTs in a moderately endemic area where microscopy is available reduced drastically over-treatment with antimalarials. Properly trained clinicians with adequate support complied with the recommendation of not treating patients with negative results. RDTs used as first-line diagnostic tool have a huge potential for reducing inappropriate prescriptions and hence improve management of patients.

Ethical issues in clinical research

T1P2-01

Ethical principles and practices in clinical research: an explorative survey

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To stimulate understanding and exchange of research ethics practices, an explorative survey to determine to what extent

attention to research ethics is given at the national and institutional level was sent to 15 representatives of the Clinical Research Strategic Network. This network comprised nine clinical research centres in Burkina Faso, Cambodia, Indonesia, Peru, RD Congo, Uganda, Zambia and Belgium, aims among others things at implementing essential ethical elements in clinical research. The survey was written in English and contained 21 questions about research ethics practices at the national level and within each institution. Eight institutions participated in the survey. In eight countries ethical approval is mandatory to carry out clinical research. However, research on human subjects is not regulated by a comprehensive law in at least two countries. Ethics committees (EC) are present in all eight countries, but their advice is only legally binding in seven. While the EC gives initial approval, it is often weak in the follow-up of the research, e.g. concerning follow-up of safety aspects or the possibility to interrupt the research based on ongoing results. Three institutions implement non-fault liability insurance for clinical trials. Two institutions only routinely execute the policy of the International Committee of Medical Journal Editors about registration of clinical research projects in a public database, as a prerequisite for publication. Most ECs do not have the possibility to follow up clinical research after the initial approval; also, there are no structural means to verify and ensure that the opinion of an EC is respected when the research is carried out, in both cases, probably due to lack of resources and at least in some countries due to the lack of a clear legislative framework regulating ethical review. Non-fault liability insurance seems to be a poor tool for academic researchers due to high costs and lack of model templates or guidelines. The International Committee of Medical Journal Editors about trial registration seems to be largely unknown. In general, more substantial investments are needed to strengthen national and institutional capacities in the field of clinical research ethics.

T1P2-02

Informed consent, decision-making capacity and vulnerability in resource constrained settings

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Through the informed consent procedure a potential research participant or their parent/guardian agrees to enroll in a research project. Specific guidelines address the consent of individuals with diminished or impaired decision capacity. However, to our best knowledge there are no guidelines for populations that are vulnerable due to socio-cultural or socio-economic factors, including language barriers, gender relations, community pressure, dearth of health care and poverty. In 2008 a Network of researchers from Belgium, Burkina Faso, Cambodia, Cuba, the Democratic Republic of Congo, Indonesia, Nepal, Peru, Uganda and Zambia was created to jointly build the capacity to conduct biomedical research that addresses the need of vulnerable populations, while complying with sound ethical and scientific standards. For understanding the ethical challenges concerning informed consent in resource-constrained settings, the network convened in Antwerp in December 2008 to critically review the process. The work methods included plenary presentations on informed consent process in various settings and break away sessions to review case studies. It was agreed that several critical issues must be considered when seeking informed consent in resource constrained settings, including the lack of access to adequate health care which could lead to vulnerability when making decisions on participation in biomedical research. There was no consensus as to whether illiteracy is *in itself* a vulnerability factor and more research is needed on this. With respect to waivers of informed consent, it was agreed that it should be exceptional and never justified by the poverty or illiteracy of a population. While the signature can be waived in exceptional circumstances, there was unanimity that the interview process could not. Another major issue is that Ethics Committees and researchers should find context-related ways to address the contradiction between legal age and social status, for entitling mature minors, e.g. minors married by customary law and minor mothers, to take free autonomous decisions on participation in medical research. Further, social scientists including anthropologists should be involved in the design and evaluation of consent tools for ensuring that the procedure is adapted to local values and contextual constraints -always within the limits of respect for fundamental universal ethical principles. There is an urgent need for clear guidance to prevent exploitation of populations whose participation in biomedical research is not based on a free choice but on the necessity to access otherwise inaccessible medical care or other benefits. This meeting was only a first step and several critical issues may not have been addressed; however, we believe that the issues raised offer an opportunity to start a debate leading to better guiding principles on the informed consent procedure for biomedical research in resource constrained settings.

T1P2-03

Rationalising international approaches to ethical review: examining and revising the ethical review practices for clinical research funded, sponsored or carried out by Northern organizations in developing countries

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Various international recommend that clinical research sponsored, funded, or supervised by Northern organizations in developing countries be submitted for ethical review in the countries where the research takes place and in the country of the sponsor. In December 2008 a Network of researchers from Belgium, Burkina Faso, Cambodia, Cuba, the Democratic Republic of Congo, Indonesia, Nepal, Peru, Uganda and Zambia met at the Institute of Tropical Medicine in Antwerp, to build capacity for conducting health research that addresses the need of vulnerable populations, and to address the topic of 'double ethical review'. The discussion was based on the experience of projects sponsored by ITM and carried out with partner institutions: protocols are routinely submitted to the ITM Institutional Review Board as well as to the ethics committee (EC) at Antwerp University Hospital and to the EC in the study's countries. The workshop agreed that 'double ethical review' presented some challenges. In national, regional and private reports from northern countries the 'requirement' has not been substantially considered and there is often a sense of paternalism. There is a need to develop a systematic approach to ethical review that promotes respect and trust among research partners and improves the efficacy of international ethical review practices. Communication and education that cross traditional

boundaries (both those of geography and power relations) are needed. The group proposed that at the moment clinical research sponsored or funded by Northern organizations in resource-poor settings should undergo double ethical review, to minimize the risk of double standards and practices linked to the North-South inequalities, and to bring together the complementarities of perspectives of the various ECs, for increasing the quality of the research and promoting better protections of subjects and populations. In a preliminary way, we suggest that protocols be submitted simultaneously to the ECs in the North and in the South indicating the names and contact information for all ECs involved in reviewing the study. If comments are received from one or more EC, the researcher should send a single letter of reply to all the concerned ECs, so that each one becomes aware of all comments. In addition, measures are needed to deal with unwarranted delays from one or more EC, rules should be established to address cases of disagreement, and clear commitment to the highest ethical and scientific principles should be developed by all parties.

T1P2-04

Ethics and clinical research in Democratic Republic of Congo (DRC)

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Clinical research involving humans is subject to national and international ethical guidelines, whose principles are summarized in the Helsinki Declaration. In developed countries, many efforts and investments are undertaken to enforce these principles, while it is generally considered that most developing countries lack the means to carry out adequate ethical review of clinical research, irrespectively of whether it is carried out by sponsors from developing or developed countries. To address this question, we used questionnaires and interviews addressed to researchers at the Kinshasa University Teaching Hospital and to some key policy-makers and presidents of Ethics Committees (EC) in the Democratic Republic of Congo. We also examined the researches carried out in the past five years at Kinshasa University Hospital. The survey was carried out from 13th of October to 1st of November 2008. We found that in DRC, clinical research is not governed by a structured legislative framework. A national EC was created in 2006, but it still lacks sufficient and secured resources to be fully operational. We identified two other operational ECs in DRC, located respectively at the School of Public Health and at National Control Program against Trypanosomiasis. 49% of researchers (84/164) had some knowledge of ethical guidelines and were aware of the localization of the EC at the School of Public Health. However, 49% of clinical researches (81/161) only were based on a written protocol. 47% of the researchers based on a written protocol (38/81) had been submitted to an EC and 79% had received a written approval. Five percent (9/164) received training in good clinical practice. Enforcement of ethical review in clinical research is not a priority in the DRC. In Kinshasa, most researchers have limited or very limited knowledge about ethical guidelines and ethical review and often conduct their researches without a written protocol. If we have this situation in the capital, what could be the case in the provinces? This topic needs to be improved very urgently, through investments to strengthen the ethical review and by changing the mentality of researchers, to ensure maximal protection of the study subjects and scientific soundness of the research.

T1P2-05

Research ethics and international epidemic response: the case of Ebola and Marburg hemorrhagic fevers

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Outbreaks of filovirus (Ebola and Marburg) haemorrhagic fevers [FHF] in Africa are typically the theatre of rescue activities involving international experts and agencies tasked with reinforcing national authorities in clinical management, biological diagnosis, sanitation, public health surveillance and coordination. These outbreaks can be seen as a paradigm for ethical issues posed by epidemic emergencies, through the convergence of such themes as: isolation and quarantine, privacy and confidentiality, and the interpretation of ethical norms across different ethno-cultural settings. Our aims were to specify the nature of ethical dilemmas arising during epidemic response, as a result of tensions between clinical care, public health investigations and research, to review existing frameworks relevant to research ethics in emergencies, to review statements about ethical issues raised during public health responses to past FHF outbreaks, and to propose new approaches to research ethics in the course of epidemicsWe did this through review and analysis of current normative documents on ethics in emergencies and analysing peer-reviewed publications describing past FHF outbreaks. We found that undertaking research during an ongoing outbreak poses considerable and specific ethical questions, often related to the blurred boundaries between research and public health practice. The scope of existing normative documents relevant to research ethics in emergencies has so far been limited by a main focus on informed consent and research ethics committees and lack of comprehensive regulatory documents endorsed at international level. Concerns over research ethics during past outbreaks of FHF have generally been poorly addressed or reported, suggesting a need for more systematic considerations of ethical issues related to the conduct of research in emergencies. For the longer term, we recommend the design of basic research protocols prior to emergencies, the establishment and strengthening of national or regional ethical research committees, and the advance involvement of potentially affected communities, including considerations to distinct ethno-cultural representations of illness and contagion.

T1P2-06

Clinical research in less economically developed countries: the ethical challenges

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The Directive 2001/20/EC on the implementation of Good Clinical Practices in the conduct of clinical trials applies not only in the EU but also in less economically developed countries. The clinical trials carried out in the later often contribute to the development of new drugs for usage in industrialized countries. The marketing authorization delivered by the European Commission can however be refused in cases of non respect of ethical principles as stipulated in the Directive 2001/20/EC. Our objective was to review the Directive 2001/20/EC focusing on the procedure for involvement of vulnerable people in clinical trials and its interaction to existing international legal norms. From the

Directive 2001/20/EC arises the necessity to reinforce the protection of vulnerable people. The common international norms that have also to be respected by sponsors and researchers correspond to the directive obligations linked to the patients' vulnerability (Declaration of Helsinki; Convention of Human Right and Biomedicine; Council for International Organizations of Medical Sciences). Before entering in a clinical trial a vulnerable subject and its legal representative should receive complete and intelligible information, insuring the best interest for the patient. Although these conditions are enforced by law in all EU countries, some issues are still of concern: (1) no consensus on the age at which it is appropriate to get minor's assent; (2) specificity and disparity about the legal representative definition; (3) the cooperation of the treating doctor in the inform consent process; (4) the limit between compensation and financial inducement/incentive; (5) assessment of direct benefit for the group concomitantly to a clear idea of the possible individual direct benefit; (6) ethics of conducting placebo-controlled studies; (7) constant monitoring for non profit research; (8) heterogeneity of Ethical Committee procedures from one country to another. The implementation of clinical trials in less economically developed countries respecting all these rules remains therefore very challenging. The fundamental ethical rules applied to clinical trials have to be respected all over the world. Weakening the ethical standards for less economically developed countries would violate fundamental human rights.

South–north trends in arboviral disease control

T6P2-01

Testing the vertical transmission of chikungunya virus in *Aedes albopictus* using the actors of the 2007 outbreak in Italy

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Experiments were conducted to determine whether transovarial transmission (TOT) of chikungunya virus (CHIKV) occurs in *Aedes albopictus*, the species responsible of the 2007 CHIK outbreak in Emilia-Romagna region (north-eastern Italy) – the first outbreak of this disease in a temperate country. *Ae. albopictus* eggs collected in the epidemic area were reared under standard laboratory conditions and F_1 females were used for the study. In BL3 laboratory, females were orally exposed through a membrane to different concentrations of virus (from $10^{4.5}$ to $10^{7.3}$ $TCID_{50}$/ml) in human washed eritrocites. Two experiments were performed using a strain of CHIKV isolated from mosquitoes collected in the epidemic area and a strain from a viremic patient coming from Cesena. After the first exposition to the viruses, the females were blood fed with two more non infected blood meals in order to obtain two more successive ovipositions. To verify the presence and the diffusion of the virus in the mosquitoes, females were sampled at different time after infection and body and legs were separately tested by Real Time PCR (RT-PCR). The eggs obtained from the three gonotrophic cycles were reared in laboratory and the adults obtained were individually tested by CHIKV RT-PCR. A total of 101 females took the infected blood meals. All the females fed with the two highest concentrations of CHIKV human strain showed virus diffusion, as proved by positive PCR on the mosquito legs at the end of experiment. Whereas only the females fed with the highest concentration of the CHIKV mosquito strain showed the virus diffusion, proved as above. A total progeny of 1056 adults were tested by RT-PCR for the presence of virus and three positive specimens were found in the progeny – 2 males and 1 female – all stemming from the second gonotrophic cycle. Based on these studies, infected females were capable of transmitting the virus vertically to their offspring at a low rate. If the TOT observed in our study represents the natural maximum rate of vertical female capability of transmitting the virus to their progeny, then the observed TOT rate was probably not sufficient to guarantee the maintenance of the virus in a temperate region during the winter period. This supposition could be supported by the observation of no autochthonous cases of CHIK fever in the same area during summer 2008.

T6P2-02

Surveillance on vector-borne diseases in Emilia-Romagna Region, Italy

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In recent years an increase in vector-borne disease activity has been recorded in different regions. The epidemiology of such diseases is conditioned by complex interactions among environment, parasite, vector, man and eventually animal – either domestic or wild – reservoir. Global warming together with the increase of transport of goods, animals and people travels are impacting the risk that exotic species, both of insects and parasites, enter and establish in new territories. For these reasons a regional surveillance program focused on vectored diseases was implemented in Emilia-Romagna. The aim of the project is to create a regional surveillance and risk assessment system based on a multidisciplinary network, with the capability of collecting data about both vector populations dynamics, and possible presence of pathogens in vectors, men and animals. It has therefore been constituted a working group, coordinated by the General Direction for Health and Social Policy of the Emilia-Romagna Region, composed by physicians, veterinarians and entomologists. Activities have been addressed to the activation of an entomological monitoring system for key vectors, to the development of diagnostic procedures of selected zoonosis, to the predisposition of a training program. *Because it is endemic in Emilia-Romagna Region, Leishmaniasis has been selected to test the system.* After only two months from its constitution, the working group had to manage the Chikungunya epidemic occurred in Ravenna and Cervia municipalities during summer of 2007. After only 15 days from the reporting of the first human cases, it has been possible to perform the diagnosis, isolating the virus from the vector (*Aedes albopictus*), to define a reporting system of clinical suspects and diagnostic procedures in man. In the same time an intensive vector control program was carried out in infected areas. The timing organization of a multidisciplinary network focused on vector diseases surveillance and control is producing important positive output in terms of managing capacity of epidemic situation and risk assessment.

Abstracts of the 6th European Congress on Tropical Medicine and International Health and 1st Mediterranean Conference on Migration and Travel Health

T6P2-03

Incidence of dengue in Australian travellers to South and South East Asia

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To estimate the incidence density of Dengue virus infection in Australian travellers visiting South and South East Asia, we conducted an interim analysis of an ongoing prospective cohort study of Australian travellers to South and South East Asia over a 2-year period. Travellers ≥16 years of age were recruited from 3 travel clinics and completed validated questionnaires and provided blood samples for serological testing prior to travel and also at a post-travel consultation. Demographic data, destination countries and travel patterns, travel history, prior Japanese encephalitis (JE) vaccination and history of flavivirus infection were obtained. Serological assays were tested for Dengue IgG by ELISA (Pan-Bio assay). Of the 374 travellers so far enrolled, 290 have returned for follow-up, 30 (9%) have been lost to follow-up and paired sera have been tested for 268 travellers; 57% were female, median age was 32 years and 24% were not born in Australia. 73% were short-term travellers (<30 days) and the two main traveller types were vacation/holiday goers (69%) and business travellers (16%). (284/374) 76% reported prior travel to one or more countries in Asia, 42/374 (11%) had received the JE vaccine and (195/374) for this trip or within the last three years. Dengue sero-prevalence: 14/268 (5.2%) had evidence of past or recent dengue infection. 9/268 (3.34%) were positive for dengue IgG prior to travel indicating past dengue exposure. Seroconversion for dengue virus infection was demonstrated in 5/268 (1.9%) of all travellers tested to date. This translates to an incidence of 2.97 dengue virus infections per 10 000 days of travel (95% CI 1.3–6.9). Travellers who demonstrated acute dengue seroconversion had travelled to China (n = 2) India (n = 2) and Thailand (n = 1). Two of these travellers had received the JE vaccine for this trip. Testing of 250 paired sera collected from Swiss travellers is now in progress and results of these will be presented. In this interim analysis of predominantly short-term Australian travellers with destination countries in South and South East Asia, the incidence density of dengue was 2.97 infections per 10 000 days of travel. 76% of these had a history of previous travel to Asia and 3% of travellers had been exposed to dengue on a previous occasion.

T6P2-04

Effect of spatial fumigation with Permethrin on dengue incidence in an endemic region

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We evaluated the effect of spatial fumigation with Permethrin using ultra low volume spraying (ULV) on dengue incidence, in comparison with a community participation program. A community quasi experimental assay was carried out in the state of Colima, Mexico during May to December 2008. Four hundred and seven individuals were selected from 26 blocks where people stay for at least 10 hours during the daytime. A blood sample was taken from each participant at the beginning and end of the study. The presence of IgG and IgM antibodies in each sample was determined by immunochromatography. The incidence of dengue infection was determined by the presence of IgG or IgM in previously seronegative subjects. The intervention modality in each block was: none (control blocks), an intensive educational program; and ULV spatial fumigation with Permethrin/Esbiol/Piperonile Butoxide with a motor vehicle. The crude incidence of dengue infection was 17% in 7 months. In control blocks the incidence was 30%, almost the same was observed in blocks treated with educational campaign alone (24%), meanwhile in those treated with ULV a significant reduction to 14% was noticed (ANOVA: F= 3.9, p<0.005). The variables of gender, age, municipality and population density did not appear to have any effect on the incidence of infection. The use of ULV fumigation showed a marked reduction of dengue incidence measured actively in subjects sharing the risk of contact with *A. aegypti* during daytime hours. This effect was significantly superior to that observed with the educational campaign and fosters the need to review the role of ULV in preventative programs.

T6P2-05

A survey of *Ixodid* ticks parasitizing domestic ruminants in Ghaemshahr district, Mazandaran province, Iran

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Ticks transmit different pathogens to animals and humans resulting in huge economic losses. Because of the importance of tick's recognition, particularly *Ixodidae*, we surveyed ixodid ticks infesting sheep, goats and cattle, in Ghaemshahr district, Mazandaran province, during spring 2008 and winter 2009 in 10 randomly selected villages from both mountainous and plateau regions. After collection, tick samples were separately stored in 70% ethanol, labeled with the date and the name of the field until the species determination. Adult ticks were identified under a stereomicroscope, according to general identification keys. 323 ticks were collected from 88 (86.27%) sheep, 12 (11.76%) goats and two (1.96%) cattle. About seasonal occurrence. Most of the ticks (82.66%) were found in spring and 17.34% were collected in winter. Tick occurrence was mostly (62%) in mountainous and 38% in plateau regions. Among all ticks collected, six hard tick species, namely *Rhipicephalus sanguineus* (82.4%), *Ixodes* ricinus (15.2%) *Boophilus annulatus* (1.2%) *Haemaphysalis numidiana* (0.6%) *Haemaphysalis punctata* (0.3%) *Rhipicephalus bursa* (0.3%), were identified. *Rhipicephalus sanguineus* was the most abundant (82.4%), whereas *Rhipicephalus bursa* (0.3%) and *Haemaphysalis punctata* (0.3%) were rare. In this survey we could identify important species of ticks which are vectors to pathogens causing disease in animals and humans and observe their seasonal activity. These data contribute to choosing appropriate tick management strategies.

Integrated management of HIV and TB: HIV msicellaneous

T3P3-01

Consequences of treating HIV-TB – a prospective cohort study

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This study was done to study the clinical efficacy and adverse effects (AE) of anti-tuberculous therapy (ATT) & antiretroviral

therapy (ART) when administered concurrently and also the occurrence of ART failure in this setting; the hypothesis being that concurrent ATT &ART leads to many AE & early treatment failure of ART owing to drug interactions & poor drug compliance. This prospective case-control study was carried out in a HIV clinic of a tertiary care hospital. HIV patients with tuberculosis (TB) being put on ATT and ART concurrently were enrolled as subjects. They were followed up for a minimum of 12 months (m) after initiating therapy. Fifty age matched HIV patients without TB but initiating ART were recruited as controls. Success of therapy was measured by rise in body mass index (BMI) and CD4 cell count & disappearance of signs of TB. Standard definitions of ART failure & immune reconstitution inflammatory syndrome (IRIS) were used. Statistical analysis was done using R 2.7.2 (R Development Core Team (2008). URL http://www.R-project.org). Linear regression analysis & Fischer's exact test were used where required.

Results: 92 subjects & 50 controls were enrolled in the study. They were well matched for age & duration of follow up (cases followed up for 204 patient-years (py) & controls for 115 py; mean duration of follow up: 26.6 m & 27.5 m respectively). All subjects completed ATT. BMI increased in subjects even after nullifying the effect of treatment regimen & duration of follow up (increase in subjects over controls was 8.98%, $P = 0.001$). However no such effect was noted with the CD4 cell count ($P = 0.96$). Long-term follow up (>18 m) showed a similar pattern. Three subjects died after a mean interval of 36 m from diagnosis of TB. TB recurred in 5.43% cases with mean time for recurrence being 26.6 m. Drug-induced hepatitis was the commonest ATT-related AE (23.9%). AE to ART were noted in 23 subjects (25%) and in 7 controls (14%). Zidovudine induced anaemia was the commonest AE associated with ART in 13 subjects (14.1%) and 3 (6%) controls ($P = 0.18$). 9/13 patients developed anaemia ≥6 m of ART with a mean time of 12 m. IRIS was commoner in subjects than controls ($P = 0.045$). In 61% of the subjects it manifested as exacerbation of TB and & in others as reactivation of latent viral infection. Occurrence of IRIS showed a bimodal pattern with the mean time being 1.9 m after starting ART in 55.5% subjects and 9.1 m in the rest. ART failure was commoner in the HIV-TB group (14.13% vs. 4.1% $P = 0.1$). Mean time to ART failure was 27 m. ATT does not significantly worsen the success of concurrently administered ART. IRIS is commoner suggesting good immediate immune recovery. But this is not sustained as reflected in the fact that rise in CD4 count with ATT-ART did not match the rise in BMI. Poor long-term immune restitution is a cause for concern and needs further evaluation.

T3P3-02

Integration of TB and HIV interventions in Northern Uganda

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One of the biggest challenges for TB control programmes has been integrating HIV activities. Before 2006, TB and HIV in Uganda were being managed by two distinct vertical programmes implemented with different funding sources, by different staff operating in detached departments, with a different schedule of drug orders and different recording systems. Relationship between the two programmes started in 2006 with dissemination of policy documents by the Ministry of Health recommending avenues for collaboration. The Northern Uganda Malaria AIDS and Tuberculosis (NUMAT) Program operates in nine districts of northern Uganda, a region whose HIV prevalence of 8.2% is higher than the national average. NUMAT worked with the nine districts and the TB control programme regional office through multiple interventions including: extensive training of health workers in TB/HIV collaborative activities; improved availability of TB drugs, reagents, HIV test kits and other supplies at the treatment sites; comprehensive and integrated support supervision; technical assistance to conduct quarterly review meetings on TB/HIV performance; dissemination of educational messages to the local leaders and the general public. TB/HIV information from the Northern Region for 2006, 2007 and 2008 were assessed using the existing reporting system. HIV parameters were included in the customary cohort reporting of the TB programme and HIV-related information added to the TB registers and TB patient cards. The proportion of TB patients tested for HIV steadily increased with gradual institution of provider-initiated HIV counseling and testing: from 43% in 2006, to 50% in 2007 and to 59% in 2008. The percentage of co-infected HIV/TB patients was 46%, 50% and 54% in the three years respectively. No information was recorded on cotrimoxazole prophylaxis for the co-infected patients in 2006 and 2007. During 2008, 79% of co-infected patients were put on co-trimoxazole while 18% were on ART. Cases of sputum-negative pulmonary TB and extra-pulmonary commonly associated with HIV infection accounted for 41% of new cases in 2006, 46% in 2007 and 42% in 2008. The rate of death during TB treatment remained between 5% and 5.7%. A shift from a vertical approach to a more integrated collaboration is possible. However, a continuing technical assistance to control programme institutions, health facilities and field workers is necessary to sustain the achievements in the long-term.

T3P3-03

In silico based evaluation of efavirenz and rifampicin drug–drug interaction considering weight and pharmacogenetics

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We tested whether a pharmacokinetic simulation model could extrapolate non-clinical drug data to predict human efavirenz exposure after single and continuous dosing as well as the effects of concomitant rifampicin. Efavirenz pharmacokinetics were simulated using a physiologically based pharmacokinetic model implemented in the Simcyp™ population-based absorption, distribution, metabolism and excretion (ADME) simulator (version 8.20, Simcyp™ Ltd., UK). Physicochemical and metabolism data obtained from the literature were used as input for prediction of pharmacokinetic parameters. Efavirenz tissue binding constants (Kps) were computed. The model was evaluated by comparing simulated efavirenz plasma concentrations with obtained clinical data. The model was then used to simulate the effects of rifampicin on efavirenz kinetics in 4000 virtual patients taking into account bodyweight and CYP2B6*6 pharmacogenetics. Poor and extensive CYP2B6*6 metabolizers where each divided into two groups, based on bodyweight (>50 kg or <50 kg). These four groups where then further divided into eight subgroups, each consisting of 500 individuals receiving either 600 or 800 mg of efavirenz. Changes in efavirenz steady-state AUC, C_{max} and C_{min} were used to evaluate the magnitude of the predicted interaction. The model predicted efavirenz concentration–time profiles reasonably well with close agreement between pharmacokinetic parameters derived from the model and the clinical data after both single dose and repeated administration. The simulated effects of rifampicin co-administration on efavirenz treatment showed only a minor decrease (19%) in efavirenz area under the curve (AUC), in agreement with clinical observations. The simulation model was able to predict efavirenz pharmacokinetics after single and repeated dosing as well as the impact of rifampicin treatment on efavirenz exposure. *In vitro–in vivo* extrapolation can be a useful tool when assessing the clinical risk of drug-drug interactions. Our results suggest that indiscriminately increasing efavirenz dose

during rifampicin treatment may lead to high plasma concentrations, possibly increasing the risk of adverse drug reactions.

T3P3-04

Tuberculosis among HIV infected children

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To find out the prevalence and pattern of TB among HIV infected children and analyze the variations in relation to gender, we studied HIV infected children registered in anti-retroviral therapy centre of a multi speciality teaching hospital from January 2007 to December 2008. The work was carried out after institutional ethical clearance and informed consent from parent/guardian. We have gathered Socio-demographic, clinical and therapeutic facets of these cases. They were subjected to Revised National Tuberculosis Control Program [RNTCP] for diagnosis and treatment of Pulmonary TB. Data were analyzed statistically. There were 500 HIV infected children in our study and all acquired infections through maternal-fetal transmission. Among them, 74 (M = 42 & F = 32) had TB with their age ranging from 2 ½ to 14 years and median 6 years. Among TB patients, pulmonary TB was noted in 60 patients, lymph node TB in 14, established AIDS in 28 and all responded to anti-TB treatment without adverse effects. Prevalence of TB among HIV infected children was 14.8% and more prevailed among males (57%). Within infected individuals, pulmonary TB (81%) was more common. Hence, HIV infected Children have to be monitored for TB constantly in their views of susceptibility and exposure in order to initiate treatment and prevent the complications.

T3P3-05

HIV-positive migrants face important problems of access to care in Thailand

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Two million migrants live in Thailand. Most of them face serious problems to access Thai health services. MSF worked from 2005 to 2009 in southern Thailand to increase access to health services for 10 000 Burmese migrants engaged in fishing, construction and rubber plantation work. This included paying for cost of care for unregistered migrants, transport, translation services, organizing mobile clinics, and health education. In addition, MSF provided HIV/AIDS care, including ARV. In migrant populations ARV initiation is often discouraged due to fears of high loss to follow-up. In literature we did not find any data on treatment outcomes among migrants. This report describes MSF's project for Burmese migrants under treatment of HIV/AIDS in Phang Nga. We conducted a retrospective review of routinely-collected MSF program data from January 2005 to March 2009. 252 patients were diagnosed as HIV-positive. For only 33% of patients not enrolled through PMCT, CD4 counts were available. Of these 56% showed a CD4 count below 200 and 68% were classified as WHO Stage III or IV. Overall, 55 deaths among 252 (22%) patients were recorded, with a mean time from diagnosis to death of six months. 37% were lost to follow up, most pre-ART initiation and possibly including underreported deaths. However, of 49 patients on ARV, 78% were still alive and on treatment. Only four deaths on 55 (2%) occurred and loss to follow up was 6%. This study showed the continued existence of important bottlenecks to ART initiation for Burmese migrants in Thailand. Although for most patients urgent ARV initiation was indicated at moment of diagnosis (CD4 <200 or Stage III–IV), only 15% had started ARV after one year. This confirms the necessity of timely enrolling patients on ARV, as confirmed by other studies from Thailand. However, for migrant workers accessing HIV care and in particular ARV remains problematic despite MSF's efforts to overcome certain barriers. Many patients in urgent need of ARV died while waiting for ARV initiation.

T3P3-06

Violence of everyday life, prejudice, secrecy and adherence to antiretroviral treatment

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Adherence is critical to antiretroviral treatment. We conducted a qualitative research to elicit factors contributing to long-term adherence to antiretroviral treatment from the perspective of people living with ARV in Burkina Faso. Series of in-depth interviews where conducted with 80 people on treatment for more than 3 years. Subsequently, seven focus group discussions were held with people who were on treatment for less than 6 months or ARV-naïve (female and male); people on treatment for more than 6 years (female and male); decision makers and NGO leaders; traditional healers; and representatives of networks of people living with HIV: people on antiretroviral treatment experience moral, cultural and social violence in their everyday lives, which lead to non acceptance of the condition, persistent feeling of shame, lack of disclosure, and subsequently to non-adherence. Secrecy and concealment are the main tactics for performing the task of antiretroviral pills taking and account for the most effective strategies in executing the regimen on the dose-to-dose basis. Yet these same tactics constrain the ability to maintain long-term adherence (persistence). The enduring social violence and prejudice towards people on ART led many to make the decision to omit or conversely to hide their pill-taking, thus further contributing to non acceptance of the condition and non adherence to antiretroviral treatment. Simplistic strategies promoting 'living positively with HIV' and failing to address intolerance, moral, sociocultural and political violence that disregard the safety of those on treatment leads to victim blaming, a reinforcement of the suffering among people living with HIV and poor adherence over time.

T3P3-07

Adapting prevention programs: variables that influence HIV/AIDS awareness among immigrants in Spain

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The Tropical Medicine Department in the Hospital Ramón y Cajal is a multidisciplinary group that started a linguistic and culturally adapted educational program for immigrants three years ago. The objectives of the program are to increase HIV/AIDS awareness and reduce the prejudices against people that are HIV-positive. The survey for HIV/AIDS awareness involved a group of 577 immigrants from the Sub-Saharan in Africa, Eastern Europe, Latin

America and Morocco. They filled out a KAP (Knowledge, Attitude and Practices) questionnaire before attending an educational lecture at NGOs and immigrant associations in 10 Spanish Autonomous Communities from April to December in 2008. Statistical analysis: univariate and multiple regression model, SPSS program. The results with a P-value <0.05 had statistical significance. 577 resident immigrants in Spain were surveyed. Median was age 26 years (range 12–55). 74% were men; 60% came from Sub-Saharan Africa, 69% from urban areas. Educational levels were eterogeneous. 88% declared themselves practicing some religion, of which 55% were Muslims. 69% declared not to have a stable partner. Median length of stay in Spain: 12 months (range 2 weeks–22 years). 90% declared to know that Aids exists. 84–87% knew the ways of transmitting HIV through blood and sexual relations, and 69% the vertical transmission. 10% said they could recognize at a glance a HIV+ person. Regarding treatment for HIV, 15% stated that there was no treatment available, and 22% did not know if it was available. 7% felt that condoms do not protect against HIV transmission, and 10% doubted the effectiveness of its protection. More than half of participants do not accept to drink from the same glass and 22% does not accept to shake hands with a HIV+ person. Variables that significantly influenced the awareness level of HIV were educational level (the higher the educational level, the higher the level of knowledge about HIV; $P < 0.001$); religion (higher level among Christians; $P < 0.03$). There were no significant statistical differences of the awareness level about HIV/AIDS among those in Spain who had previously attended an informative talk and those who had not. Studies of this kind provide more information to adapt the preventive programs on aids for the target group, so that the information is received in an effective way.

Chronic degenerative diseases

T4P3-01

Methodology and results of a community-based prospective 5 years surveillance of a cohort of hypertensive patients in rural Ecuador

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The practicability and the yield of a community based pilot project focused on the detection, monitoring, risk stratification, and outcomes assessment of hypertensive patients in the area of Borbon, Esmeraldas, Ecuador have been documented. We report here the experience and the results of translating the strategies successfully tested in the ad hoc projects to the routine conditions of care. All patients detected and diagnosed as hypertensive during the year 2004 were registered in the log books adopted by the non-professional health promoters of the area as routine working tools, and were followed up to the end of 2008 as part of the general care delivered to the communities of the area, where only infrequent controls by the scarce nursing and medical personnel available in the local health service can be planned and assumed. The cohort of 1023 patients (96.4% of African descent, 3% Amerindian Indios; 63.7% women; 53% aged <60 yr, 23%, 60–69 yr, 24%, ≥70 yr) was stratified, according to the simplified score validated in the pilot phase (see ref. above) into high and very high risk (245 pts, 24%), low and moderate (501, 49%), normal (103, 10%), undefined (174, 17%). With the exclusion of the 122 individuals who migrated out of the area, there were none lost to the 5 years follow-up, which included a closer monitoring of the population at higher risk (up to 45% of the individuals belonging to this subgroup had a mean of ≥4 controls/yr). Of the 103 fatal events (13.7% of the male, 7.9% of the female population), 68 could be formally assessed in terms of causes (42 cardiovascular, 26 others), while all 71 non fatal events could be adequately qualified (48 cerebrovascular, 22 heart failures, 1 myocardial infarction). At the end of the five years the fraction of patients with no risk score was 9%. A strategy of care based on community health promoters (the only practicable in a resource-poor environment, where people are highly dispersed in small and hardly accessible villages) has proven to be highly effective in assuring a complete long-term follow-up of the population, mostly black, where hypertension represents the dominant cardiovascular risk factor, resulting in cerebrovascular fatal and non-fatal events.

T4P3-02

Prevalence and clinical pattern of diabetes mellitus in South-West Shewa region, Ethiopia

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To describe the clinical pattern of type 1 and 2 diabetes mellitus (DM1 and DM2) in rural population of Ethiopia, 123 consecutive patients examined in Wolisso hospital, Ethiopia, from April 2006 to August 2008 with DM underwent physical examination (measurement of BP, height and weight with calculation of BMI, ophtalmoscopy) and simple laboratories analysis (proteinuria, dosage of plasmatic urea, creatinine and glucose). In a minority of DM2 patients, ECG and echocardiography were performed. 38 patients (16 f, 22 m) were affected by DM1, and 85 (23 f, 62 m) by DM2. Mean age was 29.1 and 31.2 for patients with DM1 and 54.8 and 60.9 (females and males respectively) for patients with DM2. Comparison with normal population showed significant increase of BP in females with DM1, significant increase of BP in females and males with DM2, significant increase of BMI in males and females with DM2. Comparison between DM1 and DM2 showed significant increase of BP in males with DM2 and of BMI in males and females with DM2. 48% and 35% of DM2 population (females and males), and 12% and 5% of DM1 population were affected by hypertension too. 45% and 59% of cases with DM2 and 33% and 27% (females and males respectively) with DM1 had proteinuria; 26% of males with DM2 had increased creatinine. Creatinine was not performed routinarely in DM1 population so analysis was not possible. No significant differences were found between DM1 and DM2 on albuminuria, creatinine and urea. In DM2 abnormalities were found on ECG in 68% of cases and on echocardiography in 74% of cases, mainly left ventricular hypertrophy and overload. Ophtalmoscopy in DM2 patients showed 19% of cataract, all in males; abnormal fundus pattern was found in DM2 in 50% of females (mild arteriopathy) and in 48% of males (30% mild and 18% severe arteriopathy); in DM1 abnormal fundus was found in 25% of females and 11% of males, all mild arteriopathy. Our data confirm that in an African rural population DM2 affects mainly older people and is associated with an increase of BMI compared with normal and DM1 population, even in absence of overweight. Compared with normal population, increased BP values and hypertension are frequently associated with both types of DM, but mainly DM2. Many diabetic patients show significant cardiac, ocular and renal damage, most of which could be prevented by the improvement of blood sugar control.

Abstracts of the 6th European Congress on Tropical Medicine and International Health and 1st Mediterranean Conference on Migration and Travel Health

T4P3-03

Effects of combined glibenclamide, metformin and malaysian tualang honey on body weight, blood glucose, antioxidant enzymes, glutathione and lipid peroxidation in streptozotocin-induced diabetic rat pancreas

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Prolonged hyperglycaemia causes deleterious effects on pancreatic β-cell function through glucose desensitization, β-cell exhaustion and glucose toxicity. Glucose toxicity produces its detrimental effects through oxidative stress resulting in β-cell dysfunction. We investigated whether honey, glibenclamide and metformin alone or a combination of glibenclamide, metformin and honey could attenuate antioxidant enzymes and reduce lipid peroxidation in the pancreas of streptozotocin (STZ)-induced diabetic rats. Diabetes was induced in male Sprague Dawley rats (250–300 g) by STZ (60 mg/kg; ip). Rats were randomly divided into six groups of six animals each. Diabetic rats received distilled water (0.5 ml), honey (1.0 g/kg), a combination of glibenclamide (0.6 mg/kg) and metformin (100 mg/kg) or glibenclamide (0.6 mg/kg) and metformin (100 mg/kg) in combination with honey (1.0 g/kg) orally once daily for four weeks. Non-diabetic rats also received distilled water (0.5 ml) and honey (1.0 g/kg). Data were analyzed by Kruskal Wallis H test followed by Mann Whitney U test. Fasting blood glucose (FBG) concentrations were significantly increased while body weight (BW) was significantly reduced in diabetic control rats. Lipid peroxidation (MDA), activities of superoxide dismutase (SOD) and glutathione peroxidase (GPx) were significantly elevated. Catalase (CAT) activity was significantly reduced while glutathione reductase (GR) and glutathione-S-transferase (GST) and total glutathione (GSH) did not change in diabetic control rats. Glibenclamide and metformin decreased FBG with no significant effects on BW, GSH, MDA, SOD, CAT, GR and GST except GPx. In contrast, honey significantly decreased FBG and increased BW in diabetic rats. Besides, honey significantly down-regulated activities of SOD and GPx while it increased CAT activity in diabetic rats. It also decreased MDA levels. Glibenclamide and metformin administered with honey also significantly reduced FBG and increased BW in diabetic rats. Remarkably, glibenclamide and metformin in combination with honey significantly increased CAT activity while GPx activity was significantly down-regulated with no significant effect on SOD. The combination with honey also significantly decreased MDA levels. These findings basically suggest that a combination of the two most currently used anti-hyperglycaemic drugs does not ameliorate oxidative stress in the pancreas. On the contrary, glibenclamide and metformin in combination with honey ameliorate oxidative stress in rat pancreas. Hence, the antioxidative effects produced by glibenclamide and metformin in combination with honey could be ascribed to antioxidant effects of honey. Based on these findings, it can be inferred that a combination of antioxidants and anti-hyperglycaemic agents may be of therapeutic benefits in the management of diabetes mellitus.

T4P3-04

The Ghanaian diet in the context of the epidemiological transition

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The success of health interventions in sub-Saharan Africa (SSA) may benefit from concomitant nutritional programmes. Unfortunately, reliable data on the specific eating behaviours and on aliment composition in that region are scarce. Purportedly, the Ghanaian diet is rich in carbohydrates and fat leading to excessive calorie intake. We revisited the nutritional behaviour among adults in central Ghana. A hospital-based case-control study on risk factors for hypertension and diabetes was performed at Komfo Anokye Teaching Hospital, Kumasi between August 2007 and June 2008. By food frequency questionnaires and 24-h dietary recalls intake of macro- and micro-nutrients was recorded. Anthropometrical measures (weight, height, waist and hip circumferences) were documented and body composition was assessed by means of bio-electric impedance analysis and skin fold measurements. Results were compared to data of the German MONICA survey and findings in US Ghanaians. Among 1466 Ghanaian adults from central Ghana, we observed a low daily energy intake compared to Germans and US Ghanaians. Standardized protein intake was highest in Ghana. Fat consumption was similar in Ghanaians and US Ghanaians, but lower than in the German population. Almost 60% of the daily calorie intake was provided by carbohydrates. Interestingly, measures of body shape (weight, BMI, WHR) and composition (body fat, cell mass) were in the normal range. The main source of protein was fish whereas fats came from palm and vegetable oils. Plantain, products of fermented maize, rice and bread were consumed to meet the carbohydrate needs. The typical diet in the Ashanti Region of Ghana is marked by high intakes of protein and carbohydrates and moderate consumption of fatty foods. Energy intake is much lower than proposed. The role of diet in the context of the epidemiological transition in SSA warrants further investigation.

Soil-transmitted helminthiasis and schistosomiasis: improving access to preventive treatment

T4P4-01

Reductions in environmental transmission observed with a large-scale schistosomiasis control programme in Uganda

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Schistosomiasis control programmes have historically been aimed at controlling morbidity in treated individuals, with reductions in programmatic outcomes such as infection prevalence, intensity and related morbidity being used to measure their effectiveness. In this study, a novel modelling approach was used to derive estimates of reductions in environmental transmission occurring following mass drug administration with praziquantel. Any reductions observed will benefit the wider community, including those individuals who are untreated. As part of an ongoing large-scale intestinal schistosomiasis in Uganda run by the Schistosomiasis Control Initiative, mathematical models were fitted to a longitudinal cohort followed up across successive rounds of treatment. This, to the best of our knowledge, is the first time this has been done. The models were developed from EpiSchisto® in the published literature, for which the authors kindly provided the code. Instead of estimating a rate of infection and immunity function separately, these separate parameters were combined

into a composite force of infection (FOI). It was found that this approach provided more robust outcomes given that the action and strength of immunity in human-schistosome systems is still poorly understood. As the aim of this modelling project is to provide programme-useful output, a phenomenological rather than mechanistic modelling approach is likely to the most approporiate way forward. It was observed that mass drug administration resulted in significant reductions in FOI following one round of treatment in areas that had low intensity at baseline, and following two rounds of treatment in areas with medium and high intensity at baseline. Further, FOI stayed reduced following a third round. This is the first time that a schistosomiasis control programme has been monitored for the impact of reducing transmission and not just the programmatic outcomes (such as morbidity or coverage). The reductions observed will help to inform the direction of future control programmes and may also help identify areas where local elimination could be considered.

T4P4-02

Mefloquine, artesunate and mefloquine-artesunate against *Schistosoma haematobium* infections: a randomized exploratory open label trial

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Novel antischistosomal drugs are urgently required, because the treatment and control of schistosomiasis relies on a single compound praziquantel. We have recently demonstrated that the antimalarial mefloquine possesses interesting in vivo and in vitro antischistosomal properties. We carried out a randomized exploratory open label trial to assess the efficacy and safety of mefloquine (25 mg/kg), artesunate (4 mg/kg for 3 consecutive days), mefloquine-artesunate (100 mg artesunate plus 250 mg mefloquine for 3 consecutive days) against *Schistosome haematobium* infections among schoolchildren in Côte d'Ivoire. As positive control standard praziquantel (40 mg/kg) was used. The primary end points were cure and egg reduction rates of *S. haematobium* infection 21 days after the final treatment dose. Incidence of adverse events were monitored up to 3 days after the final treatment dose. 83 children (37 boys and 46 girls age: 5–13 years) were included in the study. Cure rates of mefloquine, artesunate and mefloquine-artesunate against *S. haematobium* infections were 21%, 25% and 61%. A significantly higher cure rate (88%) was observed with praziquantel. No statistically significant difference was observed between egg reduction rates in praziquantel and mefloquine-artesunate treated children (96.4% and 95.9%, respectively). Adverse events were generally mild or moderate in severity. The most common adverse event reported was abdominal pain. The incidence of abdominal pain was significantly higher for children treated with mefloquine (89.4%) and mefloquine-artesunate (83.3%) compared with children treated with artesunate (60.0%) and praziquantel (46.1%). Mefloquine and mefloquine-artesunate show moderate efficacy on *S. haematobium*. Hence, malaria patients co-infected with *S. haematobium* with mefloquine-artesunate might reduce the burden due to schistosomiasis. Further studies in the laboratory and the field are necessary to deepen our understanding of the antischistosomal properties of mefloquine and mefloquine-artesunate combination.

T4P4-03

Rapid assessment of *Schistosoma haematobium* infection in Niger using school-based questionnaires

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Simple and accurate means of rapidly identifying communities at highest risk schistosomiasis is key for implementing control activities. School-based questionnaires about symptoms of urinary schistosomiasis have been widely used to classify the endemic level in the community. On the basis of this classification, the optimal frequency of treatment of school age children can be determined. The threshold for applying yearly mass treatment is visible haematuria greater than 30%; this strategy may leave many schools without treatment even though some of the children are infected. This study investigates the diagnostic performance of school-based questionnaires as a rapid and cost-effective method for estimating the prevalence of *Schistosoma haematobium* infection in seven districts of Niger. A face-to-face questionnaire about health problems including whether they had schistosomiasis as well as associated symptoms such as blood in the urine and pain during urination was administered by teachers to a total of 9600 schoolchildren (aged 6–15 years) from 161 schools. Self-reported symptoms were then validated by screening 960 respondents for microhaematuria using reagent sticks. The prevalence of reported schistosomiasis in the interview was strongly correlated with the prevalence of infection determined by microhaematuria. We will highlight the relationship between self-reported symptoms and infection prevalence and intensity was analysed, according to age and sex. We will discuss the sensitivity and specificity of diagnosis by the interviewing tool according to varying prevalence of infection. Our findings suggest that, in Niger, self-reported symptoms provide a useful rapid method for identifying communities with a high prevalence of morbidity. This inexpensive method is a potential tool for sustainable control in the context of finite resources.

T4P4-04

Monitoring albendazole efficacy after regular treatment of soil-transmitted helminth infections in Nepali children

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After several rounds of preventive chemotherapy for soil-transmitted helminth (STH) infections, drug resistance is a potential threat. In Nepal de-worming has been integrated with the national biannual vitamin A distribution and two million children aged 13–59 months have been de-wormed twice a year, since 1999. The main study objective was to compare the efficacy of a single albendazole 400 mg dose in previously (pre-school age) treated, and untreated school-children. A secondary objective was to assess STH prevalence and intensity in school-children after regular deworming in preschool years. The school-based study was carried out in Dhadhing District in October–November 2006 with baseline and post treatment assessments. Albendazole efficacy was compared between children most exposed to the drug in their preschool years (now 5–8 years) and those never exposed to the drug (now 11–14 years). Every child enrolled in the study who returned a fresh stool sample was treated with one albendazole tablet 400 mg (GSK). Stool samples were examined by Kato Katz smear. 21 days later children who tested positive for any STH at baseline provided a second stool sample. Using both the pre- and post-treatment assessments, drug efficacy was measured by cure rate (CR) and egg reduction rate (ERR). A total of

2018 stool samples were examined at baseline for *Ascaris lumbricoides*, *Trichuris trichiura* and hookworm infections. The mean STH prevalence in the 5–8 year old group was 66% (42–80%); 82% (73–99%) in the 11–14 year old group. 34% and 28% of children in the younger and in the older age-group, respectively, had moderate-heavy STH infections. Of the 1,475 children positive at baseline, 1325 children were reexamined at 21 day follow up. In both age groups albendazole achieved a high CR of >96% and ERR of >97% in children with ascariasis. For children with trichuriasis however, the cure rate was poor at <25%, ERR (<30%). The regimen was moderately effective in curing hookworm (>66%) in both age groups and when analysis was controlled for different intensities of infection at baseline (hookworm were significantly higher in older children) ERR showed an equally good efficacy (>98%) in light, moderate and heavy infections in both groups. A cumulative 34% prevalence of moderate/heavy STH infections in previously treated school children indicates that the benefits of de-worming preschool-children were short-lived. Prevalence of 66% in these younger children calls for continuing twice yearly de-worming treatment in school years. This study has also confirmed that albendazole efficacy against *A. lumbricoides* and hookworm infections is sustained by showing similar CR and ERR between children with different albendazole drug exposure. Poor efficacy against *T. trichiura* infection regardless of treatment exposure is worrying and merits further investigation.

T4P4-05

Efficacy of albendazole and mebendazole alone or in combination with ivermectin against *Trichuris trichiura* and other soil-transmitted helminths

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To assess the efficacy and safety of albendazole (400 mg) and mebendazole (500 mg) alone or in combination with ivermectin (200 mg/kg) against *Trichuris trichiura* and other soil-transmitted helminths among schoolchildren in Unguja, Zanzibar, Tanzania. We screened 1041 schoolchildren from two primary schools in Unguja for soil-transmitted helminth infections, using the Kato-Katz method (two thick smears per stool sample). Children positive for *T. trichiura* infections (n = 653) were asked for a second stool sample, which was again subjected to duplicate Kato-Katz. Next, children were randomly assigned to one of four treatment groups. Three to 5 weeks post-treatment, two stool samples per child were collected and examined by Kato-Katz (two thick smears per sample) to assess the prevalence and intensity of *T. trichiura* and other soil-transmitted helminth infections. We followed a per-protocol analysis, using cure rate (CR) and egg reduction rate (ERR) as primary outcomes. Overall, 537 children had complete data records. The CR against *T. trichiura* was 56.7% using mebendazole plus ivermectin, 36.0% with albendazole plus ivermectin, 18.3% with mebendazole alone, and 10.0% using albendazole alone. The respective ERRs were 97.1%, 90.5%, 65.9% and 41.1%. In children with multiple helminth infections CRs for *Ascaris lumbricoides* were 100% using albendazole alone or mebendazole plus ivermectin, 92.9% (ERR: 99.9%) for albendazole plus ivermectin and 77.8% (ERR: 99.8%) for mebendazole alone (n = 64). CRs for hookworm were 66.7% (ERR: 95.6%) using albendazole plus ivermectin, 60.0% (ERR: 94.3%) for albendazole alone, 34.3% (ERR: 80.0%) for mebendazole alone and 25.7% (ERR: 49.4%) for mebendazole plus ivermectin (n = 140). The combination of either albendazole or mebendazole with ivermectin leads to a better therapeutic outcome for *T. trichiura*. In settings where multiple helminth infections are common, combination therapy should be considered to enhance drug efficacy and reduce transmission of, and morbidity due, to soil-transmitted helminths. This strategy might delay the development and spread of benzimidazole resistance. However, to gain and sustain control of soil-transmitted helminthiasis in endemic settings anthelminthic treatment must go hand-in-hand with health education and improved access to clean water and sanitation.

Malaria in pregnancy and in children

T2P3-01

HbS and HbC traits and their effect on *P. falciparum* malaria phenotypes in Ghanaian infants

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The protective effect of sickle cell trait against severe *Plasmodium falciparum* malaria in childhood is the reason for the high prevalence of haemoglobin S (HbS) in Africa and haemoglobin C (HbC) in parts of West Africa. Much less is known about the effect of HbS/HbC on *Plasmodium falciparum* infection, mild malaria, anaemia and possible resulting health benefits. 1070 children from Ashanti Region, Ghana, were enrolled at the age of three months and followed by monthly active visits and passive case detection until the age of two years. The effects of the b-globin genotype on the age-dependent levels of parasitaemia, haemoglobin and stunting as a marker for chronic malnutrition were analysed by logistic regression and population-averaged models. In comparison to HbAA-carriers, children with HbAS-genotype had a lower risk of *P. falciparum* malaria (relative risk [RR] 0.78, 95% confidence interval [CI] 0.66–0.92), while HbAC-carriers were not protected (RR 1.08, CI 0.93–1.26). In children with the HbAS genotype the age-adjusted parasite density was reduced by 50.8% in comparison to those with the HbAA genotype. In children with the HbAC genotype the parasite density was reduced by only 22.9%. HbAS-carriers were also protected against episodes of anaemia (RR 0.51, CI 0.39–0.66) and had a lower risk of stunting (odds ratio (OR) 0.56, CI 0.33–0.96) compared to children with the HbAA-genotype. In contrast, HbAC-carriers were neither protected against anaemia (RR 1.15, CI 0.95–1.39) nor stunting (OR 0.93, CI 0.58–1.50). Our data show that protective effects of HbAS against parasitaemia, mild malaria and anaemia already exist during infancy while HbAC does not seem to protect against these conditions in infancy. These results support the notion that the selective effects mediated by HbAS and HbAC act in different ways. The protective effect of HbAC may be rather specific for distinct manifestations of severe falciparum malaria. Furthermore, HbAS protects against stunting, a marker for chronic malnutrition and risk factor for childhood mortality, which is facilitated by repeated episodes of malaria and anaemia. This indicates a possible additional survival advantage for HbAS-carriers.

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T2P3-02

Malaria has no effect on birth weight in Rwanda

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Malaria has a negative effect on pregnancy outcome, causing low birth weight, premature birth and still births, particularly in areas with high malaria transmission. In Rwanda malaria transmission intensity ranges from high to nil, probably associated with variable altitudes. Overall the incidence decreased over the last 6 years (2002–2007). Therefore, the impact of malaria on birth outcomes is also expected to vary over time and space. Obstetric indicators (birth weight and pregnancy outcome) and malaria incidence were compared and analyzed to their association over time (2002–2007) and space. Birth data from 12 526 deliveries were collected from maternity registers of 11 different primary health centers located in different malaria endemic areas. Malaria data for the same communities were collected from the National Malaria Control Program. Associations were sought with mixed effects models and logistic regression. In all health centres a significant increase of birth weight over the years was observed ($P < 0.001$) with a significant seasonal fluctuation. Malaria incidence had no significant effect on birth weight. There was a slight but significant decreasing effect of malaria incidence on the occurrence of premature delivery (P-value 0.045) and still birth (P-value 0.009). Altitude showed a slight but significant negative correlation with birth weight Overall, a statistically significant decline of still birth risk was found with increasing maternal age ($P = 0.041$) and a decrease over the years of premature delivery ($P = 0.010$) and still birth ($P = 0.036$) was observed. In Rwanda birth weight and pregnancy outcome are not directly influenced by malaria, which is in contrast to many other studied areas. Although malaria incidence overall has declined and mean birth weight increased over the studied period, no direct association was found between the two. Socio-economic factors and improved nutrition could be responsible for birth weight changes in recent years.

T2P3-03

Malaria control in pregnancy: monitoring the effectiveness of IPTp-SP beyond the coverage with ≥2 doses

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To compare different approaches of evaluating the effectiveness of intermittent preventive treatment with sulfadoxine-pyrimethamine in pregnancy (IPTp-SP) at community level, we conducted a randomized trial in a large health centre in rural Burkina Faso between 2003 and 2006. We aimed at establishing whether a targeted community-based promotion campaign to increase antenatal clinic attendance and uptake of IPTp-SP could effectively improve pregnancy outcomes, 1544 primigravidae (PG) and secundigravidae (SG) were followed until delivery. Uptake of IPTp-SP, peripheral and placental parasitaemia and low birth weight (LBW) were assessed. 908 women (58.8%) had received two or more doses of SP during pregnancy, 531 (34.4%) one dose and 105 (6.8%) no SP at all. When ≥2 doses were compared to ≤1 dose, IPTp-SP was highly efficacious in reducing peripheral (AOR 0.27 95%CI 0.21–0.35, $P < 0.001$) and placental (AOR 0.30 95%CI 0.22–0.40, $P < 0.001$) parasitaemia and low birth weight (PG: AOR 0.47 95%CI: 0.22–1.00, $P = 0.050$; SG: AOR 0.51 95%CI: 0.27–0.98, $P = 0.045$) at an individual level. Coverage with ≥2 doses of IPTp-SP was 71.8% in villages with health promotion and 49.1% in non-promotion villages ($P = 0.008$) but the impact on peripheral (OR 0.84 95%CI: 0.60–1.18) and placental (OR 0.86 0.58–1.29) parasitaemia and low birth weight (OR 0.85 0.61–1.17) was not significant. This is partly explained by lower coverage in adolescents during the high malaria transmission season. An overall good coverage with IPTp-SP can hide low coverage in high risk groups and lead to false interpretations concerning program effectiveness. Alternative methods for evaluating program effectiveness including the relation of LBW in primi- as compared to multigravidae are discussed.

T2P3-04

Intermittent preventive treatment during pregnancy (IPTp) by sulfadoxine pyrimetamine (SP) in a rural region of Benin: effect on placental parasitemia and low birth weight one year after national implementation of IPTp

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The administration of intermittent preventive treatment (IPTp) with sulfadoxine pyrimetamine (SP) to pregnant women has been implemented since 2006 in Benin, to replace chloroquine prophylaxis. IPTp is known to be efficacious against malaria during pregnancy, as shown by a clinical trial carried out in 2005 in a neighbouring area (reduction of placental malaria (PM) from 17% before the trial to 3%, reduction of LBW from 16% to 9% and increase of average birth weight from 2876 to 3060 grams) (Briand and col., 2008). However in rural areas, without the strict supervision of a clinical trial, the actual effectiveness may be different. The objective of the study was to assess the observance and efficacy of IPTp in rural Benin one year after its implementation and although the study was not designed to, its effect on PM and birth weight. 625 women were recruited at delivery between June 2007 and July 2008 in three maternity clinics. Data about malaria prevention have been collected: use of IPTp with SP (number of doses), chloroquine (CQ) and impregnated bed nets. Placental malaria was determined at delivery and newborns' weights were collected. Multiple logistic regression was used to assess factors associated with PM and LBW. Women attended an average of 4.1 antenatal visits (SD = 2.1) and were 66.3% to sleep under impregnated bed nets. According to the questionnaires, 85.3% (511/610) received IPTp during their pregnancy (among them, 17.1% one dose and 82.9% 2 doses). 18.4% (110/599) were still taking CQ. 7.2% of women (43/599) had neither taken IPTp nor CQ. The proportion of women presenting PM at delivery was 10.9% (66/604). 10.3% had a LBW, and average birth weight was 2976gr (SD = 399.5). PM was more frequent in women taking CQ (16.7% vs. 9.8%, $P = 0.04$) than SP (IPTp, any dose). In multivariate analysis, PM was found to be associated to the use of CQ (aOR = 1.92; $P = 0.05$). LBW was not significantly associated with the use of IPTp (aOR = 0.46; $P = 0.07$) or CQ (aOR = 0.44, $P = 0.09$) but with the use of impregnated bed nets (aOR = 0.30; $P < 10–4$). The proportion of PM was intermediate between the period preceding the change in malaria prevention policy (prophylaxis by CQ) and the use of IPTp in the context of a clinical trial. CQ associated with PM may be a result that indirectly proves the risk of not taking IPTp. Surprisingly, in spite of a moderate effect on PM, IPTp (even taken once only) allowed to increase birth weight substantially.

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T2P3-05

Malaria treatment seeking behaviour of mothers with under 5 years old children in Binh Phouc, Viet Nam

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In mountainous and remote areas of Viet Nam, malaria is still endemic and threat people's health. Although early treatment is one of the main structures of malaria control, minority people's treatment seeking behaviour is not clear. We aimed to describe access to malaria treatment, possible choice and regulation of decision for malaria treatment, and perception and knowledge of malaria in a minority's community, Binh Phouc province, Viet Nam. Family members of all households in the community were confirmed with the village census book, and 75 households which have at least one under 5 years old child were targeted. Interviews using structured questionnaires were administered to care takers of the children by house- to house visiting. 74 of 75 households participated to the study. Almost interviewees were mothers of children. Questionnaire included; characteristics of interviewee, parity, socioeconomic status, sick history of the children in last one year, detail of treatment, and knowledge of children's symptoms. Before 2000, this community was very poor and a lot of people include children were died from "high fever". But according to economic development, now people can access to the health facilities easily by their own motorbikes and pay for treatment. Mothers knew children's high fever is dangerous, and they consulted immediately. However, they stop taking anti-malarial drugs when fever down. Very few mothers complete the required treatment. In the study community, access to treatment was not very difficult economically, geographically and socially. Detection and treatment for malaria was provided by free of charge at the public health facilities, however mothers choose private clinics because of quality and confortability of medical services. They consult appropriately but their medication was inappropriate. Health education and observation which focused on "taking medicine" are required.

Laboratory and tropical diseases

T4P5-01

Detection of *Cryptosporidium* with microscopy, rapid-tests, ELISA and real time PCR

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Cryptosporidium remains largely underdiagnosed in current routine diagnostic procedures in microbiology laboratories. We compared six different diagnostic methods for the detection of *Cryptosprodium* in feces in both acute and chronic diarrhea. Microscopic examination (Iron Hematoxiline Kinyoun stain), Crypto-strip (Coris Bioconcept), ImmunoCard STAT! Cryptosporisium/Giardia (Meridian), Xpect Giardia/Cryptosporidium (Remel), Cryptosporidium ELISA (Clindia), and real time PCR for the detection of *Cryptosporidium* were compared. From May 2008 until January 2009, 181 watery and mushy feces were included mainly from children younger than 10 years. 108 specimens from acute diarrhea were sent for bacteriological examination and 73 triple feces test (TFT)-samples to the parasitology department, representing a more chronic form of diarrhea. Using real time PCR as the gold standard, the sensitivity of microscopy, Crypto-strip, ImmunoCard STAT!, Xpect and ELISA were 69%, 81%, 89%, 92%and 94% respectively. The specificity of microscopic detection, Crypto-strip, ImmunoCard STAT!, Xpect and ELISA were 100%, 98%, 99%, 99% and 92% respectively. Remarkably, the majority of the positive *Cryptosporidum* samples were not found in watery, as described in all textbooks, but rather in loose to mushy stools (73%). Furthermore, half of the positive samples were not sent for parasitological examination but only for bacterial culture. We conclude that the widely used microsopic examination is a very specific but less sensitive method for the laboratory detection of *Cryptosporidium* in feces. More sensitive methods for the detection of *Cryptosporidium* in feces are ImmunoCard STAT!, Xpect and ELISA and Real time PCR. The majority of positive *Cryptosporidium* samples were found in children younger than 10 years old. Examination of both watery and mushy stools, sent only for bacteriological examination, for the presence of *Cryptosporidium* yields additional positive samples which would otherwise not have been detected.

T4P5-02

Multiplex/realtime PCR in the laboratory diagnosis and for the epidemiological screening of pathogens causing diarrhoea in early childhood in Ghana

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Despite the fact that diarrheal diseases remain a major threat for children under 5 years in most tropical countries, little information is currently available on the prevalence and incidence of the causative agents for diarrhea, in particular from areas of subsaharan Africa. Major reasons are insufficient laboratory equipment, lack of technical skills and costs for diagnostics. The aim of this study was to investigate the prevalence and incidence of pathogens causing diarrhoea in children under 5 years in the Ashanti region of central Ghana using molecular diagnostics. Stool samples from 2495 children were collected at the OPD of the Presbyterian Hospital in Agogo during May 2007 and November 2008. Laboratory examinations comprised microscopy for the presence of parasites, microbiological methods using selective culture media as well as two multiplex/realtime PCR assays targeting DNS of a variety of enteropathogenic bacteria and intestinal protozoan parasites, respectively. The results indicated high prevalence for enteropathogenic *Shigella spp.*/EIEC, *Campylobacter jejuni* and *Salmonella enterica* as well as for *Giardia duodenalis* and *Cryptosporidium parvum/hominis*. In contrast, *Yersinia spp*., *Entamoeba histolytica* or *Cyclospora cayetanensis* were not found. With the exception of *Giardia duodenalis* the presence of all other pathogens was associated with diarrhea.

CONCLUSION With the exception of *Yersinia spp*., *E. histolytica* and *C. cayetanensis*, common enteropathogenic bacteria and protozoan parasites play an important role as etiologic agents of childhood diarrhoe in rural Ghana. The role of Giardia remains still undefined. Multiplex/real-time PCR, in comparison to 'classical' methods, is useful to obtain a fast presumptive diagnosis and to enable clinicians to implement an appropriate antibiotic treatment without time loss.

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T4P5-03

Development of an efficient diagnostic kit for easy and fast detection of pathogenic intestinal parasitic protozoa

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Giardiasis, Cryptosporidiosis, and Amebiasis are among the most prevalent human enteric infections worldwide. Due to their importance in less-developed countries, these diseases have been recently included in the Neglected Diseases Initiative by the WHO. The diagnostic methods for these pathogenic parasites have low efficiency, are laborious, some of them expensive, and demand sophisticated equipments and very well trained personnel. We have developed highly specific monoclonal antibodies (mAb) capable to detect *Giardia lamblia* and *Entamoeba histolytica/dispar* cyst wall molecules and *Cryptosporidium sp.* (*C. hominis*, *C. parvum*, *C. felis*, *C. cervine* and *C. meleagridis*) oocysts antigens, without cross-reactivity to any other intestinal organisms. These mAbs were tested using genotypified cysts and oocysts by immunofluorescence (IFA), enzyme-immuno (ELISA), dot blot, and Western blot assays. The tests showed high specificity and sensitivity when analyzed in hundreds of stool samples of infected individuals. Using pairs of specific mAbs for *Giardia*, *Entamoeba*, and *Cryptosporidium*, we developed a very inexpensive and easy to use dipstick diagnostic kit. Particular mAbs were applied to a supported membrane for capture of parasites' antigens from tap-water resuspended fecal samples and the presence of the microorganisms was detected by a secondary mAb labeled either with gold particles or horseradish peroxidase. Positive controls consisted in *Giardia* cysts generated in culture, immunopurified *Entamoeba* cyst wall molecules, and *Cryptosporidium parvum* oocysts obtained from infected calves. The method permitted the fast visualization of the presence of the parasites directly from stool samples with high specificity and without the use of any additional equipment. The test is capable of detecting as little as ten cysts/oocysts per ml of resuspended stool samples. This dipstick diagnostic kit can be performed in parallel in a high number of samples, does not require experienced personnel, and due to the stability of the reagents, it can be stored in the absence of refrigeration, making this kit a valuable tool for the detection of these parasites in rural and/or poor areas of the world, as well as in travelers moving to endemic areas where these diarrhea-causing parasites are common.

T4P5-04

Improving the diagnosis of parasitic infections in disease-endemic countries: making molecular diagnostics accessible

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Diagnostic tests based on nucleic acid amplification and detection can be 100× more sensitive than microscopy, and may allow for the quantification of parasites, but are not applied at a large scale in disease endemic countries. The minimum laboratory requirements for even conventional polymerase chain reaction (PCR) amplification methods are not commonly found in endemic countries outside universities and large teaching hospitals. In the periphery and rural regions where the diseases are most common, low tech sensitive and specific rapid diagnostics remain an urgent requirement. Our research group has, in close collaboration with other groups including parties in disease endemic countries, taken up the challenge to develop and deliver simplified molecular diagnostic tools to disease affected regions. Isothermal methods, that require little simple equipment (only water bath), such as nucleic acid sequence based (NASBA) or loop mediated (LAMP) amplification are combined with simplified read-out systems, like nucleic-acid lateral flow assay (NALFIA) or oligochromatography (OC), which do not use electricity and/or require sophisticated gel systems that produce toxic waste such as ethidium bromide. Test performance for these disease was assessed in the laboratory and in the field in disease endemic countries. Several test formats have been developed for malaria (NASBA-NALFIA), trypanosomiasis (NASBA-OC) and leishmaniasis (NASBA-OC and LAMP) with excellent analytical and diagnostic performance. As test performance is exceeding that of so-called gold standard diagnostics, values on diagnostic sensitivity and specificity are difficult to present. In all cases analytical sensitivity was much better that standard microscopy, often exceeding the detecting of 1 parasite/ml clinical sample (like blood). Most developed tests have passed laboratory and phase I (ring trials) evaluation. Phase II results are expected to be presentable. Implementation of simplified diagnostic tools is feasible, but will require an investment in training.

Threats to access to essential medicines: economic crisis and counterfeit drugs

T1P4-01

A.P.P.A.® Project: counterfeit medicines

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The quality of medicinal products is imperative to support their safety and efficacy. *A.P.P.A.*® Project proposes as primary objective the realization of galenic labs with the aim to prepare galenics which show the above requisite, looking at the compliance of patients living in developing countries (DC). The circulation of substandard medicines in the DC is a serious clinical and public health concern. Problems include under or over concentration of pharmaceutical ingredients, contamination, poor quality ingredients, poor stability and inadequate packaging. At present *A.P.P.A.*® onlus is studying the quality of some medicinal products sold in the countries in which *A.P.P.A.*® galenic labs are working. The aim is to demonstrate the degree of quality of medicines purchased *in loco* from pharmacies or from illegal street-pharmacists; the study was conducted in Turin (Italy) at Pharmacy Faculty. About 100 samples are the object of the present study; these are from: Brasil, Cameroun, Congo, Kenya, Madagascar, Malawi, Tchad, and Uganda. We have evaluated the quality of aspect, friability, hardness, mass uniformity, disgregation, content uniformity (by UV spectrofotometric analysis): each assay was performed as requested by current European Pharmacopoeia. The results demonstrated that the majority of tested samples satisfied requested parameters for mass (95%) and content (85%) uniformities. Nevertheless there were few samples which showed complete absence of active pharmaceutical ingredient, while others showed an amount of drug minor than that declared in the label. Disgregation assay showed that 10% of samples didn't satisfy the required quality, therefore the therapeutic efficacy would not be guaranteed. Friability assay showed a more crucial result, because 27% of samples were not adequate to maintain

intact the form after packaging. The most worrying data concerned the hardness assay: almost the 50% of tested samples are unsatisfactory; the resulted high hardness could compromise the availability of the medicinal products. Generally the negative results are relative to medicines bought by illegal street-pharmacists. This preliminary study has demonstrated that sometimes it is possible to find, in DC, counterfeit medicines. The 5% of tested samples could be defined criminal false, in which the drug is completely absent or present in a amount absolutely not effective. About the 50% could be defined imperfect false because, even if the drug is present, the quality of pharmaceutical forms is not been respected: therefore the medicines could not show the expected therapeutic efficacy. The results showed the importance of our project, to produce galenics which respect quality, above all in those Countries where people usually buy medicines from illegal street-pharmacists.

Leishmaniasis and innovative disease management

T4P6-01

Epidemiological and entomological survey of visceral leishmaniasis focus in Tbilisi, Georgia

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Over the last 15 years the number of human visceral leishmaniasis (VL) cases increased substantially in the capital of Georgia, Tbilisi. However, no studies have been done to determine the prevalence and characteristics of transmission. For this reason we aimed to carry out a survey on active VL focus in Tbilisi, to determine the seroprevalence of *Leishmania* infection in humans and dogs, to identify the responsible parasite and to incriminate the vector(s) of the disease. The direct agglutination test (DAT) and the rk39 dipstick test were used for seroprevalence determinations in humans and dogs, respectively. Sandflies were collected by CDC light traps and sticky-paper traps, identified using collection of taxonomic keys, and live female flies were examined for parasite infection. Bone marrow samples from clinically diagnosed children and serologically positive dogs, along with infected sand flies, were subjected to PCR analysis to identify *Leishmania* parasites. The two-sided *t*-test in R and SAS programs were used for statistical analysis of the results. A total of 4266 children, ages 1–14 years, were tested by DAT, and those with a titer of 1:6400 and higher were considered seropositive. The seroprevalence at baseline was 7.3%. The results of a follow-up study, one year after the baseline survey, indicated seroconversion among children equal to 6.0%. Testing of dogs revealed 111 of 630 domestic (17.6%), and 110 of 718 stray (15.3%) dogs were positive. Bone marrow examination by microscopy of 49 of the 111 positive domestic dogs demonstrated amastigotes. Clinical signs of VL were found only in 1.3% and 2.9% of seropositive domestic and stray dogs, respectively; all other dogs were asymptomatic. Five species of sand flies were identified: *Phlebotomus kandelakii* (64%), *P. sergenti* (19%), *P. balcanicus* (10%), *P. halepensis* (6%), and *P. wenyoni* (1%). Microscopy revealed *Leishmania* promastigotes in two species: *P. kandelakii* and *P. balcanicus* (infection rate ≍1%). The parasites were identified by PCR analysis as *L. infantum* and the PCR product matched those amplified in isolates from local patients and dogs. Our study showed that Tbilisi is an active focus of VL with a high prevalence of infection in both humans and dogs and that *L. infantum* is responsible for human and canine VL in Tbilisi. In addition *P. kandelakii* and *P. balcanicus* were incriminated as vectors of the disease. These data should be useful in developing effective control measures for prevention of VL in Tbilisi and, together with results of expanded surveys, all territories of Georgia.

T4P6-02

The epidemiology of *Leishmania donovani* infection in a high transmission foci in Nepal

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Nepal reports a visceral leishmaniasis (VL) incidence of 0.5 per 1000 per year. A large community trial testing the effectiveness of long-lasting insecticide treated nets in the prevention of VL was launched in Nepal and India in 2005. We report here the baseline epidemiological features of Leishmania infection in the study clusters in Nepal. On basis of past reporting of VL cases by the health system, 10 clusters with highest VL incidence rates were purposefully selected, each with approximate 350–1500 population, a minimum distance of 1 km between any two clusters and a minimum average VL incidence rate of 0.8% over the past 3 years. All households belonging to the clusters were mapped and socio-demographic data as well as data on past VL incidence were collected. An exhaustive serological survey was done collecting finger prick blood on filter paper in November-December 2006. Direct agglutination test (DAT) was done and a titer ≥1:1600 was taken as marker of infection. The serosurvey on 5397 individuals over 2 years old showed an infection prevalence of 9% overall, ranging between 5 and 15%. The prevalence of infection was slightly higher in men (9.9%) than women (8.3%). In both genders the prevalence of infection increases with age group but no clear association was found between nutrition status and DAT results. Having a kala-azar case in the household in the preceding 2 years was a strong predictor for a positive DAT result. Houses with past Kala azar cases had 38.9% of DAT positive individuals (out of 439 people) compared to 7.1% (out of 5058 people) in households without KA cases. Households with animals had fewer positive DAT (7.6%) than those without them (12.0%). *Leishmania* infection is highly clustered, with attack rates ten times higher at hamlet level than those reported at village level, which are in the 1 per 1000 range. The concept of hot spot or focus should be used for planning of control activities.

T4P6-03

Incidence of asymptomatic infection with *L. donovani* and their evolution in high endemic villages in India and Nepal

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Only a fraction of *L. donovani* infections evolve to clinical Visceral Leishmaniasis (VL), and the role of asymptomatic infections in transmission of VL is not clear. We analysed prospective data from

highly endemic villages in India and Nepal to document the frequency and the evolution of recent asymptomatic infections, including the duration between seroconversion and disease appearance. In 26 highly endemic villages in Nepal and in India, incident leishmanial infections were recorded, within the context of a community intervention trial (KALANET). Over a period of 2 years 3 consecutive blood samples (capillary blood on Whatman filter paper) were collected with 1 year interval, and follow-up was done on all study subjects until 6 months after the last serosurvey to detect clinical cases. Sero-conversion from negative to positive, measured by Direct Agglutination Test (DAT) and using a 1:1600 titer as cut-off was recorded in all individuals providing at least two sero-samples. The number of individuals enrolled in the study was 20531, of which 75% provided a baseline sample, and 79.2% of these had 3 consecutive samples. Of 11 697 individuals, 779 (6.7%) sero-converted. Incidence was twice as high in India (8.42%) as in Nepal (4.33%) and was lower the second year of the study. In both countries, about 70% of those that sero-converted in the first year of the study turned back to negative titers the following year. 159 individuals developed KA in the 2 year period (123 in India + 36 in Nepal). The infection:disease ratio was overall 4.9:1. During the 2 years follow-up we identified 110 new cases of KA (patients who had no previous episode of KA), 72 in the first year and 38 in the second. The longer the time elapsed between the sero-sampling survey and the appearance of the clinical symptoms, the lower was the probability of finding antibodies, but positive titer were found up to 21 months prior to the disease. In all but one case, for those who gave serum before and after KA, seroconversion was confirmed. The incident disease ratio in highly endemic zones in the Indian subcontinent is at least 5:1. As in 70% of cases seroconversion was transient, the sampling with yearly intervals may have missed a number of seroconversions. Seroconversion could be shown in most KA incident cases, and precedes clinical symptoms, but the time between the two events can range from 1 to over 20 months.

T4P6-04

New recommendations for dosing of miltefosine in children with visceral leishmaniasis

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Efficacy and pharmacokinetics/-dynamics of miltefosine in children suffering from visceral leishmaniasis (VL) remain ill-characterized. In a large phase 4 trial, the number of treatment failures was significantly higher in the paediatric population than in adults (≥12 years) while given the same dosage of 2.5 mg/kg (J. Infect. Dis. 2007;196:591–8). Based on this and the previous finding that the average plasma concentration in children in the last week of treatment was 24 μg/mL, while in adults 70 μg/mL has been reached (Expert Opin. Drug Metab. Toxicol. 2008;4:1209–16), our hypothesis was that the current linear mg/kg dosage is too low in children and that a dose based on allometric scaling might result in a similar exposure to miltefosine between children and adults. Pharmacokinetic (PK) parameters from a previously developed population PK model (Antimicrob. Agents Chemother. 2008;52:2855–60) were standardized to lean body weight, and CL and V were scaled with an allometric power of 0.75 and 1, respectively. To validate, a predictive check of our model was performed by comparing original PK observations from a paediatric clinical trial (mean and range of C_{min} at day 26, from: Pediatr. Infect Dis. J. 2003;22:434–8) with distributions of these values from 300 Monte Carlo-simulations of this trial from the PK model. An allometric dosing-formula for miltefosine in children of all ages is proposed, scaled with a power of 0.75 from a standard adult (60 kg) receiving 150 mg ($Dose_{child} = 150^* (Weight_{child}/60)^{0.75}$). Exposure to miltefosine (time and AUC above threshold) after the currently used 2.5 mg/kg dose and after the allometric dose was compared by simulations ($n = 1000$). All calculations and simulations were performed with software packages NONMEM, R and Pirana. The miltefosine PK model with allometric power scaling could predict observed PK values in a real paediatric VL trial adequately. Exposure to miltefosine (time/AUC above threshold) was similar between adults receiving 2.5 mg/kg and children receiving the new allometric dose. More importantly, 36% of the children receiving the currently used dose of 2.5 mg/kg had a lower exposure to miltefosine than 95% of adults receiving 2.5 mg/kg or children receiving the allometric dose. The currently applied dose of 2.5 mg/kg results in a significant lower exposure to miltefosine in children than in adults. We recommend the use of an allometric dose formula for miltefosine in children with leishmaniasis ($Dose_{child} = 150^*(Weight_{child}/60)^{0.75}$), which results in a similar exposure to miltefosine between adults and children and probably results in improved clinical outcome in children. An easy-to-use table will be presented for implementation of this dose in the clinic. More data are urgently needed on both PK and PD of miltefosine in VL, certainly in children, to further improve the treatment of this fatal neglected disease.

T4P6-05

Methods for characterization and identification of miltefosine in suspected substandard capsules

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Recently, it was revealed that generic miltefosine capsules for the treatment of visceral leishmaniasis contained no active ingredient (e.g. *Newsdesk*, Lancet Infect. Dis. 2008; 8:666). Here we report on the methods to identify and characterize pharmaceutical miltefosine products and the procedures we have used to assess the quality of these substandard products. Miltefosine capsules were analyzed to their miltefosine content, and total capsule contents were characterized with various analytical chemical techniques: liquid chromatography coupled to tandem mass spectrometry (LC-MS/MS), Fourier transform infrared spectroscopy, near-infrared spectroscopy, a colorimetric assay, and inductively coupled plasma mass spectrometry. Both total capsule contents and various extracts were analyzed. Various analytical techniques were found suitable to accurately identify and also quantitate the amount of miltefosine in pharmaceutical formulations. Investigated generic miltefosine capsules appeared to be substandard: they contained no active pharmaceutical ingredient, determined by any of the applied analytical techniques. The only substances that could be demonstrated confidently in these products were the common inactive excipients: lactose monohydrate and microcrystalline cellulose. The analytical chemical techniques here presented were all found very useful methods to detect miltefosine in pharmaceutical products. We recommend the use of a combination of reported complementary assays to characterize the total contents of these capsules. The finding that there were generic miltefosine capsules available that contained no active pharmaceutical ingredient points at the urgent need, besides the comprehensive laboratory techniques presented here, to develop also simple rapid assays for use in field conditions that can rapidly detect substandard miltefosine products.

Abstracts of the 6th European Congress on Tropical Medicine and International Health and 1st Mediterranean Conference on Migration and Travel Health

T4P6-06

Mass effect of village-wide use of long lasting impregnated nets on visceral leishmaniasis vectors in India and Nepal: cluster randomized trial

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Visceral leishmaniasis (VL) control programs in the Indian subcontinent are currently considering the use of long lasting impregnated nets (LN). We tested the impact of comprehensive provision of LNs on the density of *Phlebotomus argentipes* in twelve clusters (6 in India and 6 in Nepal) from the ongoing KALANET cluster randomized control trial. Ten houses per cluster were monthly monitored for 12 months post-distribution of LN using CDC Light Traps.A random effect linear regression model showed that the cluster-wide provision of LNs significantly reduced the *P. argentipes* density/house by 24.9% (95% CI 1.80–42.5%). If the ongoing KALANET clinical trial shows that LNs have an impact on VL incidence, the entomological evidence described here provides a strong argument that LNs should be provided free to ensure the comprehensive coverage required to generate a significant mass effect, which should reduce the risk of VL for the community.

T4P6-07

The e-compendium: a geo-referenced bibliographical database on leishmaniasis epidemiology

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Access to peer reviewed bibliographical data on the epidemiology of infectious diseases is essential for researchers, health professionals and students. Various internet based services offer fast and reliable access to such information. These online databases enable the user to query the data in various ways, allowing access to relevant and personalised bibliographical information. With the e-compendium concept, we aim to introduce an innovative dimension to the way such data can be presented and queried. By geo-referencing categorized bibliographical data and visualising it using an online interactive mapping format, the user is able to search for articles in relation to the area the study is related to. Although the data currently included in the e-compendium is on leishmaniasis, the same concept could be applied to any other disease. The e-compendium is built on a standards based format, which would allow the data to be used in many different applications. Another key feature of the e-compendium is the ability for users to update the information through their browser, thereby enabling collaboration. The e-compendium on leishmaniasis epidemiology presents the user with a simple interface which allows the user to interact with the map and the bibliographical data it contains. The user interface also supports various visualisation functionalities, allowing the user to select a preferred mapping format (e.g. Google maps) and information overlay (e.g. human cases, vectors, reservoirs). Furthermore, extra layers of mapping information (e.g. altitude, population density) and other geo-referenced data can be added to the e-compendium, allowing the user to cross-reference bibliographical data with other available information such as risk and case maps. Finally, the e-compendium also includes a country-by-country summary on epidemiological information based on a WHO publication. The e-compendium contains peer reviewed bibliographical data on the epidemiology of leishmaniasis. The data encompasses worldwide information with a particular focus on endemic areas. We have included bibliographical data going back to the early 1980s. Involvement of the international leishmaniasis community is actively pursued to guarantee the data included in the e-compendium is as correct and complete as possible. The Verona ECTMIH conference would offer a unique opportunity to present the application in a live demonstration.

Expanding access to ACTs

T2P4-01

Successful introduction of artesunate and amodiaquine is not enough to fight malaria – results from an adherence study in Sierra Leone

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Free malaria diagnosis and treatment are offered in the Medecins Sans Frontières (MSF) catchment area, eastern Sierra Leone, for a population of 150 000. Since 2004 and in accordance with the national protocol, artesunate and amodiaquine (AS+AQ) has been the first-line drug combination. Its therapeutic efficacy depends entirely on the efficacy of the individual components and on treatment intake according to correct protocol. We aimed to measure adherence to AS+AQ in patients treated for uncomplicated malaria. We included patients ≥1 year old who received AS+AQ in MSF community health centres (CHCs) after confirmed diagnosis of uncomplicated falciparum malaria. Adherence was measured by home visits the day after the last prescribed treatment dose. Patients/caretakers were interviewed using a systematic questionnaire and remaining AS+AQ tablets were counted. A sample size of 97 patients was required for significant adherence results. Additional exit-interviews were carried out with persons having an AS+AQ prescription prior to leaving the CHCs to gain information on treatment attitudes and to assess prescription quality. In total, 118 patients were visited at home: 27 (22.9%, 95%CI 15.2–30.6) patients had ≥1 tablets left at the time of the visit and were defined as certainly non-adherent; 34 (28.8%, 95%CI 20.5–37.1) were defined as probably non-adherent (verbal account of incorrect [n = 27] or incomplete [n = 7] intake); and 57 (48.3%, 95%CI 39.2–57.5) as probably adherent. The main reasons for incomplete intake were sickness after one dose of AS+AQ (32%, 11/34), no food available for drug intake (15%, 5/34) and forgetting to take them (12%, 4/34). The main self-reported reasons for incorrect intake were vomiting after drug intake (45%, 12/27); 37% (10/27) said they were given incorrect instructions in the CHCs. 81% (46/57) of probably adherent patients said they followed instructions given at the CHC. In exit-interviews 82% (42/173) were able to correctly repeat AS+AQ intake instructions given to them. Only 15.6% (27/173) were given additional information related to the treatment. Adherence to treatment with AS+AQ by patients should not be taken for granted. Even a well established treatment programme should monitor adherence regularly. Our results were online with two other studies carried out under comparable project characteristics, but had lower adherence compared to two studies carried out right after the introduction of a new antimalarial. Only some of the factors affecting adherence can be addressed directly in an

operational setting. Our study suggests that giving clear explanations on correct AS+AQ use should include discussion of disease symptoms as well as possible treatment side effects, and how to manage them. Other factors are more difficult to influence, such as patients forgetting to take their treatment.

T2P4-02

Increased access to malaria diagnosis and treatment through free care provided in health centres and by malaria village workers in Chad, Mali and Sierra Leone

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Médecins Sans Frontières developed primary health care projects with a major focus on malaria in Mali (Kangaba district), Chad (Bongor district), and Sierra Leone (Bo district), aiming at an increased access to prompt malaria diagnosis and treatment, and at mortality reduction. The intervention package for malaria, at health centre level (HC), included health promotion, a diagnostic strategy based on rapid diagnostic tests (RDTs), treatment with artemisinin combination therapy (ACT) and free care. In addition a network of malaria village workers (MVW) was set up in the community. The evaluation was based on the attendance rates and on retrospective mortality surveys. In 2005, in Mali, subsidised RDTs and ACTs were delivered for free to children, keeping fees for consultation and other drugs in place. Confirmed malaria cases rose from 5104 in 2004 – before MSF support – to 6644 in 2005 and 8169 in 2006. By December 2006, free care for consultations and for other essential drugs was implemented for all illnesses for under fives and for pregnant women with fever. This new strategy led to 18 483 treated malaria cases in 2007. A complementary network of MVW, trained to perform RDTs and administer ACTs for free, led to another 7159 cases treated in 2007. In Chad, MSF subsidised RDTs and ACTs but HCs continued to charge for consultation fees and other treatments. The number of malaria confirmed patients treated in the health centres remained similar over 3 years (2005: 24 889, 2006: 26 915, 2007: 23 356) while free decentralised malaria care by adding a network of malaria village workers permitted to treat 90 294 patients in 2007. The under-5 mortality rate (U5MR) decreased from 3.0 /10 000/day (95% CI, 2.3–3.6) in 2004 to 1.5/10 000/day (0.8–2.3) in 2008, in the areas benefiting from free malaria care with MVWs. In the Sierra Leone HCs, free care for all diseases and for all population groups was introduced in 2004. The number of malaria cases doubled from 5535 in 2004 to 10451 in 2005. In 2005 and the following years, more than 110.000 malaria patients were treated per year in the HCs. Adding a complementary network of malaria village workers delivering free malaria care, allowed to treat another 100 000 patients a year. U5MR decreased from 3.5/10 000/day (2.6–4.4) in 2005 to 1.3/10 000/day (0.9–1.7) in 2007. The study shows the feasibility of having malaria diagnosis systematically confirmed by RDTs before treating with ACTs on the different levels, including the community level. It also showed that free malaria diagnosis and treatment only, embedded in a paying system, has a limited impact on increasing the uptake and coverage of malaria care, while free care for all diseases at HCs increases drastically the number of malaria patients promptly diagnosed and treated. Access can be further increased by a complementary network of malaria village workers providing free malaria diagnosis and treatment. U5MR carried out in two of the three countries indicate a downward trend.

T2P4-03

Understanding and improving access to prompt and effective malaria treatment: the ACCESS project in Tanzania

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The ACCESS project carried out in two rural districts in Tanzania aims at improving access to health care using malaria as a tracer condition through three complementary interventions: (1) social marketing to make community members come forward for appropriate and timely treatment; (2) improved quality of health care services; and (3) development of high quality commercial drug outlets. We also evaluated extensively the impact of these interventions on morbidity and mortality parameters. Semi-quantitative cross-sectional community surveys were used to investigate disease perception and treatment seeking behaviour, complemented by quantitative and qualitative studies on drug availability and quality of care. Health impact was measured in the frame of an established Demographic Surveillance System. In this setting, compliance by the population was good, while health system factors appeared to be major obstacles to appropriate and timely treatment. Poverty related factors also influenced negatively the outcome of health episodes. Modern medicine was clearly preferred by most patients and 87.5% of the fever cases in children and 80.7% in adults were treated with one of the recommended antimalarial, reflecting the intensive social marketing and health education campaign. However an estimation of community effectiveness revealed that only 22.5% of children and 10.5% of the adults received prompt and appropriate treatment despite high health facility usage. One of the reasons might be that drug and antimalarial stock-outs had occurred in many of the health facilities surveyed. Access issues are multiple and arise at different levels of both the supply and demand side. This calls for a comprehensive approach that moves beyond provision of health services to also include measures that strengthen household economies.

T2P4-04

Exposure to lumefantrine in infants and children receiving artemether-lumefantrine for acute uncomplicated malaria: impact of African diet components

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Artemether-lumefantrine (AL) shows high 28-day cure rates in children with uncomplicated *Plasmodium falciparum* malaria. Food consumption affects the oral bioavailability of lumefantrine, but data are lacking regarding lumefantrine exposure according to food consumption in children with malaria. The objective was to evaluate the effect of food on lumefantrine exposure in children with *P. falciparum* malaria. We conducted a randomized, multicenter study of two AL formulations (dispersible tablets [DT] vs. crushed tablets [CT]) in infants and children. Lumefantrine plasma concentrations were used to

construct a two-compartment pharmacokinetic model in order to compare the oral bioavailabilities of lumefantrine among the types of meal consumed at the time of dosing. The model incorporated data from 621 patients who received 3722 AL doses in total. Meals consumed at AL dosing were milk alone (57.4%), pancakes alone (27.8%), no meal (9.6%), and other meal (5.2%). For crushed tablet, the relative bioavailability was 1.57 (90%CI: 1.29–1.96) for patients consuming milk and 2.74 (90%CI: 1.93–3.61) for patients eating pancakes versus patients who ate no meal. For the dispersible tablet, the relative bioavailability was 1.65 (90%CI: 1.28–2.09) with milk and 1.83 (90%CI: 1.42–2.39) with pancakes versus patients who ate no meal. Most patients (98.2%; 797/812) in the primary analysis population had PCR-corrected parasitological cure at Day 28. All patients ($N = 37$) who ate nothing with any AL dose achieved parasitological cure. Consumption of milk or typical African food enhances lumefantrine bioavailability providing adequate therapeutic exposure. Efficacy as measured by the 28-day cure rate was high (98%).

T2P4-05

Access to malaria treatment in rural Tanzania after switch to ACT

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In 2006 the first line treatment in public health facilities for malaria in Tanzania changed from Sulphadoxine-Pyretamine (SP) to Arthemeter Lumefantrine (ALu – Coartem^{TM}). The ACCESS project aims to increase the availability of quality antimalarial care in both the public and the private retail sectors. In the latter, ACCESS worked with other partners on the ADDO (accredited drug dispensing outlets) project, which was piloted in selected districts in Tanzania. We aimed to assess the changes in treatment seeking practices after the switch to ALu and the introduction of specific interventions. The study was implemented within the framework of the Ifakara Demographic Surveillance System in southern Tanzania (80 000 people). Households surveys were carried out in 2004 (137 patients), 2006 (153 patients) and 2008 (127 patients) to elicit information on treatment seeking practices for fever. Health facility surveillance and shop censuses were carried out regularly to assess the availability of antimalarials in both the public and the private sector. The surveys showed very high antimalarial use to treat fever: 86% in 2004 and 96% in 2008. In 2004 the most commonly used antimalarials were SP (46%) and Quinine (48%), whereas in 2008 it was ALu (36%), SP (39%) and Quinine (18%). The number of shops stocking antimalarials remained virtually unchanged between 2004 and 2008 (0.72 per 1000 people). However the proportion of people who got treatment from a shop increased from 31% (23–39%) to 43% (34–52%) and the quality of treatment improved. Health facilities experienced regular and prolonged stock-outs of SP towards the end of 2006 but since ALu has been introduced it has been available in facilities for over 80% of the months of the year. The proportion of people who got treatment from health facilities remained constant at 49%. Two years after the switch to ALu a third of fever cases were treated with the new drug. The introduction of ADDOs led to an increase in the number of fever cases treated in the private sector.

T2P4-06

Functioning public health service system in early diagnosis and treatment of malaria in the national malaria control programme – Viet Nam

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Reports over the past 8 years show that malaria continues to decline all over the Viet Nam. Morbidity and mortality fell from 3.07/1000 and 0.12/100 000 in 2001 to 0.70 and 0.03 respectively in 2008. No important malaria epidemic occurred during this period. This was beyond the expected goals defined for 2010. The improvement is due to large part to coverage and quality of the diagnostic and treatment system. More than 95% of villages in remote and malaria endemic areas have village health workers (VHWs) trained in basic malaria diagnostics and control. VHWs take blood smears for examination and provide first line treatment and along with community leaders now play an important role in malaria surveillance and detection. Every district has a mobile preventive medicine and malaria team which consists of 10–15 health staff. Many new microscopic testing points of blood slides have been set up in commune or inter-communes (to reach 3000 points in total national-wide). Each microscopy points has at least one microscopist. The ability of parasite detection of microscopists is 78–88%. About 81–89% of local people have access to microscopic points when they get fever. Most of priority districts show that 95% of patients are receiving diagnostic and correct treatment; 70% of patients suffering from malaria seek treatment within 24 hours after the onset of symptoms. Early treatment is now mostly carried out at the commune and village levels. Currently, close to 80% of all treatments are carried out at this level; around 20–25% are treated by mobile teams and hospitals. 90% of health facilities have sufficient equipments and supplies for malaria diagnostic and 75% of them have Artemisinine base Combination Therapy (ACT). The proportion of *P. faciparum* cases treated with ACT is around 50–60% of the total cases. *P. falciparum* drug resistance is being monitored regularly and new treatment guidelines have been issued for each region as needed. The guidelines are scheduled for review every 3–5 years. A whole spectrum of anti-malarial drugs are now easily available and are free of charge nationwide: artesunate, quinine, chloroquine, and artekin (CVartecan and arterakin).

T2P4-07

Pharmacovigilance of artemether-lumefantrine in pregnant women followed up till delivery in Rwanda

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Antimalarial drugs that are considered safe during pregnancy become increasingly ineffective. Many countries shifted their treatment guidelines to artemisinin combination treatment (ACT). In Africa, a common ACT is artemether-lumefantrine (AL). The introduction of AL as first line drug for uncomplicated malaria, including malaria in pregnancy, went faster than drug registration, so that off label prescription is common. Pre-clinical investigations showed that artemisinin drugs. In Rwanda pregnant women with malaria are routinely treated with AL. In this study we followed these patients and compared these to controls, women with no malaria and no exposure to AL during the current pregnancy. Routine ante natal care and peripartum data were recorded. In the session we report the preliminary data on pregnancy, abortions and stillbirths, possible adverse events associated with AL, pregnancy outcome and full neonatal check looking for congenital defects. There was a slight over expression of acute obstetric events during pregnancy among women who were exposed to malaria

and AL. These events may also have been caused by malaria itself but this is less likely because these events did not occur during/around the malaria episode. There was no significant increase of congenital defects born from mothers who were exposed to AL.

Event	Study groups: Malaria patients (*n* = 990)	Study groups: Controls (*n* = 986)	
Uncomplicated pregnancy and delivery	919	937	*P*-value: 0.05
Complications	71	49	
Abortion	14 (1.4%)	5 (0.5%)	
Still Born	38 (3.8%)	28 (2.8%)	
Congenital malformation	2 (0.2%)	1 (0.1%)	
Maternal death	1 (0.1%)	2 (0.2%)	
Premature delivery	7 (0.7%)	1 (0.1%)	
Neurologic problem	1 (0.1%)	0 (0.0%)	
Normal delivery of a living child but died during follow up[1]	8 (0.8%)	12 (1.2%)	

These fatalities were considerred not caused by malaria or Al treatment.

Access to care and to prevention in migrants

MCP1-01

Approaching beliefs and risk perception in immigrants travelers visiting friends and relatives (VFRs) in order to adapt a preventive program

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To study values, beliefs and practices of migrants living in Spain regarding risk perception and preventive attitudes when visiting friends or relatives, we conducted a qualitative study (ethnological design) consisting of semistructured interviews in NGOs (in Madrid from September to December 2008: 6 Sub-Saharan Africans, 8 Latin-Americans; age range: 18–44) and participant observation in HIV and Chagas prevention programmes developed in 2007–2008. Triangulation of data and researchers was done. Results: Individual factors: Migrants less integrated or in an illegal situation in Spain had less perception of risk. Those born in the Tropic thought they had more immunity than tourists. For VFRs, stomach disorders are the most common health problems related (named reasons: change of climate, water and food). Support Network: Family can encourage prevention if they regard migration as something positive. It can be detrimental to health of VFRs when the family doesn't want or can't make changes in domestic habits (water, food, etc.). Children born in the host country are considered as a more vulnerable group. Sociocultural Factors: Differences between the health systems

Table for MCP1-01

Fictitious name	Age (years)	Sex	Country	Educational level	Legal situation in Spain	Time living in Spain	Civil status	Number of viists visitas al país de origen	Travel duration
Robert	30	M	Benin	University	Permiso de residencia	4 years	single	2/year	2 weeks
Edouard	30	M	Ivory Cost	Secundary	Sin permiso de trabajo	2 months and a half	single	0	0
Mamadou	30	M	Mali	University	Sin permiso de trabajo	3 years and a half	Maried,1 children in Mali	0	0
Alain	30	M	Ivory Cost	University	Asilo	6 months	single	0	0
Saliou	44	M	Guinea Bissau	University	Permiso de residencia	18 years	in couple	5	Between 15 days and 3 months
Hélène	20	w	Cameroon	Secundary	Permiso de residencia	4 years	Single, 1 children in Spain	0	0
Gabriella	24	M	Paraguay	Secundary	Sin permiso de residencia	3 years	Married, 1 children in Spain, 1 children in Paraguay	0	0
Rosa	36	W	Dominic Republic	University	Permiso de residencia	3 years	Married, 2 childrens in Spain	1	1 month
Jenifer	33	W	Dominic Republic	Primary	Permiso de residencia	5 years	Single, 2 children in Rep Dom, 1 children in Spain	3	1 month
Violeta	18	W	Colombia	Secundary	Permiso de residencia	4 years and a half	Single, pregnant	3	Between 45 days and 1 year and a half
Valeria	27	W	Bolivia	Secundary	Permiso de residencia	5 years and a half	Single, pregnant	0	0
Gustavo	22	M	Bolivia	Secundary	Sin permiso de residencia	2 years	Single	0	0
Elisa	33	W	Bolivia	Primary	Sin permiso de residencia	2 years	Married, 5 children in Bolivia	0	0

(traditional medicine, private access, paternalistic approach), lack of notion of prevention and the belief that Spanish doctors are not prepared to treat tropical diseases explains why VFRs don't usually consult their GP before travelling. Strategies: to adapt progressively to food and water. Some diseases are considered as controllable without medication, as malaria (mosquito net and repellent). Latin-American migrants use to go to the doctor in their countries of origin for a check-up. Spanish paediatricians are considered as a reference for the children when searching advice for preventive measures before travelling. Reason of travelling: If it is an urgent or dramatic situation, the preventive attitude disappears. Yearning for seeing family and friends again puts worries about health risk of travel in a secondary place. Emotional pressure, lack of support network, non-acculturation and the belief of being immune are factors that can hamper preventive attitudes when travelling back home. Differences between health models can lead to a misunderstanding and mistrust against Spanish health care providers. Children are more protected and paediatrician seems to be a key point to give preventive information to families.This research has been very useful to elaborate preventive strategies aimed to VFRs.

MCP1-02

Improving health care for immigrant pediatric patients and families with sickle cell disease (SCD) through the design and production of a three language, image-rich educational book: "Sickle Cell Disease: information and advice for children and parents"

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An educational book in three languages (Italian, French, English) was developed specifically for children with SCD and their caregivers. Coloured drawings and cartoons with figures of different ethnic background were prepared to illustrate the mode of transmission of SCD, its effects on the human body and its main acute and chronic manifestations. The drawings and the text were discussed with parents and children both in meetings and during routine health care visits for six months. All 36 families participated in the meetings, felt free to ask questions in there own language (English or French). Many suggestions were made by parents or by the children themselves and their suggestions were added in the book. Instructions on temperature measurement and fever management, antibiotic prophylaxis administration and home pain management were requested by parents to be stressed in the definitive version of the book. The efficacy and usefulness of the educational book in increasing adherence to treatment and health schedules can now be prospectively evaluated in a two year time. In our setting the active involvement of culturally heterogeneous caregivers can provide a Multicultural Health Education model reproducible for other diseases as well.

MCP1-03

Unhealthy conditions and lack of care in detention centres for migrants Malta

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Over the last years thousands of migrants tried to reach Europe over the Mediterranean Sea. In 2008 Malta has registered 2704 new arrivals, a significant increase compared to previous years. People arriving without documents are systematically put in government detention centres. Since August 2008 MSF provided health and psychological care in three Maltese detention centres, but the continued unacceptably poor conditions led to suspension of MSF's intervention in February 2009.

METHODS Analysis of medical data collection based on 3192 consultations by MSF between August 2008 and February 2009, interviews with key informants, including patients, migrants, health and administrative staff in the detention centres; review of additional specific documentation of living conditions in these centres. For almost 60% of arrivals the country of origin was in conflict or with widespread human rights abuse – 47% came from Somalia. Numbers of new arrivals are increasing, with 7% women and children and almost 70% reporting illness problems at arrival, mainly linked to the travel. Conditions in detention centres showed overcrowding with in some cases less than 3 m^2 per person, very few functioning showers and toilet amenities. Shelter and nutrition were substandard. Basic care and hygiene measures for infectious diseases were insufficient or absent, this in presence of outbreaks of chicken pox, gastro-enteritis and tuberculosis. Isolation measures were applied randomly, including for non-ill persons. Deterioration of health status among detained people was documented, with 65 episodes of infectious disease among 60 people healthy at arrival. A high frequency of respiratory, skin and gastro-intestinal infections was documented. The journey and the detention have a serious impact on mental health. 21% reported to have suffered physical abuse prior to arrival and many report witnessing deaths of family members or co-travellers. The intended policy of deterring migrants to enter Malta seems ineffective in view of increasing numbers of arrivals. The overall term 'Migrants' can be misleading as the majority of people arrive from countries with major refugee streams. Some people arrive with health problems, but most get ill as a consequence of bad hygienic and nutrition conditions during detention. Some documented detention centres would even fall short of international minimal standard conditions for refugee camps in SSA. Measures to provide care and to control infectious diseases are insufficient. The report documents psychological and physical health damage from conditions of detention. Maltese authorities fail to respond to basic needs of people in detention centres and fail to bring significant change to the current health hazard.

MCP1-04

Ethical and public health concerns based on the retrospective analysis of referrals for diagnostic parasitology of immigrants and autochthonous population in Lampedusa island (Italy)

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Based on the cases referred to the Pathology Laboratory, the paper explores the incidence of parasitic diseases in the immigrant and autochthonous population of the Italian Island of Lampedusa, and examines possible ethical and public health concerns related to the results. The study retrospectively reviewed the parasitological diagnosis made on blood, urine and stool samples of all cases referred to the sole clinical laboratory of Lampedusa Island, during the period from January 2008 to May 2009. Separate statistics were built for indigenous and immigrant population. Over a total of about 7000 regular residents of Lampedusa Island, 3.928 persons were referred to the laboratory for diagnostic parasitology during the observation period. Out of these, 3600 blood smears, 3700 urine sediments and 111 stool samples were examined with following results. In five cases infection with Giardia lamblia was diagnosed, and in 45 cases Ascaris lumbricoides eggs and 29 cases of other helmints were found in stool samples. No parasitological findings were reported from the observation of blood smears or urine sediment. In contrast, over the total declared number of 40.140

immigrants disembarked on Lampedusa (35.540 in 2008 and 4.600 to may 2009) and hosted in the temporary camps over the observed period, only 18 were referred to the laboratory for further diagnostic investigation. Out of these, one case of falciparum malaria was diagnosed through blood examinations, one case of *Schistosoma haematobium* was found in urine, while stool examinations resulted in one case of *Entamoeba hystolitica*, 3 of *Giardia lamblia* and a constant presence of a variety of helminthic infections. The disproportion between cases referred from the indigenous population and those belonging to the immigrant population highlights the scarce attention given to the latter. The high proportion of confirmed cases of parasitic infection shows the relevance of these diseases among the immigrant population and elicits concerns about the potential risk of the emergence or the increased incidence of communicable diseases in the island (especially for those with an oral-faecal route of transmission). Concerns are raised both from an obvious public health perspective, and from an ethical point of view, i.e. in relation with the right to health of immigrant population whose access to care is limited, with a call for more attentive screening and health care provision to immigrant population, which current immigration policies and official attitude do not favor.

Research needs in migrants' health

MCP2-01

Differences in the frequency of primary care medical visits between immigrants and Spanish nationals

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To analyse the frequency of primary care medical visits of immigrants with regard to the nationals in a publicly funded universal health system, we conducted a retrospective descriptive study of number of visits. We analysed all numbers of appointments from 20 primary care centres for 2007 to family physicians based on data obtained from electronic medical records. The number of visits was adjusted by sex and age using the reference population from the health card data base. Direct standardization was performed to avoid differences caused by population distribution bias. The total number of visits to family physicians per year was considered the main variable. We analysed 2 553 763 appointments from a reference population of 1 018 160 people. The average number of visits to primary care centres was lower in the case of the immigrant population (adjusted value 1.5) than in the Spanish group (adjusted value), a relation that was maintained for all age and gender groups. All differences were statistically significant ($P < 0.05$). Despite public opinion to the contrary, immigrants make less use of public health services. This may be due to better health, better use of the health system or other factors such as the difficulty of access and legal status.

MCP2-02

A social health model supporting undocumented immigrants in Italy

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In 2008, 5.8% of Italian residents were foreigners. According to a Report of the Ministry of Interior, in July 2007 some 750.000 undocumented migrants were present in Italy, most in Southern areas. Current legislation (June 2009) gives undocumented migrants the right to access to healthcare, without being reported to the immigration authorities and subject to the issuance of an identification code called STP (immigrants temporarily present) by the national health system. The implementation of this legislation (which at the time of writing is at stake because of a pending law proposal on Public Security) has met enormous difficulties, due to the lack of knowledge by the beneficiaries and/or the providers themselves, lack of outreach activities and cultural mediation, and ambiguity of the legal text. Since 2003, MSF has been operating in Southern Italy, alongside the public health services, with the objective of building appropriate skills and tools to meet the health needs of the migrants. MSF has set up a model based on six levels:

(1) Health care to undocumented immigrants: based on an outpatient system located within the structures of Local Health System and interacting with the secondary level (specialists and hospital). Successful examples of the model are the integrated management of pregnancy and the assistance for psychiatric disorders.

(2) Outreach: proactive outreach to bring the information on available health care to the beneficiaries, carried out by cultural mediators and social workers, has proven to be a key-factor to maximize access to healthcare.

(3) Linguistic-cultural mediation: the use of qualified persons belonging to the same linguistic and cultural areas of origin of the beneficiaries, has proven to be a key-factor to build trust and maximize access.

(4) Training on legal, socio/cultural and healthcare aspects, targeting staff of National Health System.

(5) Legal advice on specific cases, with the broader aim of providing standardized information to beneficiaries about their rights.

(6) Advocacy aimed at fostering social change at national and regional level.

The above findings show that it is possible to improve the access to healthcare for undocumented migrants, provided that there is a strong commitment of policy-makers and health system. Lack of commitment, or the introduction of discouraging measures (for instance, the risk of being reported to migration authorities) put at stake the individual health and creates unnecessary health risks for the community.

MCP2-03

Intercultural mediation as solution to linguistic and cultural conflicts between health personnel and migrant patients and a way to social integration

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In the past 10 years, Spain became an attractive place for migrants and the number of residents from other cultures grew up significantly. Many immigrants do not speak Spanish, which causes communication problems between health care professionals and patients. Thus a multidisciplinary at our hospital recruited 18 men and women from different cultures to provide language interpretation and management of culture conflicts in social and health fields. The mediators received 100 hours of medical, interpretation and mediation training and 125 hours of practical training registering interventions (SPSS statistic program). The mediators also passed an Acculturation Scale test ($BISS^2$) before and after the practices (Scores 1 = no stress/4 = manifest stress), $n = 11$. Statistic analysis: Wilcoxon test for paired samples. During two months and a half of practical training, the students intervened 157 times. Languages most often used were English

(23%), French (20%), Arab (15%), African languages like Wolof, Pulaar and Bambara (14%), Russian (8%), Bulgarian (8%) and Rumanian (7%). Departments requesting the service most frequently were the TMC (30%) and the Emergency dept. (23%). 69% of the interventions were first visits.

The mediators were 10 women and eight men coming from sub-Saharan Africa, Rumania, Bulgaria, Armenia, Morocco and Latin-America. The acculturative stress was reduced after the experience: the average passed from 2.60 to 2.32, ($P = 0.026$). Perceived discrimination was also reduced: from 2.49 to 2.19 ($P = 0.045$). This experience shows the advisability of implementing a mediation service in hospitals and health centers in countries with a high percentage of people from other cultures. It also reduced acculturative stress and perceived discrimination in people from other cultures.

Gender disparities in TB and HIV: evidences and strategies

T3P4-01

Epidemiology of the HIV/AIDS epidemic: the reasons for the increasing number of women infected with HIV in Eastern Europe

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Russian Federation and the Ukraine are among the European countries with the most rapidly increasing number of newly diagnosed HIV cases, mainly transmitted by intravenous drug users, but also increasingly by sexual contact in the general population and by mother-to-child-transmission. An example of the rapidly spreading HIV/AIDS epidemic in the Russian Federation and the Ukraine, and the impact of gender on HIV/AIDS will be analysed, demonstrating the importance of integrating gender into HIV programmes that increase women's access to information. Evaluation of the reported HIV/AIDS cases from the official epidemiological register of the Ukrainian Centre for AIDS Prevention between 1995 and 2007, alongside data from the Moscow Centre for HIV/AIDS Prevention since 1995. In 2007, 17 669 new HIV cases were registered in the Ukraine and 44 713 new HIV cases in the Russian Federation. In the newly registered cases of HIV, the proportion of women rose in the Russian Federation from 13.0% in 1995 to 43% in 2007 and in the Ukraine from 37.2% in 1995 to 41.9% in 2006. There has also been a considerable increase in mother-to-child-transmission of HIV since 1995. Between 1987 and 1994 the proportion of children among the people newly infected with HIV in the Ukraine was 2.2%. In 2007 it was 19.4%. The reasons for the increasing number of women infected with HIV in the Russian Federation and in the Ukraine are, above all, that women and girls do not have the knowledge or opportunities to make sure that they are protected, or to demand protection from their sexual partners. Women are often afraid of being tested for HIV in both countries in case their diagnosis is disclosed. HIV infected people continue to be stigmatised by relatives and friends, by co-workers and even by the staff of the healthcare facilities they visit. The fear of encountering prejudice from healthcare workers sometimes discourages women from seeking medical care from the women's health service; and, in the event of an HIV infection being confirmed, from registering with an AIDS centre or continuing to be examined at the women's health service. Other possible causative factors are increasing unemployment and impoverishment, especially among women, and an increase in prostitution in Russia and in Ukraine, accompanied by rising intravenous drug use among female sex workers.

T3P4-02

HIV/AIDS and response of troubled youth

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Islamic charities provide health, education and social services to millions of people in Pakistan. But in Pakistan sexuality remains a taboo topic. Through a questionnaire data on knowledge, attitude, behavior and practices related to STIs/HIV/AIDS was collected from 1200 male religious students and religious scholars from randomly selected Islamic religious centers. 70% had friends of opposite sex; due to strong religious values and restriction 30% did not. 40% had kissing and only 18% had intercourse. During intercourse only 3% used condoms. 42% consider that condoms are used only for family planning purpose. 56% answered that during intercourse use of condoms reduce sexual pleasure and enjoyment. 32% used drugs and 38% did not know about STIs and HIV/AIDS. Training of adolescent as peer educators is recommended. Such information should be given to youth in a way that does not challenge local norms and values. Problem-based learning and participatory education for improving knowledge and condom use and community-based interventions should be considered for STIs/HIV/AIDS prevention.

T3P4-03

HIV and sexual practices of transgender community in Pakistan

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On the bottom rungs of Pakistan's social ladder, the eunuch-transvestites or *Hijras* scrape out a hard existence. Cultural descendants of the court eunuchs of the Mughal Empire (1526–1858), they now earn their living as beggars, dancers and prostitutes. Most Pakistani cities have sizable Hijra communities, divided into clan groups living mostly in slums and presided over by a leader or guru. To assess risk behaviours including number and type of sex partners, condom use, knowledge of STIs and HIV/AIDS among hijras (eunuch) of Lahore, Pakistan, 200 *hijras* were recruited through Respondent Driven Sampling and interviewed by a team of experienced interviewers. The mean age of the respondents was 29.2 ± 6.3 years. 68.5% were illiterate; 23% were married. Among married, 89% were married to women and had 1–7 children. 60% nt had taken some hard drug (Cocaine, Heroin, Morphine and Amphetamine) during the last 12 months and 3% had injected drugs. 8% had sex with a woman during the last year. During the last one week, 82% respondents had 1–21 new clients and 69.5% never used condoms; 21.5% had oral sex with new clients. During the same period, 72% respondents had 1–12 regular clients and 71.5% of them never used condom while 7% respondents had 1–5 non-paying partners. During the last one month, five *hijras* had paid women to have vaginal sex. 19% paid another man for sex. Only 27.1% were not aware of any symptom of sexually transmitted infections. 81.5% were familiar with HIV/AIDS. However knowledge about its mode of transmission was faulty. Due to low level of accurate knowledge regarding STI/HIV and pernicious risk behaviours, hijras may become a potent source of HIV transmission, if necessary remedial measures are not taken.

Abstracts of the 6th European Congress on Tropical Medicine and International Health and 1st Mediterranean Conference on Migration and Travel Health

T3P4-04

Awareness of HIV sero-status among pregnant women in Northern Uganda: a cross-sectional assessment

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Awareness of own HIV sero-status is crucial for an effective expansion of programmes to prevent mother-to-child transmission (PMTCT) of HIV. This is the necessary pre-condition for enrolment into effective prophylaxis regimens to protect the baby from infection and for referral towards further clinical assessment and care, including anti-retroviral therapy. Health facilities in Uganda are expected to provide with specific PMTCT data routinely in order to facilitate an evaluation of the service performance. However, these data are often irregular and incomplete with a difficult estimate of the target population eligible for PMTCT intervention. The Northern Uganda Malaria AIDS & TB Programme (NUMAT) adopted the rapid and cost-effective LQAS (lot quality assurance sampling) survey technique to measure PMTCT-related indicators. Randomly selected women in reproductive age (15–44 years) that had given birth in the two years prior to the survey were interviewed. A structured questionnaire was used to examine ANC-related services they had attended during their pregnancy. The survey was conducted in all nine districts of the Central Northern Region of Uganda. 93% of the 793 respondents had attended ante-natal care at least once during their last pregnancy, but only 66% eventually were aware of their HIV sero-status. A number of missed sequential steps made this possible. Although trained midwives are deployed in most ante-natal clinics and provider-initiated HIV testing is recommended, 181 interviewed mothers (23%) were not counseled on HIV-related issues and an additional 28 were not offered to be tested. Some 27 more declined to be tested and despite availability of rapid testing methods, 34 of those tested did not receive their test result. Ultimately, those who reported having disclosed their result to the partner were 483 (61% of all respondents). Interestingly, only 414 (52%) of all mothers could mention the three ways of mother-to-child transmission of HIV. Even with better availability of PMTCT services through extensive training of health workers and supply of HIV tests, still many opportunities for providing the whole range of this service to pregnant mothers in Northern Uganda are missed. There is need to tackle all related factors, possibly starting from a detailed understanding why such opportunities get missed and a more scrupulous implementation of existing PMTCT policy documents and guidelines.

T3P4-05

Vitamin D status of HIV-infected women and its relationship with HIV disease progression, anemia, and mortality

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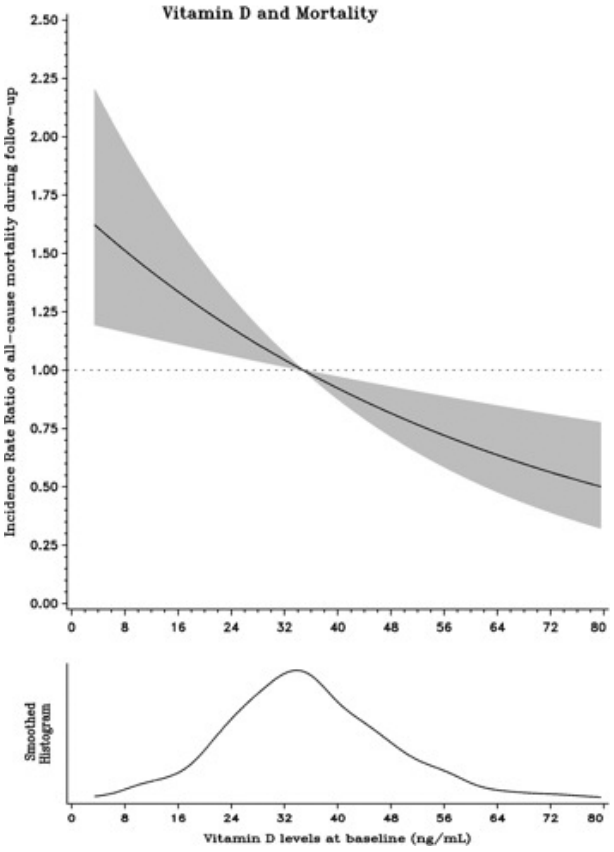
Vitamin D has a potential role in slowing HIV disease progression and preventing mortality based on its extensive involvement in the immune system. We assessed vitamin D levels in HIV-infected pregnant women at enrollment into a trial of multivitamin supplementation (not including vitamin D) in Tanzania. These women were followed up every month (median follow-up time: 69.5 months) and information on hemoglobin levels, T-cell counts, HIV disease progression, and mortality was recorded. Cox proportional hazards models and generalized estimating equations were used to assess the relationship of these outcomes with vitamin D status. Low vitamin D status (serum 25-hydroxyvitamin D <32 ng/mL) was significantly associated with progression to WHO HIV disease stage III or greater in multivariate models (incidence rate ratio [RR]: 1.25; 95% confidence intervals [CI]: 1.05, 1.50; $P = 0.01$). No significant relationship was observed between vitamin D status and T-cell counts. Women with low vitamin D status had a 46% higher risk of developing severe anemia over the course of follow-up, as compared to women with adequate levels of vitamin D (HR: 1.46; 95% CI: 1.09, 1.96; $P = 0.01$). Vitamin D was also associated with a 42% lower risk of all-cause mortality, when comparing the highest quintile of vitamin D with the lowest (RR: 0.58; 95% CI: 0.40, 0.84; $P < 0.01$). If confirmed in randomized controlled trials, low cost vitamin D supplementation could be a simple method to prolong the time to initiation of anti-retroviral therapy in HIV-infected patients, particularly in resource-limited settings.



Diseases targeted for elimination. 1: leprosy

T4P7-01

Disability in people affected with leprosy: stigma, social participation and discrimination

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INTRODUCTION Leprosy programmes are hampered due to the lack of data on leprosy-related disability and its consequences on social participation and discrimination. We conducted a cross-sectional house-to-house survey amongst persons affected by

leprosy with disability in 5 districts in Indonesia: Subang (West Java), Gresik, Malang (East Java), Bone and Gowa (South Sulawesi). We obtained basic demographic data including age, gender, marital status, employment status, WHO disability grading, and physical impairment. Standardized and validated general disability survey tools were used based on generic methods and instruments for disability and stigma, compatible with the International Classification of Functioning, Disability and Health (ICF) conceptual framework Screening of Activity Limitation and Safety Awareness (SALSA) scale, Participation scale, Jacoby-stigma scale and Explanatory Model Interview Catalogue (EMIC) scale. 1358 people affected by leprosy were surveyed, mean age was 42.5 and 843 were male. 76.7% of people suffered from physical impairment (48.7% for grade 2 and 28.0% for grade 1). Almost 60% had no limitation in executing daily activities due to their physical impairment, however more than 60% of the people had problems in participating in the community. Participation restrictions were significantly associated with education level ($P < 0.001$), grade of impairment ($P < 0.001$) and perceived stigma ($P < 0.001$). Physical impairments, activity limitations, participation restrictions, and stigma are common among people affected by leprosy in Indonesia. However, stigma and lack of social participation was perceived as a worse problem than the physical impairments by leprosy. Addressing the issues of stigma and social reintegration and rehabilitation of persons affected by leprosy is an urgent need.

T4P7-02

Hansen's disease endemic control in the Amazon

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The 44th UN Health Assembly called for the eradication of Hansen's disease by 2005. In the triple frontier area (Brazil-Paraguay-Argentina) of the Amazon our priorities are training of community health agents and health education, as health infrastructure is practically inexistent and it is difficult to maintain a network of health professionals in the area over time. Our aim was to intensify the prevention activities; to facilitate the treatment in remote areas; to train community health workers (CKW) as key agents for the eradication of the disease.

METHODS (A) Grotjanhto method as a screening method by trained CWV of etiology, (B) Matise method (for the diagnosed patients). From 1997 to 2008 we made 20 855 diagnoses, undertook 3794 activities of prevention, 1997 activities of physical rehabilitation, 6120 activities of social rehabilitation, 527 382 consultations in urban zone, 38 430 consultations in rural zone, 99 798 dermatological exams, 138 general campaigns and 107 CWV courses. The prevalence has diminished from 123.48 in 1986 to 16.48 in 2008. According to the WHO the disease should have been under control since the beginning of this century, but endemic regions lack a solid health system, hence our effort to train lay health workers, who are usually the only ones who will remain in place long enough. They have contributed to control the epidemic making treatments acceptable and easier.

Miscellaneous on migrant health

MCP4-01

Sickle cell disease affected children: an increasing group of children born in Europe from immigrant families

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Inherited haemoglobin disorders are an increasing global health problem and SCD has become the paradigm of immigration haematology in Europe. Italy is a natural reservoir of SCD due to the high frequency of both the S gene in the Sicilian population (2–13%) and the beta thalassemia mutations in the Italian population (6–11%). Globalization recently brought to the Northern Regions immigrants from areas where SCD variants are even more frequent. To describe social and clinical characteristics of children referred to our Center with suspect of sickle cell hemoglobinopathies and determine specific health care needs of this unique group of immigrant children., we set up a hub and satellite like service to improve care for SCD patients in the Veneto Region in order to grant minimum standards of care for all children even if knowledge of SCD is still scarce. We performed a descriptive analysis of the social and clinical information of patients accessing our haematology outpatient clinic or inpatients services. 99 children were referred to our Center with suspect of SCD from January 2002 to June 2009: 56 had SCD (43 HbS/HbS, 8 HbS/beta thalassemia, 5 HbS/HbC), 32 were carriers (30 HbS/HbA, 2 HbC/HbA), 6 are still under investigation. Mean age at SCD diagnosis was 29 months (range: 1–130). 24 were M and 32 were F. Ethnic background was heterogeneous: 79% were African, 9% from South America, 7% from Italy and 5% from Albania. Moreover, 86% of the children came from first generation immigrant families, 10% were Italians or born from mixed Italian/immigrant couples and 4% were internationally adopted children. 43/56 (77%) were born in Italy and all live in the Veneto Region. According to international guidelines tailored to our setting, SCD children were placed of Amoxicillin Prophylaxis twice a day and pneumococcal immunization. All patients follow a health maintenance protocol with scheduled visits and monitoring of organ damage, including Transcranial Doppler (TCD) for primary stroke prevention and cardiac ultrasound for prevention of pulmonary hypertension. Major clinical events were: 13 Acute Chest Syndrome (ACS), 3 Strokes, 18 Severe Pain Crisis requiring hospitalization. 45 children were admitted at least once, with a total number of 128 admissions. Eight children are on Hydroxiurea Treatment for recurrent ACS and/or pain crisis and 5 are on chronic transfusion regimen (3 on Erythrocytapheresis and 2 on simple transfusion), mainly for primary or secondary stroke prevention. SCD affected children represent an increasing group of children born in Europe from immigrant families with specific social and health care needs. Given the complex multidisciplinary needs of these patients, Pediatric Health Services in Italy should include diagnostic and therapeutic paths for the acute and chronic manifestations of SCD such as TCD screening performance and availability of Erythrocytapheresis.

MCP4-02

Undocumented female immigramts in the Netherlands have unmet needs in sexual and reproductive health

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To assess which reproductive health problems and needs undocumented immigrant women have and what obstacles they experience when seeking help for these problems or needs, we conducted a descriptive study of 100 women, aged 18 and older, were recruited through many different support organizations, general practitioners (GP's), churches, midwives, recruiting posters and advertisements in local newspapers. Variety was sought according to age, country of origin and reason for being undocumented. The women expressed many obstacles and problems in seeking reproductive health care, such as lack of information about reproductive health services and contraception, problems with financing of services and fear for deportation. This resulted in lack of or delayed pregnancy

care (19% never attended any antenatal care), numerous pregnancy related and obstetric problems, low use of contraception, a considerable unmet need for contraceptive methods, very high abortion rates (64.9/1000) and low rates of cervical cancer screening. Also gynaecological and sexual problems were prevalent. Exposure to sexual and physical violence in the past was frequently reported: 28% and 45%. This was reported significantly less frequent when a woman was accompanied by her husband/partner during the interview. 71% of the women that reported sexual problems were sexually abused. The reproductive health status of undocumented female immigrants in the Netherlands is worrisome. Most of these women are not able to exercise control over their own reproductive and sexual health. There is an urgent need to empower these women through information and education, and to strengthen their personal skills. Routine screening for exposure to violence by physicians is recommended. This should be executed in absence of any companions. Further, the Dutch government should make efforts to ensure adequate access to (free) reproductive health and family planning services.

MCP4-03

In the relationship between physician and foreign patient the linguistic misunderstanding is a lexical problem or a semantic problem?

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INTRODUCTION Problems in communication with health care professionals contribute to the vulnerability of immigrant patients. There are a lot of differences in the conceptualization and categorization of the various parts of the body in the different languages and cultures. This issue is fundamental in the relationship between physician and foreign patient and therefore in transcultural medicine. Through a simple interview we asked foreigners of different nationalities present in Rome to express in their languages the next concepts of parts of the body: foot, leg, hand and arm. In 52% of languages under survey, the English concepts of foot and leg are expressed by a unique lexeme that indicates the whole lower limb, in the same way the English concepts of hand and arm are expressed by the same word that indicates the whole upper limb; in 22% of languages under survey the concepts of foot and leg are expressed by a unique word, but hand and arm by two distinct words; in 9% hand and arm are rendered by only one word, while foot and leg by two different terms; 17% of these languages use different terms to indicate foot/leg and hand/arm. For example: the tamil word *Kal* indicates the whole lower limb both foot and leg. But if the doctor asks the patient which part of *Kal* hurts him, the patient can use the word *Padam* to refer to the part corresponding to the foot. In standard Japanese hand and arm are translated from two distinct words (*Te* hand and *Ude* arm) but there isn't any distinction between foot and leg, so they use the unique lexeme *Ashi*. The cultural-linguistic difference between a physician and his foreign patient can cause misunderstandings, delaying diagnosis or causing it to be mistaken and leading to wrong therapeutic choices.

MCP4-04

Comparative study of paediatric prescription drug utilization between the Spanish and immigrant population

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We studied the overall and specific differences in prescription drug utilization between the immigrant and Spanish population residing in the Autonomous Region of Aragon in 2006, using the pharmaceutical billing database and the Aragonese Health Service Users database for 2006. The studied population comprises 159 908 children, of whom 13.6% are foreign nationals. Different utilization variables were calculated for each group. A total of 833 223 prescriptions were analysed. Utilization is lower for immigrant children than in Spanish children for both DID (66.27 vs. 113.67) and average annual expense (€21.55 vs. €41.14). Immigrant children consume fewer prescription drugs than Spanish children in all of the therapy groups, with the most prescribed (in DID) being: respiratory system, anti-infectives for systemic use, nervous system, sensory organs. Significant differences were observed in relation to the type of drugs and the geographical background of immigrants. Prescription drug utilization is much greater in Spanish children than in immigrant children. There are important differences regarding drug type and depending on immigrants' geographical backgrounds that suggest there are social, cultural and access factors underlying these disparities.

MCP4-05

The experience of surgery "Salute senza Margini" dedicated to immigrants without residence permit in the Health District of Casalecchio di Reno of Azienda Unità Sanitaria Locale (AUSL) of Bologna

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This research refers to the "Salute Senza Margini", created for immigrants without residence permit and the poorest instituted in 2002. We wanted to gain a clear understanding of the population served, statistics about the diseases treated, the overall quality of service provided. Data were extracted from case histories of users. So far 747 immigrants have been treated under the policy (69% were women). The average age was 25 years. Before 2007, 81%patients came from Eastern Europe, 38% from Romania. In 2007, when Romania and Bulgaria became members of the EU, most patients were Moldavians (21%) and in 2008, Moroccans (21%). Most immigrant women came to the surgery for obstetric-gynaecological diagnosis (24%), gastrointestinal diseases (6%), muscular pains (6%), and cardio-respiratory pathologies (7.5%). This research showed that immigrants average age is pretty low; contagious diseases are rare. Doctors have also noticed reticence by users to answer their questions due to poor understanding of the local language, perhaps related to a lack of education or distrust.The surgery is a valuable asset for immigrants without residence permits, and the activities of the surgery are going to be monitored to assess their effectiveness. In the future cultural and linguistic mediators will support doctors.

Diseases targeted to elimination. 2: filariasis, teniasis

MCP4-06

Knowledge, attitudes and practices (KAP) study regarding to malaria transmission and protection among Afghan refugees and comparing with Iranian resident Southeastern Iran

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Annually, 24–36% of malaria case in Beluchestan area occurs among Afghani refugees. Afghan refugees' knowledge on malaria transmission and therefore protection are important because they

enable local Health Services to manage malaria control among Afghani refugees. To explore and investigate knowledge, attitude and practices of Afghan refugees and Iranian residents with respect to malaria transmission and protection, a cross-sectional study was performed and 10% of target groups were selected by systematic random sampling and then interviewed. 385 Iranian and 390 Afghani refugees participated. 76.6% of Iranians and 60.1% Afghanis are familiar with typical symptoms of malaria but nearly 50% of both groups did not know malaria transmission occurs by mosquito bites. About 90% of Afghanis stated that they do not use any self protection against mosquitoes bite during night, while 60% of Iranians use bed nets. Most Afghanis sleep indoors during malaria transmission seasons without any protection. Cross-border traffic of Afghani is an important factor for persistence of malaria in Baluchestan area, as are life style and lack of protective behaviour of refugees. Afghani communities must be encouraged to participate in malaria control programmes.

T4P8-01

Factors influencing the microfilarial load of *Onchocerca volvulus* six months after a first dose of ivermectin

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Ivermectin (IVM) has two main effects on *Onchocerca volvulus*: a microfilaricidal effect, inducing a rapid decrease in the microfilaridermia, and an inhibition of microfilarial release by adult female worms (the so-called embryostatic effect) which lasts about 2 months. After this period, the progressive resumption of the adult worms fecundity brings about a slow skin repopulation by microfilariae (mf). It has been shown that the repopulation rate may vary largely between individuals, and we have tried to identify factors that may account for this variability: individual data collected as part of two clinical trials conducted in Cameroon were analyzed. In both trials, microfilarial loads had been measured before (D0) and 6 months after a first dose of IVM (D180). In the first trial, in which 965 patients aged 5 years and over had been examined, individual information on age, gender, and level of endemicity of the village of residence was collected. In the second trial, which involved 97 males aged 25 years and over who harboured at least 2 onchocercal nodules, information on age and number of palpable nodules was available. Multilevel negative binomial regressions were used to assess which of these factors may have influenced the microfilaridermia observed on D180. After controlling on other possible cofactors, the loads on D180 were found to be higher in patients with higher microfilaridermia on D0, in young individuals (respectively 1.7 and 1.5 times higher in subjects 5–9 and 10–14 years old, compared to 20–34 year-old individuals), in males (1.4 times higher than in females), in individuals living in villages with higher levels of endemicity, and in subjects harbouring a higher number of palpable nodules (2.3 and 2.7 times higher loads in subjects showing 3–4 and >4 nodules, respectively, compared to subjects harbouring 2 nodules). Studies are ongoing on the possible emergence of suboptimal responses (SOR) of *O. volvulus* to IVM. The skin repopulation rate by mf is one of the phenotypes used to detect such a SOR. Our findings indicate that any analysis using this indicator should take into account individuals factors that may be associated with a more-rapid-than-expected reincrease in the microfilarial load several months after IVM treatment.

T4P8-02

The *Taenia solium* genome project: progress report

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A consortium of key laboratories at the National Autonomous University of Mexico is carrying out a full genomic project for *Taenia solium*. This project will provide powerful resources for the study of taeniasis/cysticercosis. The nuclear DNA content estimated through cytofluorometry on isolated cyton nuclei was of about 270 Mb. Two probabilistic calculations based on shotgun sequenced genomic clones, resulted in size estimates for the haploid genome of 110–130 Mb. A combined strategy with 454 and capillary sequencing is under process. So far, we have achieved 9X coverage by 454 pyrosequencing and 4.7X coverage by capillary sequencing. Current assemblage still has over 30 000 contigs. Recently, 30 fosmids were sequenced and used as reference to validate our assemblies. The excessive fragmentation of the assembly could be due to: cloning artifacts, contamination (~3–6% of pig DNA), and diminished coverage. To complete the genome assemble, new strategies of sequencing are been carried out, Whole Genome Profiling and 454 FLX pyrosecuencing. Our estimates suggest that 90% of the genes are already included. Besides genomic sequencing, 61 997 clean ESTs have been obtained: 10 851 from adult cDNA library, 5902 from larval libraries and 45 244 from a larval full-Length cDNA library. Clusterization process produced 5632 contigs and 5911 singlets. Polymorphism study of contigs shows that 564 are polymorphic genes. From the full-length cDNA library 6709 non-redundant genes were identified. Average of gene, intron and exon sizes was 2600–3200, 199–238 and 202–276 nucleotides, respectively. Four splicing leader sequences were identified, three of them specific for *Taenia* and one related to SL sequence in *Echinoccocus*. Genes ontology analysis revealed genes encoding proteins involved in metabolism, genetic information processing, environmental information processing, cellular processes and even genes related to human diseases such as cancer and immune, neurodegenerative and metabolic disorders.

Access to reproductive health services

T5P2-01

Effects of women's bargaining power on institutional delivery and unmet needs for family planning in Burkina Faso

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To assess the effects of women's bargaining power as measured by their economic autonomy, their freedom of decision making and acceptance of male dominance, in explaining the occurrence of institutional delivery and unmet needs for family planning in Burkina Faso. Multilevel logistic regressions were carried-out on data from the 2003 edition of the Demographic and health survey of Burkina Faso, to estimate the likelihood of giving birth in a health center (Institutional delivery) among 7238 mothers who gave birth to their youngest child within the 5-years preceding the survey, and to estimate the risk of sustaining unmet need for family planning (FP) among those who were married (N = 6901). Unmet need for FP occurs when a fertile married woman who would prefer to avoid pregnancy does use no FP method. Main independent variables were the share of a woman's contribution to

the household expenditure (economic autonomy), the extent to which she has a final say on her own health and on the functioning of the household (freedom of decision) and the extent to which she believes that a husband is justified in beating his wife (acceptance of male dominance). The association between these dimensions of bargaining power and the dependant variables was examined while controlling for the women's characteristics, the household socioeconomic status (SES), and contextual factors. Adjusted models show that after controlling for the mother's age, parity, education, marital status and religion, the number of prenatal visits, the household SES, and the type of residential area, the likelihood of institutional delivery was higher among women who shared at least 50% of the household expenses compared to those who had no income (Odds Ratio [OR]:1.44; 95% Confidence interval [CI]: 1.09, 1.91). Institutional delivery was less likely among women with the highest score on the index of male dominance (five out-of five) with a OR of 0.78 (95% CI: 0.63, 0.97) compared to women with the lowest score (zero out-of five). There was no significant association with freedom of decision making. Concerning unmet needs for FP, higher acceptance of male dominance (OR: 1.23; 95% CI: 1.03, 1.45 for the highest score), or lower decision making freedom (OR: 1.18; 95% CI: 1.03, 1.34 for the lowest score) were associated with higher risk of sustaining unmet need, whereas economic autonomy was associated with a lower risk (OR: 0.74; 95% CI: 0.59; 0.94 for sharing at least 50% of expenses). Lower bargaining power compromises women's access to health care independently of the household socioeconomic status. These findings underscore the need for thinking about how to overcome intra-household gender-related barriers to acquiring health care in addition to currently promoted solutions against economic barriers.

T5P2-02

The pregnant woman and her cultural context: the dialectic of access at southern Mozambique

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The lack of access to sexual and reproductive health care, especially in developing countries, contributes to the high morbidity and mortality arising from health problems that should be largely avoidable. Consequently, the *Millennium Development Goals* for 2015 now target universal access in order to improve maternal health. Access requires, however, that reproductive health care services be available when needed. In fact, this implies a dialectic between the supply of and potential demand for health care. Due to this dialectic, the pregnant woman and her cultural context constitute a key dimension, whose study and analysis are generally ignored in public health policies. On the basis of experience with the Safe Motherhood Program in southern Mozambique, we used a health and ethnographic framework to analyze the factors that affect the choices and the tortuous path of treatment arising from obstetric complications in a society where the supply of health care is plural. Those choices and courses do derive not merely from kinship and gender relations and the cultural logic about maternity, disease, risks and causality but also from the socialization of experiences that individuals have with the health services. Conditioned by the context of poverty, the health system offers a fragile alternative for responding to the population's medical needs. In this scenario, where access has health and cultural dimensions, the present study about access analyzes the meetings and misses between the health services and the population and furnishes a basis for a qualitative interpretation of the indicators of sexual and reproductive health.

T5P2-03

Aama programme: a demand side financing to reduce maternal and newborn deaths in Nepal

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Financial cost is a major barrier to women accessing maternal care. A study in 2003 showed the cost of a normal health facility delivery exceeded $80, including travel, medical fees and opportunity costs. In 2005, to offset travel costs a nationwide Maternity/Safe Delivery Incentives Programme was initiated, providing lump sum payments to all women delivering in public health institutions and, in 25 low HDI districts, free services and institutional subsidies. An independent evaluation (with 5503 samples) showed the incentives had a positive impact on use of government services, with an estimated 24% increase in the probability of a woman who is aware of the incentives delivering in a government institution. The impact was greatest among the bottom three wealth quintiles and negligible among the top two, giving an inherent impact on equity. In the 25 low HDI districts, where delivery services were free, institutional deliveries increased more significantly (by 9.3%) than in other study districts (average 1.1%), indicating the greater effectiveness of a combination of free care with incentives to those women who delivered at the health institutions. Following extensive inputs from researchers and experts, from January 2009 the Government of Nepal introduced the *Aama* programme, providing free delivery services (including complication management) at all public health institutions with

gradual expansion to teaching and community hospitals, plus incentives to cover travel costs. With intensive public awareness raising, this has the potential to substantially increase facility deliveries and reduce the maternal and newborn deaths in Nepal.

T5P2-04

Access to emergency obstetric care in rural Zambia – linking national data in a geographic information system

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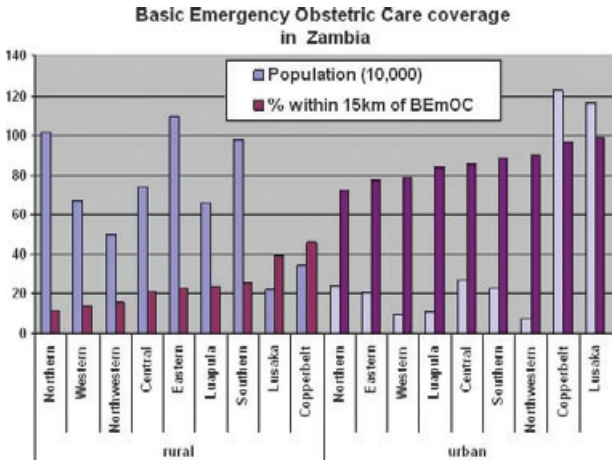
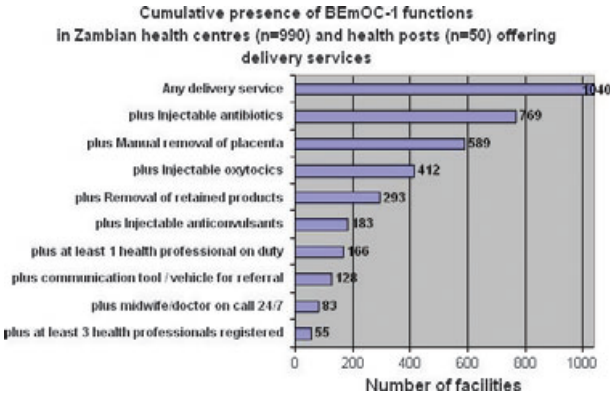
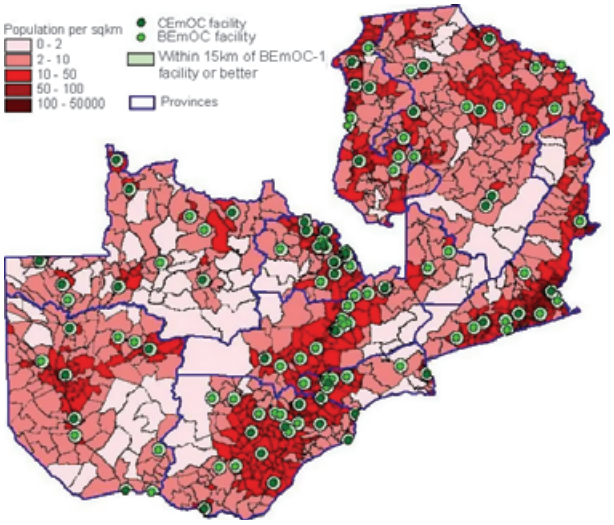
Maternal and neonatal mortality could be reduced if all women delivered in a setting where a skilled attendant can provide emergency obstetric care (EmOC) in case of complications. We aimed to assess (1) all Zambian health facilities in terms of EmOC provision, (2) their geographic distribution and population coverage and (3) how distance to an EmOC facility influences women's use of health facilities for delivery. We linked data from the Zambian Census 2000, the Zambian Health Facility Census 2005 and the Zambian Demographic and Health Survey (DHS) 2007 using their geographic coordinates, which allowed us to combine user and provider information on a national scale. Health facilities were classified by whether they could provide any delivery care, basic or comprehensive emergency obstetric care. Using a Geographic Information System, we calculated coverage with EmOC services using ward-level population data from the census and determined straight-line distances to the closest health facility of a certain level of care for all DHS clusters. Multivariable multilevel logistic regression analyses were performed in STATA to investigate the influence of distance on place of delivery for 3282 rural births between 2002 and 2007.

88% of Zambian health facilities offering delivery care are not sufficiently staffed or equipped to save a mother's life in case of complications as they cannot provide Basic Emergency Obstetric Care (BEmOC). Around half of the Zambian population lives further than 15 km from a BEmOC facility; less than 10% in urban areas and over 70% in rural areas. 48% of births to rural mothers living within 5km of a BEmOC facility were delivered in a facility, 39% of those living at 5–10 km and only 29% of those living more than 15 km away from such a facility. Using the natural logarithm of the distance in km and controlling for confounding by other determinants of delivery care use such as education and wealth, the odds of delivering in a facility setting decreased by 30% (95% confidence interval: 9–46%, $P = 0.008$) for each unit increase in distance. Lack of geographic access to functioning EmOC facilities is an important reason why two thirds of rural deliveries in Zambia still occur at home without skilled care and why maternal and neonatal mortality remain high. National data with geographic information can play a crucial role in monitoring EmOC availability and can be used for planning health facility upgrading. Eventually, this could contribute to improving access to EmOC and to saving lives.







Chagas disease

T4P9-01

Imported Chagas disease in Italy: preliminary screening results of selected immigrant populations

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Historically limited to Latin America, recently Chagas disease (CD) has become an increasingly important problem among

immigrants to non endemic countries. To assess the prevalence of *T. cruzi* infection among risk groups for CD in northern Italy, we screened (in 2009, with two different serologic tests) four main groups of subjects: (I) 98 pregnant Latin American women attending the referral Obstetric Clinic of Mangiagalli Hospital, Milan, in the first half of 2009; (II) 99 Bolivian subjects in Bergamo (Lombardy); (III) 99 adopted children screened at the Child tropical unit, S. Cuore Hospital of Negrar, Verona; (IV) 155 Italian travellers/expatriates and 113 immigrants examined at the Centre for Tropical Diseases (CTD) of the same hospital. We used a particle agglutination test (ID-PaGIA®, Dia-Med) or a recombinant ELISA (Bioelisa®, Biokit), followed by an immune chromatografic test (Rapid test Chagas, Cypress Diagnostics). A case was defined by two different, concordant positive tests. The overall prevalence of *T. cruzi* infection was 7.8% (46/591). Prevalences in the four grous were: Among pregnant women, 1% (1/98, a Bolivian woman); among Bolivian residents in Bergamo, 23% (23/99, plus 8 patients who had discordant results); among adopted children, 4% (4/99 cases, plus one discordant); among patients examined at our Centre, 6.7% (18/268): 15% immigrants (17/113) and 0.6% (1/155) Italians (an acute case in a traveller to Brasil). We found a high prevalence among Bolivian residents, while prevalence was much lower in all other nationalities. Screening is warranted for all Bolivian residents in Italy and for blood (or organ) donors coming from endemic countries. Moreover, considering the risk of congenital transmission, as well as the severity of CD in children (an age at which the treatment is more effective), we also propose to test also all Latin American women of child bearing age.

T4P9-02

Chagas disease in Spain: results of a public health program tailored to migrants from Latin-America

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In order to adapt informative chats and preventive strategies about Chagas disease aimed to Latin-American migrants living in Spain, a survey was developed by our Tropical Medicine Center (TMC) about ways of transmission, symptoms and diagnosis of Chagas disease. The program was carried out in Madrid from December 2007 to May 2009. Migrants from Latin-America living in Madrid, Spain, completed a questionnaire: some attending for the first time the TMC and some in NGOs before an educational chat given by a physician from the TMC, who could resolve the participants' doubts. After the chat, a rapid diagnosis test was offered to the participants. Results were analyzed with Chi-square test. $P<0.05$ was considered statistically significant. 556 Latin-American migrants completed the questionnaire: 287 attending the TMC and 269 in NGOs. 257 migrants from endemic areas received the chat in NGOs and 149 were tested *in situ*. Those from Bolivia met at NGOs were analyzed. 207 participants from Bolivia, 61% were women. Mean age 33 years (1–68 y). 34.5% came from rural areas (n = 197). Educational level: 83% secondary or higher. 10% had never heard about Chagas disease, 64% knew that it is caused by a parasite and 38% that it is endemic from Latin-America (n = 187). Answering about ways of transmission: triatomine vector 88%, blood transfusion 44%, mother to child 43% (n = 185); solid organ transplant 21% (n = 168). Only 47.5% believe that it is possible being asymptomatic and infected by *T. cruzi* (n = 177). About clinic: Chagas disease can involve heart (70%) or intestine (17.5%), n = 178. From July 2008 we offered the participants a rapid test to diagnose the infection. Since then, 149 migrants from Bolivia heard the chat and 85% stated their intention to do the test (n = 137). Finally, 115 participants were tested: 91 were negative and 24 were + for *T. cruzi* infection. 17 (70.8%) are actually attending theTMC. Migrants from Latin-America living in Spain are not well informed about Chagas disease and it ways of transmission. More than half of those surveyed were unaware of vertical transmission, although the majority of them were child-bearing age women. Public Health Programs like this show efficacy and a good acceptance. This highlights the need to improve similar initiatives tailored to migrant population from Chagas endemic areas in order to approach them and inform them about the disease, and where to go for diagnosis and follow-up.

T4P9-03

Intracellular cytokines in Chagas' disease and HIV infection

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Chagas' disease and HIV infection are associated with a depression of T cell response and disturbances of cytokines networks. The mechanisms involved in host–parasite interaction in patients simultaneously infected by *Trypanosoma cruzi* and HIV are not well understood. The purpose of our study was to describe the specific profile of cytokines of patients with Chagas' disease and/or HIV patients, using flow cytometry assay to detect intracellular accumulation of cytokines on peripheral blood mononuclear cell after 72 hours of *in vitro* antigen stimulation (trypomastigote antigen). Brefeldin-A, phorbol and ionomycin and control without trypomastigote antigen were employed. Fifty volunteers were analysed. Frequency of cytokines on TCD4 and TCD8 cells from co-infected (HIV and *T. cruzi*) patients (n = 11), control group of healthy volunteers without HIV and without Chagas' disease (n = 15), patients with chronic Chagas' disease (n = 10) and HIV infected patients (n = 14) were compared. The average of age and the minimum and maximum value of age in years was of 48 (35–63), 31 (22–50), 43 (26–60) and 41 (25–57) years old, respectively. Average values of CD4 in the groups were: 511, 961, 865 and 511 cells/mm^3, respectively. CD8 average values were: 824, 1215, 855 and 970 cells/mm^3, respectively. The results suggested a distinct pattern of cytokines on different cell phenotypes (TCD4 e TCD8) among the studied clinical groups. The analysis of intracellular accumulated cytokines into cells after *in vitro T. cruzi* antigen stimulation demonstrated lower proportion of TCD4+/IL-2+ in the Chagas' disease patients group, with or without HIV infection, than in the control group without these infections (P = 0.0011). Moreover, our study showed lower proportion of T CD4+/IFN-g+ cells in patients with Chagas' disease than in the control group (P = 0.0120). Such data are concordant with a modulation of the immune response aiming to reduce the cellular damage to myocardium. On the other hand, parasite antigen seems to induce a decrease of the proportion of TCD4+/IL-2+ cells and TCD4+/IFN-g+ cells, and, in a minor level of the proportion of TCD8+/IL-2+ cells in the control group, HIV+ group and co-infected group. Furthermore, the decrease of the proportion the T CD8+/IFN-g+ cells from HIV infected patients is highly suggestive of the inhibitory property of *T. cruzi* antigen and possibly absence of a regulatory action of T cells in this group.

Abstracts of the 6th European Congress on Tropical Medicine and International Health and 1st Mediterranean Conference on Migration and Travel Health

T4P9-04

Age-group analysis of benznidazole treatment-related adverse events in children and adolescents in three Chagas disease programs in Bolivia, 2002–2009

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In Bolivia, where about 15% of people are infected, Médecins Sans Frontières (MSF) has provided free Chagas diagnosis and treatment for children and adolescents in Entre Ríos (2002–2006) and Sucre (2005–2008), and for all age groups up to 50 years old in Cochabamba (2007-present). We report preliminary adverse event findings stratified by age group for patients <18 years old treated with benznidazole in these resource-limited settings. We retrospectively analysed routinely collected patient data from three MSF programs in Bolivia. *T. cruzi*-positive were treated with benznidazole. Treatment-related adverse event frequency and type were analysed by age group: <5, 5–9, 10–14, and 15–18 years old in all three programs. A total of 2657 patients <18 years of age were treated with benznidazole for Chagas disease. Benznidazole-related adverse events were observed in 30.7% (816/2657) of patients overall in all three programs, 20.2% (538/2657) of adverse events were cutaneous, 6.6% (176/2657) gastrointestinal, and 3.8% (102/2657) neuromuscular. Most adverse events were mild. Four cases required hospitalisation. No deaths occurred in treated patients. Adverse events increased with age: 13.3% (24/180) among all patients <5 years old; 27.8% (241/866) 5–9; 31.6% (404/1279) 10–14; and 44.3% (147/332) 15–18. In three Chagas care programs in Bolivia, 30.7% of patients <18 years old treated with benznidazole developed an adverse event. Frequency of side effects increased with age, more than tripling from children <5 years old to adolescents 15–18 years old. This age-related increase likely impacts treatment adherence and thus potentially efficacy in older patients. Observer variability in the documentation of adverse events likely explains much of the risk variations reported overall and per age group. Greater awareness of side effects and their impact is necessary to improve acceptance and safety of treatment among health workers and communities. Although most were mild, the high rate of adverse events underlines the need for new, less toxic, more effective treatments, including pediatric formulations and shorter treatment durations.

T4P9-05

Poor tolerance of nifurtimox among Latin American adult immigrants with chronic Chagas disease

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Nifurtimox and benznidazole are the only validated drugs for the treatment of Chagas disease. As indication for treatment has mainly focused on children until recently, there are little data on the tolerance of these drugs in adults. The objective of this study was to describe the tolerance of nifurtimox in a cohort of adults patients (age >16 years) with chronic Chagas disease. Between June 2008 and July 2009, all patients diagnosed with Chagas disease at the Geneva University Hospitals were offered treatment with nifurtimox 8-10 mg/kg/d for 60 days in the absence of contra-indication(s) such as age >50 years, prior history of complete anti-chagasic treatment, concomitant psychiatric illness or neurologic disorder (including epilepsy), allergy to nifurtimox, pregnancy or lactation, renal or hepatic insufficiency, advanced cardiac or digestive tract chagasic involvement, or unfeasible medical follow-up during treatment. Physical examination, serum creatinin, liver function tests and complete blood count were done at days 0, 7, 21 and 60. The intensity and causality of adverse events were assessed using the Common Terminology Criteria for Adverse effects Events (CTCAE), version 3.0. Of 130 patients diagnosed with chronic Chagas disease, 124 patients could be assessed for treatment. One or more contra-indication(s) for nifurtimox therapy was present in 39 patients: age >50 years (n = 13), imminent departure from Switzerland (n = 9), prior history of treatment (n = 7), intercurrent medical problems (n = 7) and pregnancy (n = 3). In addition, 3 patients refused treatment. Nifurtimox was initiated in 82 patients but was definitely stopped in 33 (40.2%), due to the occurence of grade 2–4 adverse event(s), including severe allergic reactions. Moreover, a majority of patients complained of mild to moderate neuropsychiatric adverse reactions (insomnia, irritability, memory loss, anxiety) that did not require interruption of treatment. The full safety data is under analysis and will be presented during the congress. Nifurtimox is poorly tolerated among adults with chronic Chagas disease and necessitates close medical monitoring. Despite the absence of direct comparative data, benznidazole is likely to be a better treatment option in this age group. There is an urgent need for safer and more practical treatments for Chagas disease.

T4P9-06

Age-group analysis of *Trypanosoma cruzi* seroprevalence in children and adolescents in three Chagas disease diagnosis and treatment programs in Bolivia, 2002–2009

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In Bolivia, Médecins Sans Frontières (MSF) has provided free Chagas diagnosis and treatment for children and adolescents in Entre Ríos (2002–2006) and Sucre (2005–2008), and for all age groups up to 50 years old in Cochabamba (2007-present). We report preliminary *T. cruzi* seroprevalence rates stratified by age group for patients <18 years old screened in these resource-limited settings. We analysed routinely collected patient data from three MSF programs in Bolivia. Patients were diagnosed for *T. cruzi* using two serological diagnostic tests, and those with two positive tests were confirmed as seropositive for Chagas disease. From 2005, Chagas Stat-Pak ® rapid diagnostic test was used for screening. Seroprevalence rates were analysed by age group: <5, 5–9, 10–14, and 15–18 years old in all three projects. Diagnostic screening showed that seroprevalence increased by age group in all three projects. In the age group <5 years old, seroprevalence partly reflects mother-to-child transmission, which occurs in 1–5% of births from infected mothers. In the older age groups, seroprevalence rates reflect time exposed to risk of infection. The rapid rise in rates, particularly in rural Entre Ríos, reflects ongoing vector transmission prior to 2005. Sucre and Cochabamba have lower rates reflecting their urban settings, but migration from rural areas and increasing presence of vectors ensure that infection risks remain high. Relatively successful vector control in the last 8 years greatly reduced intra- and peridomicillary presence of the vectors in much of Bolivia. However, lack of guaranteed funding for vector control points to an important danger of increased transmission in the coming years, as well as to insecticide resistance. The high seroprevalence seen in even young children highlights the massive treatment needs in both children and adults from these populations.

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Gender-based violence and unsafe abortion: public health issues

T5P3-01

The violence of silence: Tanzanian girls, poverty and illegal abortion in times of HIV

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The study addresses the implications of illegal abortion policies and practices while focusing on Tanzanian schoolgirls. During extensive anthropological fieldwork in urban and rural Tanzania, participant observation was combined with focus-group discussions, in-depth interviews, role-plays, as well as a survey. Participatory research with pupils and teachers was pursued. A youth-friendly clinic was run through collaborative research with health workers. In spite of the HIV epidemic, schoolgirls had poor access to preventive sexual health education and services. Moreover, some contraception is perceived as inappropriate, or as endangering their fertility, and perception of own HIV risk is low. When unmet needs resulted in unwanted pregnancy, abortion strategies were opted for spanning from life-threatening self-medication with various abortifacients, to the secret and expensive use of modern health services. To obtain a safe hospital abortion, girls needed social and economic support by a parent or by the man who made them pregnant. The intervention became more costly the more advanced the pregnancy was. Stages of pregnancy and the health risk an abortion implied seemed to play little role in decision making. Girls often suffered moral reprobation and the illegality of abortion in overburdened clinics did seldom allow for quality pre- or post-abortion counselling. For some girls, this resulted in the repetitive use of abortion as a means of contraception. Moreover, the lucrative benefits of the clandestine practice might help perpetuate its riskiness. Silence and implicit agreement about the illegitimacy of girls' sexual activity and use of contraception, and the illegality of abortion uphold and even promote the occurrence of unsafe abortion. In times of HIV, these clandestine practices endanger younger and poorer girls even more. Sexual- and reproductive health rights and integrated quality services by means of information, counselling and care were poorly accessible. This suggests the need for critically rethinking appropriate sexual health promotion for youths, as well as abortion laws. Legal and political restrictions blocking safe services, and systematic skill training of teachers and health workers should be addressed if the maternal health goal of the MDGs is to be reached, especially in conditions of poverty and in the era of HIV.

T5P3-02

Is female genital cutting beginning to decline in Ethiopia?

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To investigate which factors and attitudes are associated with disfavouring female genital cutting in women of reproductive age in Oromia region, Ethiopia, we aimed to find factors that will help future programs in directing efforts towards the elimination of the practice. We evaluated representative data from a double-stratified sample (n = 2221) of women aged 15–49 ys, taken within the Demographic and Health Survey in 2005. 88% of women (1964/2221) reportedly had undergone FGC and three percent mentioned (51/1910) the most serious form ('pharaonic', infibulation). There was no difference in prevalence between urban and rural women and those belonging to Christian or Islamic fate. Median age, at which the procedure was undertaken, was 6.2 years. 64% (1385/2175) favoured the discontinuation of the practice, 30% (646/2175) favoured its continuation. 56% (544/966) of Islamic women favored discontinuation compared to 70.5% (805/1142) of Christian women. About 80% of women accepted domestic violence. There was a strong influence of education on the behaviour with the odds of favouring FGC discontinuation increasing by 20% for each year of additional schooling. In logistic regression analysis, educational level, own FGC experience, religious affiliation and self empowerment were factors significantly associated with the favouring of discontinuation. FGC is still widely practised in women in this region, but signs of a change in women's perceptions are visible and encouraging. Future programs need to be particularly directed towards the illiterate population in Oromia region; the topic should be incorporated into the curricula of primary schools already. In addition, projects need to focus on reducing partner violence and strengthening the self-empowerment of women, thus improving women's status in society.

T5P3-03

Atrocities against dalit women in India: an analysis of lay press reports

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To analyze the various atrocities faced by dalit women (DW), online versions of six leading Indian English daily newspapers (Times of India, The Hindu, The Tribune, The New Indian express, The Telegraph and Hindustan Times) were searched using various combinations of the key words- dalit, rape, harassment, atrocities and woman. Data collected from 1st January 2006 to 31st December 2008 were classified into the type of atrocities, number of episodes reported from various states of India, support/remedial measures provided by the police, government organizations and others. Data were analyzed by simple descriptive statistics. 113 women including seven minors (<18) were affected in 76 incidents as reported in lay press. Common atrocities reported were rape (42%), gang rape (11%), attempted rape (9%), murder (9%), forced stripping (5%) and medical negligence (denial of admission in hospitals). The highest numbers of cases were reported from rural areas and the state of Uttar Pradesh (22%). In 21% of the cases, the police refused to lodge a complaint against the accused or fiddled the reports, in 4% policemen were the perpetrators. Higher caste men and politicians were accused in 17% and 13% of the cases respectively. Common contributing factors observed were land dispute, money, family quarrels and caste issues. In isolated cases, DW were refused use of the roads used by higher caste, their huts were damaged, they were refused to use the land allocated to them by the government. Dalit women face discrimination due to caste, class, gender and lower socio economic status. Lack of awareness and illiteracy amongst the DW contribute further. A fear of social stigma prevents many women from reporting the cases, which make them prone to various undetected sexually transmitted diseases (STDs) and continued harassment despite constitutional provisions. Also the media reports should be taken as complaints and investigation process initiated to identify the truth and provide remedial measures [social, economical, legal and medical]. Women's empowerment and economical independence will reduce the occurrence of such events. Various government agencies should have a helpful attitude and approach to prevent such atrocities. Equally existing machineries may be geared for surveillance and containment of atrocities.

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Confronting avian flu and the new global threats

T6P3-01

Abstract withdrawn.

T6P3-02

Abstract withdrawn.

T6P3-03

Open-label phase 1/2 study to assess the safety and immunogenicity of two different doses of a vero cell-derived, whole virus clade 2 h5n1 influenza vaccine in healthy volunteers aged 21–45 years

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Availability of effective vaccines against highly pathogenic avian influenza H5N1 viruses is an urgent global public health priority. A Vero cell-derived whole virus, non-adjuvanted vaccine against a clade 1 strain (A/Vietnam/1203/2004) developed by Baxter was shown to be immunogenic and well tolerated. The H5 hemagglutinin has meanwhile evolved into many phylogenetically distinct clades and subclades, in particular clade 2. This Phase 1/2 clinical study was conducted to investigate the safety and immunogenicity of two different dose levels of a non-adjuvanted clade 2 (A/Indonesia/05/2005) H5N1 influenza vaccine. 110 healthy adult male and female subjects were randomized 1:1 to receive 2 vaccinations 21 days apart of the whole virion, Vero cell-derived influenza vaccine containing either 3.75 μg or 7.5 μg H5N1 hemagglutinin antigen, clade 2.1 strain A/Indonesia/05/2005, in a non-adjuvanted formulation. Safety was assessed by occurrence of local and systemic adverse events. Microneutralization (MN) and single radial hemolysis (SRH) assays were used to evaluate immune response. The vaccine was well tolerated after two vaccinations 21 days apart at a dosage of either 3.75 μg H5N1 HA antigen/0.25 mL or 7.5 μg H5N1 HA antigen/0.5 mL, with a follow-up until 180 days after the first vaccination. No serious adverse reactions occurred. Rates of subjects with an MN titer associated with protection (≥1:20) against the vaccine strain A/Indonesia/05/2005 after the second vaccination were 82.7% and 86.5% in the 3.75 μg and 7.5 μg dose groups respectively. Seroconversion rates for MN and SRH 21 days after vaccination (as compared to baseline), exceeded the CPMP criterion of >40% in both dose groups after the second vaccination. Cross-reactivity against a heterologous clade 1 strain (A/Vietnam/1203/2004) was also demonstrated by MN and SRH analysis. Logistic regressions and covariance analyses did not show a dose-dependent response. The H5N1 influenza vaccine against clade 1 strain A/Indonesia/05/2005 was well tolerated and immunogenic in adults after two vaccinations, as shown by cumulative serological data of neutralizing antibodies (MN) and SRH and induced a cross-neutralizing antibody response, with no dose effect observed.

T6P3-05

Event-based surveillance for emerging infectious diseases in the EU/EFTA

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We set out to describe how the European Centre for Disease Prevention and Control (ECDC) carries out its mandate f speedy detection of health threats in order to enable early and efficient response. To fulfil it, ECDC has implemented epidemic intelligence activities, an indicator (traditional public health surveillance) and event-based surveillance. The latter is crucial for surveillance of emerging diseases. It includes formal sources such as information shared daily by national health authorities across the EU via the Early Warning and Response System on Health Threats, and informal sources such as an average 600 news reports per day from across the globe looking for signals that could herald an outbreak. These sources produce about 30 daily unusual health events or signals which need to be assessed for their public health relevance, generating public health alerts which are investigated, monitored using a self-developed IT tool (Threat Tracking Tool) and communicated. From the start of epidemic intelligence activities in July 2005 up to the end of 2008, ECDC monitored 696 health threats. During 2008, ECDC monitored 250 threats compared to only 99 in 2005, 179 in 2006 and 168 in 2007. Of the threats monitored during 2008, 68% occurred in Europe, 9% in Asia, 7% in Africa and 7% in the Americas. Half of the threats monitored in 2008 were related to diseases of environmental or zoonotic origin, followed by food and water-borne diseases (22%), vaccine preventable diseases (12%), tuberculosis (5%) influenza (4%), hepatitis, HIV, STI and blood borne infections (1%) and antimicrobial resistance and health care associated infections diseases (1%). 5% of threats were related to the mass gathering events and natural disasters. The most common pathogen responsible for threats monitored in 2008 was *Legionella pneumophila*, which accounted for 34% of all monitored threats. ECDC has achieved an efficient system of detecting emerging health threats through epidemic intelligence activities. The system has improved along with its development, detecting an increasing number of public health relevant threats year by year. Most threats monitored by ECDC correspond to diseases of environmental or zoonotic origin.

Dealing with the returning traveler

MCP5-01

Prospective multicentre evaluation of the expert system *Kabisa Travel* in diagnosing febrile illnesses occurring after a stay in the tropics

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Kabisa Travel is an expert system that has been developed in 2006 by the Institute of Tropical Medicine of Antwerp, Belgium. Its performance in diagnosing febrile illnesses in travelers returning from the tropics was good in a retrospective single center study. The study purpose was to assess the diagnostic accuracy of Kabisa Travel compared with that of treating travel physicians. From December 2007 to April 2009, travellers with fever after a stay in the tropics were included prospectively in a multicentre non-inferiority trial conducted in 10 travel clinics

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Table 1 for MCP5 – 01 Number and proportions of correct diagnoses (top 1 and top 5 ranking) made by clinicians and by Kabisa Travel detailed by diagnosis

	Top 1 ranking		Top 5 ranking	
	Clinicians	Kabisa	Clinicians	Kabisa
Reference Diagnoses (n)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Tropical diseases (*n* = 133)	**104 (78)**	**110 (83)**	**123 (92)**	**123 (92)**
Falciparum Malaria (*n* = 59)	57 (97)	54 (91)	58 (98)	59 (100)
Non Falciparum Malaria (*n* = 22)	12 (55)	17 (77)	19 (86)	20 (91)
Dengue (*n* = 25)	21 (84)	23 (92)	23 (92)	24 (96)
Rickettsial infections (*n* = 8)	5 (62)	5 (62)	6 (75)	6 (75)
Enteric fever (*n* = 8)	5 (62)	6 (75)	8 (100)	7 (87)
Chikungunya (*n* = 4)	0 (0)	0 (0)	4 (100)	2 (50)
Amebic liver abscess (*n* = 4)	3 (75)	3 (75)	3 (75)	3 (75)
Other tropical diseases (*n* = 3)	1 (33)	2 (67)	2 (67)	2 (67)
Cosmopolitan diseases (*n* = 68)	**38 (56)**	**36 (53)**	**56 (82)**	**56 (82)**
Bacterial enteritis (*n* = 14)	10 (71)	10 (71)	14 (100)	14 (100)
Infectious mononucleosis like syndrome (*n* = 13)	3 (23)	1 (8)	9 (69)	8 (61)
Respiratory tract infections (*n* = 11)	4 (36)	5 (45)	8 (73)	11 (100)
Skin/soft tissue infection (*n* = 5)	4 (80)	5 (100)	5 (100)	5 (100)
Tuberculosis (*n* = 5)	5 (100)	3 (60)	5 (100)	3 (60)
Hepatitis A (*n* = 4)	4 (100)	4 (100)	4 (100)	4 (100)
Leptospirosis (*n* = 4)	3 (75)	2 (50)	3 (75)	3 (75)
Genitourinary infections (*n* = 3)	2 (67)	3 (100)	3 (100)	3 (100)
Other infections (*n* = 9)	3 (33)	3 (33)	5 (56)	5 (56)
Non infectious causes (*n* = 4)	1 (25)	1 (25)	2 (50)	1 (25)
Total (*n* = 205)	**143 (70)**	**147 (72)**	**181 (88)**	**180 (88)**

based in the Netherlands, Italy, Spain and Belgium. Clinicians were asked to register electronically their most probable diagnoses first. Then they entered clinical and laboratory data obtained during the first 36 hours, resulting in a probability ranking by Kabisa Travel. The ultimate diagnosis confirmed by bacteriology, parasitology and/or serology was considered as the reference. A survey of the clinical utility was also conducted. Of 246 registered cases, 205 with confirmed diagnosis were included. The male-to-female ratio was 1.85 and the mean age was 35 years (range: 0.5–73); 60% of patients were western travellers or expatriates; sub-Saharan Africa was the most frequent place of stay (58%), followed by Southeast Asia (24%) and Latin America (11%). Clinicians and Kabisa Travel ranked first the correct diagnosis in 70% and 72% of the cases respectively and cited it within the top 5 ranking both in 88% of them (Table 1). Clinicians estimated that they had been influenced by the expert system for the choice of further investigations in 16% of the cases, and that they had been helped for finding the correct diagnosis in 24%. These proportions were significantly higher for the missed reference diagnoses, compared to those found (48% vs. 12%; $P < 0.001$ and 48% vs. 21%; $P = 0.005$). Kabisa Travel performed as well as experienced clinicians in diagnosing febrile illnesses occurring after a stay in the tropics. Kabisa Travel helped the clinicians more often in choosing tests and finding the correct diagnosis when this diagnosis was not immediately considered.

MCP5-02

Recognition of tropical illness in the returned traveller by healthcare professionals working in an Irish university teaching hospital

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Healthcare workers practicing in Ireland are increasingly likely to encounter tropical illness in the returned traveller. This study aimed to establish the awareness of tropical diseases and the need for education in tropical medicine in a sample of front-line healthcare professionals working in a major Irish teaching hospital. A questionnaire was administered to a sample of doctors and nurses working in University Hospital Galway in Ireland. The survey recorded details of the tropical medicine training of the participants. The ability of respondents to take a travel history, to recognise tropical illness in a returned traveller and to demonstrate awareness of the geographical distribution of tropical diseases was evaluated. Fifty healthcare workers completed the survey (29 doctors and 21 nurses). The majority of medical respondents (76%) were non-consultant hospital doctors. Most of the doctors (72%) and nurses (57%) in the survey had not previously worked in a tropical or sub-tropical region. The majority of doctors (66%) and nurses (90%) had not received formal training in tropical or travel medicine. The training received by doctors was considered to be less than satisfactory in 38% of cases. This study reveals a low level of knowledge of tropical medicine amongst a sample of healthcare workers who are increasingly likely to be called upon to assess the returned tropical traveller. Deficiencies were highlighted in the ability of these professionals to record a comprehensive

travel history and to recognise specific tropical illnesses based on knowledge of their typical clinical presentation and geographical distribution. Opportunities for training in tropical medicine should be provided to this group.

MCP5-03

Italian rickettsioses surveillance study (IRiSS): imported and autochtonous tick-borne spotted fever (SFG) rickettsioses

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The aspecific manifestations of tick-borne spotted fever group (SFG) rickettsioses, together with the scarce availability of laboratory tests, may be responsible for underestimation of such disease. In this observational prospective study patients were recruited at the *Gruppo di Interesse e Studio Patologie di importazione (GISPI*) centers. Definitions: *imported rickettsioses*, with development of 3 symptoms/signs characteristic of rickettsioses within ≤10 days after returning from endemic regions; *autochthonous rickettsioses*, with development of 3 symptoms/signs typical of rickettsioses in a patient without international travel in the last 10 days. A definitive diagnosis was made on the basis of the serological test result positive for tick-borne SFG rickettsiae. From 9/2005 to 9/2009, a total of 26 suspected cases of tick-borne SFG rickettsioses were observed. Eight patients (30.8%) were confirmed imported rickettsioses. Six patients (75%) were female. Median age was 63.5 years (range, 44–66 years). Seven patients (87.5%) reported a trip in South Africa and 1 (12.5%) in Mozambique. The median exposure time in the rickettsioses-endemic area was 9 days (range, 9–15 days). The attack rate of rickettsioses in a group of 8 tourists who visited Kruger National Park was 50%. A tick bite or tick-handling was reported by 7 patients (87.5%); 6 patients reported more than 3 tick bites. Patients had fever (8 cases), inguinal lymphadenopathy (7 cases), eschars (7 cases), myalgias (6 cases), headache (5 cases), generalized maculopapular rash (4 cases), arthralgia (4 cases), neck muscle myalgias (3 cases), neurological syndrome (1 case). The median delay between the date of return and the onset of fever and rash were 5 days (range, 2–11 days) and 8.5 days (range, 5–12 days), respectively. Five patients (62.5%) had a single eschar whereas 2 had multiples. All were localized on the legs. The median delay before being seen at a clinic after return was 25 days (range, 14–38 days). None patients needed hospitalization. All patients were treated with doxycycline with clinical improvement. Subsequently, we compared clinical features of patients with confirmed tick-borne SFG rickettsioses and those showing typical clinical symptoms/signs without definitive serologic evidence. The median time from illness onset to acute-phase and convalescent-phase serum testing in negative patients was similar (8 days and 32 days, respectively). The presence of eschars was significantly more common in patients with diagnosis of tick-borne SFG rickettsioses ($P = 0.03$). People travelling to Africa are exposed to a significant risk of acquiring tick-borne SFG rickettioses. Empiric treatment based on epidemiological and clinical features can reduce rickettsia morbidity in elderly patients.

MCP5-04

Migration and tuberculosis in the European Union

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ECDC has produced an updatable report on migration and tuberculosis in the EU to support Member States integrating migrant health into national policies. It presents data analysis, evidence summary, interpretation and guidance on interventions in the field of migration and tuberculosis. The downward trend in TB across most of Europe has been interrupted by the re-emergence of TB among vulnerable populations, including cases in migrants from highly prevalent countries. In 2007, 21% of reported cases were of foreign origin. 27 countries reported 'area of origin' of TB foreign cases: Asia (32%), Africa (26%); other EU/EEA/EFTA countries (10%), other European non-EU/EEA/EFTA countries (11%). Between 2001 and 2007, notifications among nationals decreased in nearly all countries but foreign origin cases increased up to 2005, decreasing in 2006 and 2007. There is evidence that TB among the foreign-born is occurring in younger groups and is associated with higher treatment failure and poor outcome.The incidence and prevalence of drug resistant TB in low incidence countries is associated with migrants from countries that have a higher prevalence of drug resistance. Migrants may be at risk of reactivated infection because of homelessness and inadequate nutrition. Many also develop primary TB due to exposure to other infected migrants. Limited access to health care delays early diagnosis and treatment. However, many molecular epidemiological studies show that the risk of TB transmission from migrant to host populations is low. Although the risk of TB spread from migrant to host communities in Europe appears to be low, the decline of TB in these countries has been interrupted by cases among migrants from highly-prevalent populations. Poor living conditions increase migrants' risk for new or reactivated TB infection. This has implications for public health in Europe, where prevention and control programmes should be adapted to the changing patterns of migration and TB epidemiology and health care services should address the specific needs of migrant populations.

Malaria epidemiology and control

T2P5-01

Multiplicity of *Plasmodium falciparum* infection following intermittent preventive treatment in infants

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Intermittent preventive treatment in infants (IPTi) with sulfadoxine-pyrimethamine reduces malaria episodes by 20–59% across Africa. Possibly, however, this may interfere with the development of immune mechanism including premunition. Defined as protection from superinfection due to persisting infection, the magnitude of premunition can roughly be estimated by assessing the multiplicity of infection (MOI), i.e. the number of distinguishable *Plasmodium falciparum* clones *per* isolate. In 1086 children from northern Ghana and at 15 months of age, we examined premunition as reflected by MOI with *P. falciparum* six months after they had received their second dose of IPTI or placebo. MOI was assessed by *msp1/2* typing. During the first year of life, MOI remained rather stable, and increased only slightly by 15 months of age. At that age and by PCR, 20% (216/1086) of the children

were infected with *P. falciparum*. The number of distinguishable *P. falciparum* clones was similar in children having previously received IPTi (mean, 2.22) or placebo (mean, 2.35; $P = 0.5$). Likewise, the proportion of polyclonal infections did not differ between these groups (68% vs. 70%; $P = 0.8$). Children with polyclonal infections at 15 months of age were one-third less likely to experience malaria episodes until their second birthday than children with mononclonal infections ($P < 0.05$). Reassuringly, IPTi appears to have no undesirable impact on the development of premunition during infancy.

T2P5-02

Impact of the introduction of artemether-lumefantrine as first line treatment policy on malaria transmission and under five mortality in two rural districts of Tanzania

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The deployment of artemisinin-based combinations (ACT) is assumed to reduce malaria transmission and overall under five mortality. So far there is no clear demonstration of the health effects of ACT in highly endemic areas of Africa. As part of the ALIVE [Artemether-Lumefantrine (AL) In Vulnerable patients: Exploring health Impact] project, we aimed at assessing the impact of the introduction of AL as first line treatment for uncomplicated malaria on parasite prevalence, anaemia and underfive mortality. Parasite and anaemia prevalence rates were obtained by repeated cross-sectional surveys conducted in two rural districts (Kilombero and Ulanga) during the sulfadoxine-pyrimethamine (SP) era (2005 & 2006) and by one survey 18 months after AL introduction (2008). Mortality rates were obtained through a continuous demographic surveillance system (DSS) covering about 100 000 individuals in the same districts. Mortality rates of children under five years were compared during the SP era (2005 & 2006) with that of 2007 & 2008, which corresponds to the first 24 months of AL implementation. For malaria transmission, 5903 persons were assessed in 2005, 6324 in 2006 and 4557 in 2008. Parasite prevalence in the whole population was 11.4% in 2005, 13.6% in 2006 and 11.0% in 2008. Prevalence of anaemia in children under five years was 17.8% in 2005, 9.7% in 2006 and 10.1% in 2008. Use of insecticide-treated bednets was 35%, 36% and 44%, respectively. Under five mortality rate per 1000 person-years was 27.0 in 2005; 23.1 in 2006 and 21.3 in 2007. These data show stable transmission rates after the switch from SP to AL. No additional impact of AL on malaria transmission 24 months after its introduction was observed. A possible explanation might be that the level of endemicity was already quite low before AL implementation and thus an effect was less likely to be detected on the short-term. Mortality data showed a steady decline of under five mortality from 2005 to 2007. Since the mortality decline did not change before and after AL implementation, it is unlikely that the mortality reduction between 2006 and 2007 is the result of the change in treatment policy. More data are required to assess the health and transmission benefits of ACTs.

T2P5-03

Anopheles resistance against pyrethroid insecticide in urban areas and villages with different agriculture practices in the Nouna region, Burkina Faso

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The purpose of the study was to determine resistance level against deltamethrin, one of the main pyrethroid insecticide used to impregnate bed nets, in *Anopheles* mosquitoes that are a major malaria vector in the Nouna region, Burkina Faso. We tested the hypothesis that *Anopheles* insecticide resistance may vary depending on agriculture practices and use of insecticide in households in human settlements. *Anopheles* mosquito larvae were collected from ponds and temporary larval habitats within human settlements situated in zones having the following characteristics: zone 1, three villages where cotton agriculture was practiced and insecticide used extensively; zone 2, three villages with no cotton agriculture and little insecticide use; and zone 3, four sectors of the semi-urban town of Nouna. The larvae were transported to the insectarium in Nouna where they matured into adult mosquitoes. The bioassays were performed on adult mosquitoes that were put in contact with recently distributed bed nets from the corresponding settlement, positive control surface consisting of a standardized 0.5% deltamethrin-impregnated paper, or a negative control surface with no insecticide. For each mosquito batch the percentage of mosquitoes dead after 24 hours was recorded. Chi square tests were used to determine statistical significance, which was set at 5%. A total of 167 bioassays involving 5856 adult mosquitoes from 10 sampling locations were performed. After exposure to the test surface for 24 hours, the percentage of dead mosquitoes was 4% (56/1411) for the negative control, 89% (532/598) for the positive control, and 73% (2821/3847) for bed nets. In villages with no cotton agriculture, 85% (1120/1321) of adult mosquitoes were dead after, exposure to impregnated bed nets compared to 71% (940/1317) in villages with adjacent cotton agriculture and 63% (761/1209) in the town of Nouna. The difference among the three zones was statistically significant ($P < 0.001$). These preliminary results suggest that *Anopheles* mosquitoes are less sensitive to deltamethrin insecticide in villages with adjacent cotton agriculture where insecticides are used regularly and in urban areas where the use of insecticide within households may be more widespread. Although impregnated bed nets still provided protection against *Anopheles* mosquitoes in addition to being a physical barrier, their effectiveness to combat malaria will be reduced.

T2P5-04

The relevance of understanding residence and mobility patterns for forest malaria control in south east asia: the case of the Ra-glai in Vietnam

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New and innovative malaria control strategies are required in settings where standard control measures have shown to have a limited impact. One of such contexts are the Ra-glai ethnic minority communities living in Ninh Thuan, one of the 17 forested and mountainous provinces of Central Vietnam where most malaria morbidity and mortality occurs. Due to the sylvatic nature of the main malaria vector *An. dirus*, the dependence of the local population on the forest for subsistence -as is the case for many impoverished ethnic minorities in South-East Asia- further increases malaria exposure. Between July 2005 and September 2006, a multi-method study was carried out triangulating a malariometric cross-sectional survey in a random sample of 3685 Ra-glai and qualitative data from focused ethnography, including community based field work. To meet work requirements during the labor intensive malaria transmission season, the Vietnamese Ra-glai slash and burn farmers combine living in government supported villages along the road with living in a home at their fields in the forest. This double residence and mobility pattern

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directly influences the use of bed nets and hammock nets and, therefore, also the success of current malaria control programs. Despite the increased risk for malaria at their fields in the forest, bed net use was only half as common at fields (41.6%) as in villages (84.6%). The same applied for the use of long lasting insecticidal hammocks in the evening and at night (23.6% at the fields in the forest and 56.1% in the villages; under trial conditions). While malaria control policies target the villages, ethnic minority farmers are most at risk for malaria on their fields in the forest, their main residence during the rainy and malaria transmission season. New control strategies are required directly focusing on slash and burn farmers exposure at their fields. These findings further highlight the fact that the progressive confinement of malaria to minority groups and settings in Vietnam, as is the case for other Southeast Asian countries, implies that further success in malaria control is linked to research into the specific characteristics of these populations at risk.

T2P5-05

Extended follow-up of children who received sulfadoxine-pyrimethamine for intermittent preventive antimalarial treatment in infancy (IPTi)

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Intermittent preventive antimalarial treatment in infancy (IPTi) is regarded a potential malaria control measure. In a time of willingness to increase malaria control programs in Africa, the risks and benefits of IPTi with sulfadoxine-pyrimethamine (SP) are intensively discussed among researchers and responsible public health specialists, while more data are needed to guide evidence-based decision making. To investigate possible negative imprints of IPTi towards development of anti-malarial immunity, clinical rebound effects or late adverse events, children who participated in a SP-based IPTi study were actively followed-up five years after start of recruitment. This cross-sectional survey took part in the rural Afigya Sekyere district of the Ashanti Region in Ghana, an area of intense perennial malaria transmission. Clinical malaria, parasitemia, high-density malaria, and anemia were compared between children who formerly received SP or Placebo at 3, 9 and 15 months of age during the original study. IgG antibody levels against crude *P. falciparum* lysate (*Pf*LIgG) were measured by enzyme linked immunosorbent assays and correlated with the frequency of preceding malaria infections. Baseline characteristics, outcomes variables and *Pf*LIgG of both study arms were compared by contingency ($\chi 2$) and nonparametric (Wilcoxon) tests, considering P-values <0.05 as significant. 82.2% (730/887) of children of the original study could be reached and baseline characters were not different between study groups. More than three years after suspending IPTi with SP primary and secondary outcomes variables were not significantly different between the SP and Placebo group. Importantly, reported sicknesses, dermatological reactions and hospital admissions were similar frequent in both study arms. *Pf*LIgG showed a positive correlation with former malaria incidence rates and still tended to be higher in children of the placebo group. The survey showed no clinical rebound effects related to former SP treatment that might hinder implementation of SP-based IPTi in areas of intense malaria transmission.

T2P5-06

Bayesian geostatistical modeling of Angola Malaria Indicator Survey data

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The 2006–2007 Angola Malaria Indicator Survey (AMIS) is the first nationally representative household survey in the country assessing coverage of the key malaria control interventions and measuring malaria-related burden among children less than 5 years of age. The Angola MIS data were analyzed to produce the first smooth map of parasitaemia prevalence in the country. Bayesian geostatistical models were fitted to assess the effect of interventions after adjusting for environmental, climatic and socio-economic factors. Non-linear relations between parasitaemia risk and the environmental predictors were modeled by categorizing the covariates and by employing B-splines and P-splines curves. Model based predictions estimating the parasitaemia risk at unobserved locations were obtained via Bayesian kriging. Combining estimates of parasitaemia prevalence with the number of children under 5, estimates of infected children in the country were obtained. Model fit and prediction were handled within a Bayesian framework, using Markov chain Monte Carlo (MCMC) simulations. Geostatistical model predicted the highest risk of the disease in the central and north part of the country. The population-adjusted prevalence ranges from 3.76% in Namibe province to 32.65% in Malanje province. The odds of parasitaemia in children living in a household with at least 0.2 ITNs per person was by 41% lower (CI: 14%, 60%) that in those with fewer ITNs per person. The estimates of the burden of malaria obtained in this study are important for planning and implementing control interventions and for monitoring the impact of prevention and control activities. Information on the infected children could be compared to existing levels of service provision to identify underserved populations and to target interventions to high priority areas.

T2P5-07

The epidemiology of *P. falciparum* in Uganda: a population study in Mulanda, Eastern Uganda

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Malaria is a leading cause of morbidity and mortality in Uganda, accounting for over 30% of all deaths that occur before the fifth birthday. Surprisingly however there are few detailed descriptions of malaria within communities in Uganda, despite the usefulness of such information to target control at local levels. We report an age-stratified, spatially explicit study of malaria infection in a rural community in eastern Uganda. In 2008 a cross-sectional survey was conducted in four villages in Mulanda, a sub-district in eastern Uganda, to investigate prevalence and density of *Plasmodium* infection. All permanent residents were invited to participate; blood smears were collected from 1844 individuals aged between 6 months and 88 years (91% of the population). Demographic, household and socio-economic characteristics were combined with environmental data using a Geographical Information System. Spatial statistics and Bayesian hierarchical models were used to explore patterns of malaria infection and assess the influence of individual, household and environmental risk factors. Overall, 709 individuals were infected with malaria (39%). Prevalence was highest in those aged 5–9 years (64%); parasite density peaked earlier at 3 years. In total, 68% of households owned at least one

bednet although only 27% of school-aged children reported sleeping under a net the previous night. In multivariate analysis, risk of infection was highest amongst children aged 5–9 years (OR 2.97; 95% CI 2.01–4.43) and remained high in older children (OR 2.14; 95% CI 1.43–3.24). Infection risk was lower for those that reported sleeping under a bednet the previous night (OR 0.73; 95% CI 0.57–0.95) and living more than 750 m from a rice-growing area (OR 0.64; 95% CI 0.45–0.91). After accounting for clustering within compounds, there was no evidence for an association between infection prevalence and socio-economic status, and no evidence of spatial clustering. Community surveys are an important tool for quantifying the burden of malaria in endemic populations and assessing the coverage and impact of existing interventions. These findings confirm that malaria transmission in this region is hyperendemic, whilst bed net usage remains inadequate and strongly associated with risk of malaria. Results also demonstrate that much of the clustering of infection within high risk compounds can not be explained by spatial, socio-economic or demographic factors, pointing to other household and family factors influencing the distribution of malaria in this community.

Women, children and migration

MCP6-01

Eosinophilia and hyper IgE in immigrant children with helminthic infestations

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In immigrant patients, the presence of eosinophilia suggests the possibility of helminthic infestations. Immigrant children coming from countries with high prevalence of helminths present a high risk for developing either symptomatic or asymptomatic infestations and eosinophilia and hyper IgE can be a clue for starting an exhaustive diagnostic work-up. Our aims were to determine the presence of intestinal and tissular helminthic parasitosis in pediatric immigrant population and the possible association between global helminth infection with both eosinophilia and total IgE level. We undertook a retrospective descriptive study on pediatric immigrant population referred to the Barcelona Drassanes Tropical Medicine Unit between May 2001 and December 2007. Inclusion criteria considered was patients from Africa, Asia, and Latin America aged under 16 years. 276 pediatric patients attended in our unit during the study period, with a mean age of 8.1 years and a sex distribution of 51.8% men. Half of them where African origin (50.2%) followed by Latin America (31.1%) and Asia (18.7%). We found helminth parasite infection in 180 patients (65.2%) of these, 23% had more than one helminthic parasite and 31% a coinfection with a protozoa parasite. The presence of eosinophilia in infected patients compared to non-infected was higher (61.1% vs. 26% $P < 0.0001$) as well as the mean level of eosinophils (974.5 vs. 440.1 $P < 0.0001$). This difference was not related to sex or age distribution, but did show an association with African origin (56.4% vs. 43.6% $P = 0.046$). The presence of hyper IgE and mean IgE levels where also associated with parasite infection (82.6% vs. 17.4% $P < 0.0001$ and 1087.2 vs. 418.4 $P = 0.012$ respectively). In this case, hyper IgE was related to sex (65.2% in men vs. 42.8% in women $P = 0.003$), age distribution (67.4 vs. 32.6 in older and younger than 8 respectively $P < 0.0001$), and African origin (62% vs. 38% $P = 0.018$). Considering specific subgroups of parasites, the association to both eosinophils and total IgE where only seen for geohelminths ($P < 0.001$) and filariae ($P < 0.01$). No correlation between IgE and eosinophils was detected. Presence of eosinophilia and/or hyper IgE in immigrant children seems closely correlated with presence of one ore more helminthic parasites. An exhaustive diagnostic work-up, possibly in a specialized centre, should be performed in order to exclude helminthic infestations in this class of patients.

Dengue: novel diagnostic makers and vaccine development

T4P10-01

Comparison of a NS1 capture enzyme-linked immunosorbent assay with conventional and real time PCR for diagnosis of primary and secundary acute dengue virus infection

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Serological tests such as MAC-ELISA have low sensitivity for early dengue diagnosis. Molecular tests for detection, identification and quantification of virus are extremely important to diagnose during the early stages of disease. However, they remain expensive. Recent studies evaluated NS1-based ELISA as a novel diagnostic marker of acute dengue virus infection. NS1 is a highly conserved glycoprotein that is essential for viral replication. The aim of this study was to compare a commercial NS1 assay (Platelia dengue NS1 – Bio-Rad Laboratories, Marnes La Coquette, France) with two molecular tests (Multiplex and Real time PCR). Acute-phase serum specimens from 175 patients (63 with primary and 112 with secondary dengue infections) were tested by Multiplex and Real time PCR and 163 samples (60 from primary infection and 103 from secondary infection) were tested by NS1 assay. In primary infection, for samples collected 1–5 days within onset of symptoms, 72% (26/36) were positive by Multiplex PCR and Real time PCR and 94.1% (32/34) were positive by NS1 kit. After 6–8 days of disease, 3.7% (1/27) were positive by Multiplex PCR, 11.1% (3/27) by Real time PCR and 92.3% (24/26) by NS1 kit. In secondary infections, for samples collected 1–5 days after onset, positive results were 48.2% (27/56) by Multiplex PCR, 55.3% (31/56) by Real time PCR and 69.2% (36/52) by NS1 kit and in samples collected 6–8 days of onset of symptoms the positivity was 5.3% (3/56) by Multiplex PCR, 10.7% (6/56) by Real time PCR and 84.3% (43/51) by NS1 kit. The commercial NS1 antigen-capture test showed better performance than Conventional and Real time PCR in the early symptomatic phase of dengue cases. The positivity of the NS1 assay was higher in primary than secondary acute infections ($P < 0.05$).

T4P10-02

Multi-country evaluation of the sensitivity and specificity of two commercially available NS1 ELISA assays for dengue diagnosis

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Early diagnosis of dengue can assist patient triage and management and prevent unnecessary treatments and interventions. Commercially available assays that detect the dengue virus protein NS1 in the plasma/serum of patients offers the possibility of early and rapid diagnosis. The sensitivity and specificity of the Pan-E

Dengue Early ELISA (kit A) and the Platelia NS1 ELISA assay (kit B) were compared against a reference diagnosis in 1491 patients in 6 countries in Asia and the Americas. Kit B was more sensitive (62%) than kit A (50%) in confirmed dengue cases. Both kits were more sensitive for specimens collected within the first few days of illness onset relative to later time points. Kit A and B were both 100% specific in febrile patients without evidence of acute dengue. This study suggests that the best performing NS1 assay (Platelia) had moderate sensitivity (median 62%, range 34–70%) and high specificity (100%) for the diagnosis of dengue. The combination of NS1 and IgM detection in samples collected in the first few days of fever increased the overall dengue diagnostic sensitivity.

T4P10-03

Assessment of two rapid diagnostic tests for dengue

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We assessed the sensitivity, specificity, positive and negative predictive values (PPV, NPV) of two commercially available, Rapid Diagnostic Tests (RDTs) for the detection of Dengue IgM and IgG. From November, 2006 to May, 2009, 102 serum samples, from patients with fever coming to our Centre from endemic areas for dengue, were tested with two different rapid immune chromatographic tests: Dengue IgG & IgM Combo - Cypress Diagnostic (99 samples) and OnSite Dengue IgG/IgM Rapid Test Cassette – CTK Biotech (45 samples). Elisa-PanBio (IgG and IgM) was used as the reference test for both RDTs. Both RDTs proved similarly quick and easy to perform and read. Compared with the reference ELISA test, the first test (RT/Cypress) showed a sensitivity of 63% (17/27), specifity of 97% (70/72), PPV and NPV of 89.5% and 87.5%, respectively, for IgM, and 57% (21/37), 95.5% (61/62), 95.5% and 80%, respectively, for IgG. The second test (RT – CTK) presented a sensitivity of 22% (2/9), specifity of 89% (32/36), PPV and NPV of 67% and 82%, respectively, for IgM, and 19% (3/16), 90% (26/29), 50% and 67%, respectively, for IgG. Our data should be considered as preliminary results, that need to be confirmed on a higher number of cases. However, these findings indicate that their performances are far from satisfactory. For both test to be recommended as screening tools for dengue, they would need substantial improvement.

Human mobility and sex

MCP7-01

Foreign borne status and incidence of syphilis in HIV infected subjects, Italy

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Syphilis is re-emerging worldwide. In developed countries syphilis incidence rates are high among HIV infected people. We undertook this study to ascertain whether being foreign borne is a risk factor for incident syphilis among HIV infected persons. All consecutive HIV infected persons registered at the Department of Infectious Diseases, Spedali Civili, Brescia from 1 January 2001 to 31 December 2008 were included in the analysis. Demographic, behavioural, immuno-virological and syphilis treponemal tests (TPHA) results were extracted from the electronic database where information is prospectively entered. Syphilis prevalence and incidence were measured as a positive TPHA test at the first determination after cohort entry and during follow-up, respectively. Logistic regression was used to identify whether foreign-borne status and other variables were independently associated with syphilis. During the study period 2247 new HIV infected subjects were registered in the database. Among them 1638 were Italians (72.9%) and 609 were foreign borne (27.1%). A TPHA test was performed in 1710 subjects (76.1%): the probability of being tested was similar in Italians and foreign borne – 76.4% and 75.4% respectively. TPHA was positive at first test in 268 persons (11.9%): prevalence was higher among foreign-borne persons than Italians (19.8% vs. 14.1%, OR = 1.5, C.I. 1.13–1.98). Syphilis incidence was calculated in 1442 persons during a mean follow-up period of 18.5 months; 76 new cases of syphilis infection were diagnosed, with an incidence rate of 3.42 cases/100 person-year (95% CI: 2.69–4.28). In the Cox regression model foreign borne persons had a significantly increased risk of incident syphilis (HR 2.3, C.I. 1.3–4.1). Other factors which were independently associated with an increased probability of incident syphilis were: omo-bisexual orientation (HR = 5.9, 95% C.I: 3.7–9.6), not being in HAART (HR 2.7, C.I. 1.5–4.8) and older age (OR = 1.03; 95% C.I.: 1.01–1.06 for each year of age). Being a foreign borne person is a marker of increased susceptibility to new syphilis infections among HIV infected persons in Italy. Targeted preventive interventions are warranted in this population group.

MCP7-02

Migration and HIV/AIDS in the European Union

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To provide an overview of migration and HIV/AIDS in the European Union, ECDC produced the *Migrant Health-HIV Report,* based on information gathered through a survey in the EU Member States and EFTA countries and through a literature review, to support Member States integrating migrant health into national health policies. It presents a critical analysis of data, an evidence-based summary, and interpretation and guidance on interventions in the field of migration and HIV. *Results:* Foreign-born individuals are disproportionately represented in HIV and AIDS statistics in the Netherlands, Germany, Sweden, Ireland, Spain and Italy. In the UK an estimated 66% of newly diagnosed persons infected heterosexually were of black-African ethnicity, and 74% acquired their infection abroad (84% in sub-Saharan Africa). Most EU/EFTA migrant populations originate from highly HIV-prevalent areas affecting the epidemiology of the disease. Overall, the percentage of migrants from countries with generalized epidemics among heterosexually acquired infections ranges from 70% in Sweden to 25% in Finland and 0% in Lithuania, Romania and Slovakia, with a mean percentage for EU/EFTA of 42.6. However, as is the case with TB, the risk of transmission of HIV from migrant to host communities appears to be low, although available evidence is limited. Language barriers, marginalisation and social exclusion, and legal obstacles were reported as the most common factors contributing to the HIV vulnerability of migrants. Cultural attitudes, religion, fear of discrimination and poor HIV knowledge in migrant communities were also cited. Another big problem in the EU is late HIV diagnosis as it is associated with higher mortality and the current data suggests that this problem is even bigger for the HIV-positive migrant population of non-Western origin (Fisher 2008). Public health programmes and interventions should take into account that migration is an important factor in the spread and epidemiology of HIV/AIDS in certain countries in EU/EFTA. Health care services should also address the specific needs of migrant populations

enabling access to HIV prevention, counselling and testing, and treatment services.

Malaria vector control and ITN

T2P6-01

Wash-resistance and residual efficacy of long-lasting polyester netting coated with alpha-cypermethrin (InterceptorTM) against malaria transmitting mosquitoes in Northeastern India

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Malaria is endemic in the northeastern states of India, and transmission of the causative parasites is low-to-moderate mostly by Anopheles minimus. *Plasmodium falciparum* is the majority parasite (>60%), and remaining cases are due to *P. vivax*. For control of malaria besides chemotherapy, DDT is used as the residual insecticide, but transmission continues uninterrupted due to high refusal rates (>50%) by the communities. As an alternative intervention, a long-lasting insecticidal net, the InterceptorTM coated with alphacypermethrin 10% SC (0.667% w/w, 0.2 g/m^2) was subject to field evaluation for laboratory wash-resistance and residual efficacy in field conditions against An. minimus, and the associated disease transmission. Based on the entomological observations, the Interceptor net intervention was evaluated to be effective that corresponded to the least anopheline/ mosquito vector density in experimental villages. There was virtual disappearance of An. minimus in Interceptor net villages in contrast to plain-net intervention and no-net control. Contact cone-bioassay tests revealed 100% mortality in An. minimus and other commonly available mosquito species in community used Interceptor net that was consistent during follow up monitoring period (October 2006–April 2007) in field conditions. Similar levels of mortality were observed in laboratory washed nets that compared well with unwashed nets, and wash-resistance was consistent even after 20th serial wash at fortnightly intervals. The fact that laboratory based data on wash-resistance corroborated well to their retention of biological activity of Interceptor net in use by the communities in field conditions, these data could serve as good predictor for retention of biological activity helping formulate policy and procurement by the programme managers. From the cumulative data in malaria incidences in experimental villages for the post-intervention period, there was nearly 80% transmission reduction in malaria cases (inclusive of all age groups) in Interceptor net intervention villages, whereas malaria incidence remained static in plain net villages, and in contrast there was unprecedented rise of cases in no-net control area compared to baseline incidences. The community compliance and acceptance of Interceptor net was high reporting diminishing malaria cases and decreased nuisance due to other household insect pests.

T2P6-02

Two years experience with a long lasting, insecticidal bednet, Netprotect®: impact on malaria, bio-efficacy and net quality

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Long lasting insecticidal nets (LLIN) are used in the current, large scale operation against malaria. They are effective when intact and properly used. New LLIN have been recommended by WHO in 2007–2008. Very few field studies exist on these LLIN for longer term field use. One of these, the polyethylene net Netprotect®, was evaluated for two years for efficacy against malaria, bio-efficacy against the vector and damages in daily use. The nets were hung in a dispersed village (4000 people in 18.5 km^2) at the Yala Swamp, Western Kenya. Intervention (nets distributed at start) and control areas (nets distributed 6 months later) were 1.5 km apart. 2 × 150 households were selected randomly from each area. Inhabitants were interviewed before the distribution and arranging of nets. At least 3 LLIN were put up by the study group per household securing full coverage of all inhabitants and proper hanging from start, total 450 nets. Malaria cases from both areas were followed passively in the nearby clinic by clinical diagnosis and rapid diagnosis test kit (Paracheque). Net efficacy was measured by standard WHO test cones exposed 3 min on net samples, 10 nets after 1 and 2 years, respectively. Net damage was measured by replacing 2 × 38 nets after 1 and 2 years from the study area and measure number and sizes of holes and their origin (tear or burnt) on nets taken home. The study was a quasi-experimental design, accepted by the Ethical Committee of the Kenyatta University, Nairobi. Before the intervention, 5% of inhabitants in the village possessed nets and people had no experience in net use. 352 malaria cases were confirmed as belonging to the two areas during the 6 months after start of the intervention: 277 from the control area and 75 from the intervention area. A majority of nets collected both years were holed: 75% and 65% year 1 and 2, respectively, 70% smaller than 3 cm. About half the holes were burnt holes. Among the bigger holes, holes above 30 from lower edge were mostly caused by kitchen fire or oil lamps used near the bed. Small holes from sparkles were also found in nets where the kitchen fire was not close to the net. Most nets were just washed once or twice per year, and some not at all after 2 years. Bioassay on randomly chosen 10 nets per year showed that 80% of nets killed more than 80% of mosquitoes exposed for 3 min on the net. The net was an effective tool against malaria. After two years many nets were still highly effective, which corresponds well to other field studies of better known LLIN nets, and as in these studies, many nets had holes. Half of these were caused by open fire in the houses. This was especially a problem in small and single room houses. Education in sustained use of LLIN should include avoidance of use of kitchen fire and oil lamps close to LLIN.

T2P6-03

Long-lasting insecticidal hammocks for controlling forest malaria: a community-based trial in a rural area of Central Vietnam

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In Vietnam, despite substantial successes, malaria remains a problem in some remote areas located along its international borders and in the central highlands, partly due to the bionomics of the local vector, mainly found in forested areas and less vulnerable to standard control measures. Long lasting insecticidal hammocks (LLIH), a tailored and user-friendly tool for forest workers, may further contribute in reducing the malaria burden. Their effectiveness was tested in a large community-based intervention trial carried out in Ninh Thuan province in Central Vietnam. Thirty villages (population 18 646) were assembled in 20 clusters (1000 individuals per cluster) that were randomly allocated to either the intervention or control group after stratification according to the pre-intervention *P. falciparum* antibody prevalence (<30%; [3]30%). LLIH were distributed to the intervention group in December 2004. For the next 2 years, the incidence of clinical malaria and the prevalence of infection were determined by passive case detection at community level and by bi-

annual malariometric surveys. A 2-fold larger decrease in malaria incidence in the intervention as compared to the control group was observed. Similarly, malaria prevalence decreased more substantially in the intervention (1.6-fold greater reduction) than in the control group. Both for incidence and prevalence, a stronger and earlier effect of the intervention was observed in the high endemicity stratum, while in the low endemicity stratum, the intervention did not have an additional effect to the one experienced by control clusters due to the sound community based monitoring of malaria cases. The number of malaria cases and infections averted by the intervention overall, was estimated at 10.5 per 1000 persons and 5.6/100 individuals, respectively, for the last semester of 2006. In the high endemicity stratum, the impact was much higher, i.e respectively 29/1000 malaria cases and 15.7 infections/100 individuals averted. LLIH were efficacious in reducing malaria incidence and prevalence in this remote and forested area of Central Vietnam. As the targets of the newly launched Global Malaria Action Plan include the 75% reduction of the global malaria cases by 2015 and eventually the elimination/eradication of malaria in the long term, LLIH may represent an additional tool for reaching such objectives, particularly in high endemicity areas where standard control tools have a modest impact, such as in remote and forested areas of Southeast Asia and South America.

T2P6-04

Long-lasting insecticidal mosquito net usage in eastern Sierra Leone – the success of free distribution

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In eastern Sierra Leone Médecins Sans Frontières (MSF) has run a health project for a population of 150 000. A major focus of the project was malaria control, offering free diagnostic tests, treatment and prevention in community health centres and using a community malaria volunteers network. In 2006 and 2007, MSF organised a mass distribution of free, long-lasting insecticidal mosquito nets (LNs) with demonstration of correct use. More than 65 000 LNs, were distributed, targeting children under five years and pregnant women. The MSF project had three distribution strategies: (1) free distribution targeting households with pregnant women and children under five years of age (2) free LNs when discharged from the hospital and (3) free LNs while attending antenatal care visits. The aim of this follow-up survey was to measure utilization and coverage of LNs in the population. In October 2008, as part of a mortality and nutritional study, heads of 900 randomly selected households in 30 clusters were interviewed about the usage of LNs in their household using a standardized questionnaire. The condition of the LNs in the household was also checked. Of the 900 households, 751 (83.4%, 95%CI 78.5–88.4) reported owning at least one LN. Of the 16.6% who did not own an LN (149/900, CI 11.6–21.5), 91.9% had not participated in the MSF LN mass distribution. In the 751 households reporting LNs, 94.1% (707/751) were observed to have them hanging correctly over the bed. In total, the interviewers observed 1135 LNs correctly hanging over the beds and 286 LNs not hanging over the beds. The main reasons for not hanging LNs were that they were currently not yet used/still in original packaging (38.2%, 109/286) or that the LNs were used to wrap the mattress as bedbug protection (34.6%, 99/286). Of the 1135 correctly hanging LNs, 52.7% (598/1135) did not have any holes and another 22.6% (256/1135) had up to a maximum of 10 finger size holes in the LNs. The average age of the LNs was two years and 99% were washed less than 20 times. The most common source of LNs was MSF (75.2%). Of the 4997 study persons, 67.2% (3356, CI 59.1–74.3) reported sleeping under an LN the night before the study took place. No differences could be found when comparing gender or educational status. 76.8% (926/1206, CI 69.8–82.6) were children under five years and 73% (100/137, CI 59.8–83.1) were pregnant women. MSF achieved almost full coverage with LNs in the catchment area. The results surpassed the targets set in 2000 by Roll Back Malaria of having at least 60% of pregnant women and children under five using LNs by 2010. The conditions of the LNs were also in line with recommendations from the WHO for washing and duration of usage. Our survey results confirmed the success of this free distribution strategy, being to our knowledge one of the few areas online with the Abuja targets.

T2P6-05

Patterns of change in awareness, ownership, and use of ITNs in Africa from 2000 to 2008

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In 2000, insecticide-treated nets (ITNs) to prevent malaria were virtually unknown in Africa, and major ITN programs began concerted efforts to create demand, reduce taxes and tariffs, spur the commercial market, and reach vulnerable populations with subsidized ITNs. The year 2005 marked a major shift in strategy when large infusions of donor money made ITNs available free of charge to households in order to make a rapid increases in ITN ownership. What was the impact of these strategies? Drawing on data from standardized surveys from the USAID-sponsored AED/NetMark project, this study tracked awareness, ownership, and use of nets and ITNs from 2000 to 2008 in 6 countries in Africa. From 2000 to 2004 there were large increases in awareness and ownership of ITNs in all countries, usually with commensurate gains in the proportion of under-fives and pregnant women sleeping under them. From 2005 to 2008, levels of ownership increased steeply following free net distribution. However, levels of use of nets owned did not keep pace with ownership; a substantial minority of nets in households went unused. Purchased ITNs were more likely to be used than those obtained free. The ITN picture changed dramatically, both during the 2000–2004 period and the 2005–2008 period, but in different ways. The data suggest the focus of ITN programs should be on how to best sustain high levels of ownership and raise levels of use of ITNs owned.

T2P6-06

The biological performance and home improvement value of durable residual wall lining (DL) in a rural village of Mali

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A trial was undertaken to evaluate acceptability and practicality of Durable Residual Wall Lining (DL) as an alternative vector control technology to indoor residual spraying in village settings. In N'Galamadibi, a village 130 km NE of Bamako, Mali, DL was installed in 24 houses based upon their representation of typical rural construction materials. The DL contained deltamethrin at 170 mg/m^2. At 3, 6, and 9 months post-installation entomological assessments of residual efficacy were conducted using WHOPES cone tests. At 9 months post-installation a survey was made of user

impressions of the DL appeal and appearance, changes in indoor environment, and impact on perception of mosquito presence. All participants liked the DL nine months after installation. No major defects were noted. Occupants experienced no adverse reactions. A slight change in odor was reported by 37% of residents three weeks after installation, however, no odor was noted by any resident at nine months post installation. Although the majority of participants noted no change in light or temperature in rooms where DL was installed, 18.2% and 27.3% respectively noted they thought there was an increase. Mortality was 97.5–100% in efficacy tests at 3, 6, and 9 months post-install using susceptible *Anopheles* mosquitoes. Tests in each time period were conducted using 12 houses of different types with 80 specimens per wall.

T2P6-07

Effect of washing on insecticide impregnated cotton fabrics against vector species of mosquitoes under laboratory conditions

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We studied the effect of different cleaning methods (rinsing with cold water, washing with cold water and detergent, and washing with hot water and detergent, each for 30 min weekly) on the efficacy of curtains impregnated with synthetic pyrethroids (deltamethrin, lambdacyhalothrin, cyfluthrin and etofenprox). Cotton fabric samples were impregnated with 100 mg/m^2 of insecticide, subjected to cleaning, air-dried and subjected to laboratory bioassay tests as specified by WHO. Each experiment was replicated ten times and percentages of knock down and corrected mortality were calculated. There is a gradual loss of insecticide when curtains are rinsed in cold water or washed with cold water and detergent but there is drastic reduction in insecticidal activity when curtains are washed with hot water and detergent. On washing with cold water, cold water + detergent, hot water + detergent, deltamethrin persistence on impregnated curtains was observed for 40, 24 and 8 weeks respectively, lambdacyhalothrin activity was observed for 32, 20 and 6 weeks respectively, cyfluthrin was persistant for 28, 16, and 6 weeks respectively. Etofenprox showed its activity for 28, 20 and 6 weeks respectively against *An. stephensi*. Significant difference was not observed between the persistence of insecticides for *An. stephensi* and *Ae. aegypti* ($P > 0.05$), however there was a significant difference ($P < 0.05$) between the persistence of insecticides for *An. stephensi* and *Cx. quinquefasciatus*. Impregnated curtains should only be washed with cold water and detergent every 3–4 months and dried in shade.

T2P6-08

Durable residual wall lining (DL) as a replacement for indoor residual spraying (IRS) in malaria vector control

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New malaria control technologies, such as durable residual wall lining (DL) may eliminate need for a re-spray program in rural communities. DL is a dual purpose tool for traditional house improvement and malaria prevention in development since 2004. DL material combines aesthetic decorative values with vector control performance based on IRS principles. The concept is an adaptation of WHO-approved technology developed for other materials including LNs using deltamethrin. Field trials were established in Nigeria in 2006 and Equatorial Guinea, Kenya, Angola, Mali, Ghana, South Africa, and Vietnam in 2008 to evaluate installation, durability and household acceptability of DL. Each trial had baseline survey prior to installation, one-month opinion survey combined with inspection and photo documentation, and periodic entomological and residue analyses during nine months or longer post-installation. Efficacy above the value for IRS recommended by international health agencies of 80% mortality with 30 min exposure was confirmed 2 years after installation in Nigeria. Preliminary results showed a high user acceptance at all locations. Country-specific reports provided feedback on durability and efficacy under conditions where DL was installed on mud, concrete, and wood walls. Results from these studies confirm the advantages of durable residual wall lining (DL) over traditional IRS programs across a variety of housing conditions. They also identified user preferences between these new tools and IRS.

T2P6-09

Housing structure, poverty and the acceptability of long lasting insecticidal bed nets in the Peruvian Amazon

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Despite coverage problems reported worldwide, bed net use in the Peruvian Amazon is exceptionally high. To substitute for traditional untreated nets, in 2007 at the time of study, 15.207 Long Lasting Insecticidal Nets (Olyset) were distributed to 5069 families in 55 localities in the region of San Juan, Iquitos. Considering the inherent reporting bias related to bed net use, qualitative data obtained by targeted ethnography were triangulated with quantitative survey data from a random sample of 185 *vivax* patients selected from the Paujil and Cahuide Health Centers. The research was conducted in 2007, one month after LLIN distribution and in 2008, one year after their use. The bed net is a direct part of the local housing system and is therefore required to fulfill certain architectural and social requirements. Due to their large mesh size, LLINs are perceived to offer less protection from mosquitoes and other insects and not to shelter from the morning chill and are therefore not considered appropriate for the rainy season when most malaria transmission occurs. Additionally, as compared to traditional nets, the LLINs' transparency does not provide the privacy required in houses without external and/or internal walls where family members share the same sleeping space and people can look in from the outside. In more elaborate houses, wooden walls and ceilings offer these functions. LLINs are therefore less accepted and useful for low income households living in open houses. Where mosquito nets are commonly used, their complementary benefits – such as offering privacy and protection from small insects – often appear to be more decisive in fostering their use than malaria prevention. As part of the housing system, these additional benefits should be respected and possibly enhanced to improve bed net use.

T2P6-10

Validity of self-report in ascertaining malaria prevalence in remote rural communities of the Amazon Basin, Peru

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To assess the validity of self-report in ascertaining malaria prevalence when measured over different periods of time and for both direct and indirect reporting, we conducted a 30-month retrospective cohort study (2006–2008) was conducted in an area of frontier agricultural colonization of the Peruvian Amazon region. Population characteristics (807 household members from

234 households) and self-reported malaria episodes (375 episodes) were collected through questionnaires administered by interviewers, blinded to malaria status, to the head (or designate) of each eligible household. Self-reports were compared to the laboratory-confirmed cases (217 cases), considered as the gold-standard, registered at the government's local health post and confirmed from both passive and active surveillance. The validity of self-reported malaria prevalence was analyzed for periods covering the last 6 months, 18 months, and 30 months. Highest accuracies were obtained when malaria prevalence was ascertained over the last 6 months. Differences between direct and indirect reporting were negligible. When measured over the previous 6 months, indirect reporting sensitivity was 89.5% (95% CI: 66.9–98.7%) and specificity was 95.2% (95% CI: 93.4–96.6%). Lowest accuracies were obtained for indirect reporting when prevalence was ascertained over the previous 30 months with a sensitivity of 70.2% (95% CI: 62.5–77.1%) and specificity of 72.6% (95% CI: 68.3–76.7%). Multivariate analysis will be used to explore respondent and household determinants which may be associated with accurate responses. These findings support the use of time-limited direct or indirect self-report in accurately ascertaining malaria prevalence in areas of hypo-endemic malaria transmission.

T2P6-11

Epidemiology and first approach to estimate vulnerability to malaria outbreaks: steps to implement a malaria early warning system (MEWS) as adaptation measure for climate change in Colombia (INAP project)

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Vulnerability levels express the population susceptibility to malaria transmission. We conducted an exploratory retrospective descriptive study at national level using SIGEpi to georeference the cases and Annual Parasite Index (PAI, total cases/population at risk *10.000) and their distribution by age groups as proxy of endemic and immunity state in all departments of the country; next we performed a cases cluster analysis In the four municipalities of the INAP project, we developed a malaria cases and API time series from 2001 to 2008 using epidemiologic periods (4 weeks) and its distribution by age groups. Next we performed a cross sectional study for homes and individuals. Antioquia and Cordoba historically contribute 51% of malaria cases at the national level. 44 municipalities on the pacific coast contain 75%

Table 1 for T2P6-11 Epidemiological characteristics of the 4 INAP pilot municipalities

	Buenaventura	San Jose del Guaviare	Puerto Libertador	Montelíbano
Dominant Species	*P. falciparum*	*P. vivax*	*P. vivax*	*P. vivax*
Rainy season prevalence	0%	3.7%	5.7%	2.8%
Dry season prevalence	1.8%	5.8%	4%	6.8%
Pike per epidemiological period	Periodos 2 y 5	Periodos 5	Periodos 5 y 9	Periodos 8
Endemicity	Unstable, Hypoendemic	Stable, hypoendemic	Unstable, Hypoendemic	Unstable, Hypoendemic

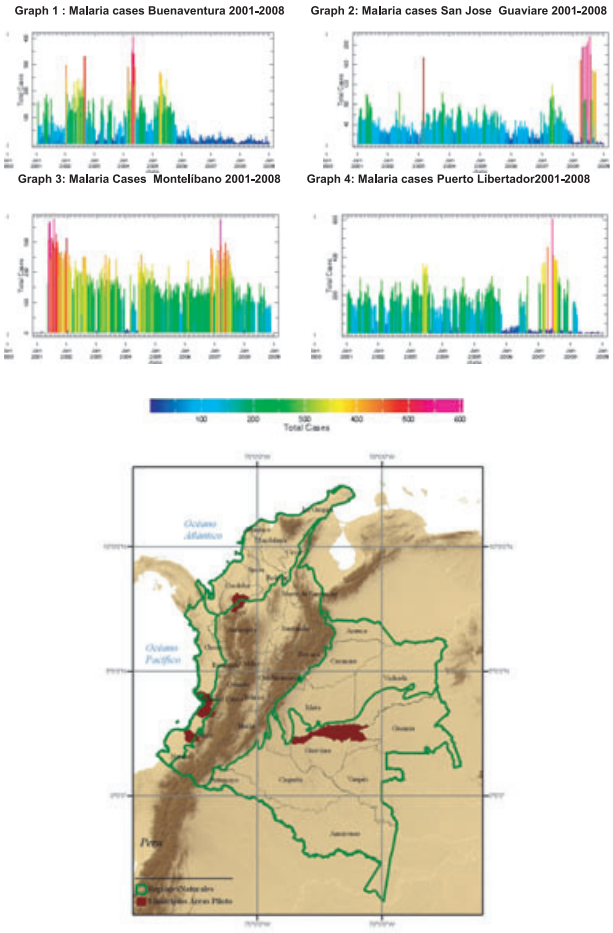
Table 2 for T2P6-11 Coverage of preventive and assistance activities and vulnerable population

	Buenaventura	Montelibano	Puerto Libertador
Information, education and comunication for malaria?	90%	52%	41%
Under 5 years	25%	61%	49%
Pregnant women	0.5%	0.1%	0.3%
Incomplete walls	64%	63%	58%
Spraying activities every 6 months	86%	38%	29%
Do not participate in breading sites and environmental control	95%	75%	95%
Knows malaria symptoms	91%	98%	96%
Goes to hospital or Microscopy	82%	89%	90%
Quality difficulties	46%	80%	60%
Finís treatment	96%	92%	90%
Bednets coverage	88%	57%	50%

Table 3 for T2P6-11 BNU criteria

	Buenaventura	Montelibano	Puerto Libertador
No sabe leer y escribir Do not read and write	25%	27%	32%
Personas a cargo del jefe de hogar	3.5	4.1	4
No tiene servicio sanitario Not availability of sanitary services	45.5%	17%	41%
Sanitario fuera de la casa Bathroom outside the house	61%	82%	71%
Paredes incompletas Incomplete walls	64%	63%	58%
Material paredes madera Walls in wood	70.5%	65%	42%
Material Techo lata Metallic Roof	51%	24%	14%

Abstracts of the 6th European Congress on Tropical Medicine and International Health and 1st Mediterranean Conference on Migration and Travel Health



Map 1: Pilot areas of the Integrated National Adaptation Pilot project. AP01: municipalities of Montelibano and Puerto Libertador, in the Department of Cordoba, on the Colombian Caribbean Coast; AP02: municipality of San Jose del Guaviare, in the Department of Guaviare, on the Colombian Eastern plains

of malaria cases and 51.03% of falciparum malaria cases, followed by Antioquia and Cordoba departments with 32%. We identified 7 clusters and found 15 municipalities accounting for 63% of malaria cases' variability. Cycles can be observed in the cluster time series. At three of the INAP municipalities the systematic time series indicated unstable hypoendemic transmission, whereas in San Jose el Guaviare we found a stable transmission This results are consistent with the household survey results. Actual access to preventive and assistance services does not achieve enough coverage to have an impact in the population. On the other hand, a large percentage of the population in all pilot areas knows malaria symptoms and as a first choice they go to the diagnosis point. Nevertheless they do not actively participate in breading site control. A high percentage of the population perceives obstacles to early diagnosis and treatment. Incomplete roofs and walls and the material they are made of limit effectiveness of inside house spraying and the reduction of effective physical barriers for *Anopheles*. Malaria is concentrated in a few departments and municipalities in Colombia. In general, the age distribution of the disease suggests hypoendemic scenarios and low immunity levels. Municipalities time series shows an unstable transmission with repetitive peak in the years analized.

T2P6-12

Risk factors for Malaria in an area with Artemisinine resistance in the forests of Cambodia

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The border of western Cambodia is considered to be an epicentre of drug-resistanct malaria and clinical and molecular evidence indicates that resistance to artesunate-mefloquine is occurring there. The spread of artemisine resistance would be disastrous for global malaria control. A better understanding of the malaria epidemiology in these forested environments is a condition for better control of *P. falciparum* malaria. We performed 2 cross-sectional surveys in 2005 in 4 districts, with 3 villages each, situated in the north-west and north-east forest areas of Cambodia (the first in August/September and second in November/December). *P. falciparum* and *P. vivax* prevalence were determined and multivariate logistic regression modelling was carried out to define risk factors. A two level clustering at village and survey level was performed. 2693 participants were included in this study. The reported malaria prevalence was 4.0% and 7.2% for *P. falciparum* and *P. vivax* respectively. After adjusting, age between 5 and 15 years (OR: 2.0; $P = 0.02$), the following risk factors for *P. falciparum* infection remained: seasonality (OR: 0.60; $P = 0.02$), Tumpurn ethnic group (OR: 7.3; $P = 0.007$), houses built on stilts (OR:0.39; $P = 0.03$), use of protection (OR: 0.62: $P = 0.047$) and location of the village. Age between 5 and 15 years (OR: 1.9; $P = 0.01$, sleeping in the forest (OR: 1.5; $P = 0.065$), having a plot house (OR: 0.67; 0.04) and villages were risk factors for *P. vivax*. The main risk factors for both species were children aged 5–14 years old living in particular villages. To eradicate malaria, specific control programs targeting the identified risk groups and a good surveillance system will be needed. Improved access to and case management at health facilities is important. Artesiminin monotherapy must be abandoned completely.

Neglected zoonotic diseases

T4P11-01

Araraquara virus: the most virulent hantavirus causing pulmonary syndrome (HPS) in Brazil

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In Brazil, 1993–2009, 1145 HPS cases were reported with a 39.5% case-fatality. Five lineages of hantavirus have been associated with HPS: Juquitiba (JUQV) in the South and Atlantic rain forest, Araraquara (ARAV) in the Southeast and Central Plateau, Laguna Negra in the Mid-West, Castelo dos Sonhos and Anajatuba in the North and Northeast. We studied aspects of HPS caused by ARAV. The study was done in the southeastern region of Ribeirão Preto which is almost completely deforested, has 3500000 inhabitants and an economy based on the sugar cane agroindustry. Clinical data of HPS cases and genomic analysis of hantavirus from these patients were performed. Rodents were captured looking for ARAV infection. 70 HPS cases were reported 1998–2009. The disease struck mostly males (75.7%), 35.8 years old, with a 54.3% case fatality. After 2–30 days incubation, patients had dyspnea (87%), fever (81%) and cough (44%) and the symptoms evolved to tachycardia (81%), low arterial blood pressure levels (56%), metabolic acidosis (57%), limphocytopenia (51%), hemoconcentration > 45% (70%), leukocytosis (67%) and

high levels of creatinine (51%). Bilateral and diffuse lung interstitial rales in chest radiographies evolved to alveolar rales. Most of the cases evolved to respiratory failure, hypotension and shock. Parenteral infusion over 2000 ml, and hypotension were both associated to bad prognosis (*P*: 0.0286 and *P*: 0.0453). Eleven HPS patients had hantavirus genome detected, from blood or tissues, by RT-PCR and nucleotide sequences of these amplicons, including parts of N, Gn and Gc genes, showed 97% homology with ARAV sequence. Furthermore, 921 rodents were captured in the field. From these, 22 *Necromys lasiurus*, 5 *Akodon sp*, 1 *Oligoryzomys sp*, 1 *Calomys tener* and 1 *Rhipidomys sp* had antibodies to Hantavirus (3.2%). The ARAV genome was detected in 5 *Necromys lasiurus*, 1 *Akodon sp*, and 1 *Calomys tener*. ARAV was isolated from lung tissues of one *Necromys lasiurus*. A significantly higher HPS case-fatality rate (*P* 0.0084) was observed in the regions of ARAV circulation compared to other regions, suggesting that this is the most virulent hantavirus in Brazil. *Necromys lasiurus* is probably the reservoir of ARAV and the virus has been isolated from this rodent. Considering that hantaviruses have ~900 years old and are rapidly evolving RNA viruses, a stringent reevaluation of the co-evolution rodent-hantavirus hypothesis is necessary. We have found 3 rodent species infected with ARAV including, *Necromys lasiurus*. It is possible that this virus is presently spreading among different species of wild rodents in Brazil.

T4P11-02
Cystic hydatidosis: proposal of a management algorithm

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Considering the complex management of patients affected by cystic hydatidosis (CH) and the lack of widely proven guidelines, the aim of this work was to propose an algorithm that can guide the decision-making process when following CH patients. The algorithm was constructed based on the data presented in a previous retrospective study performed by our group. This study evaluated the clinical and epidemiological features of CH patients and provided a literature reviewed for the treatment and management of CH. The proposed clinical notes folder is made up of six sections, each of which considers different aspects of HC management. The first section focuses on epidemiological data such as the patient's personal details and information on job, recreational activities, contact with dogs, co-morbidities if present, and HC diagnosis (year, method, symptoms). The second section collects data on the patient's medical history. The third section reports tests performed for the patient's initial assessment (abdominal ultrasound with WHO-IWGEC classification, total body CT, anti-Echinococcus IgE, laboratory parameters), as well including information on the localization of the cyst/s at diagnosis and upon surgical examination. The fourth part reports medical treatment (drugs, dosage, treatment start and end dates, adverse events and their management, and laboratory exams). The fifth part provides surgical data (characteristics of surgery, medical treatment before and after surgical intervention, post-surgical management). The last section is dedicated to the patients' follow-up. We propose a 5-year follow-up after treatment in order to evaluate response to therapy and eventual relapses and/or complications. An abdominal ultrasound exam should be performed every 6 months for two years and then annually for three years. Chest X-rays should be performed in years 1, 3 and 5 of follow-up, with a total body CT in the fifth year. As for laboratory parameters, anti-echinococcus IgE and eosinophil percentages should be evaluated every 3 months for the first 2 years and every 6 months for the following 3 years. The use of the proposed diagnostic, clinical and follow-up algorithm for the management of patients affected by CH may be helpful in organizing a patient's clinical notes more efficiently and a single-source patient management system will facilitate quick and easy data.

Community-based interventions: an opportunity for integration?

T1P5-01
Implementation of a participatory method for planning, implementation and evaluation of community health actions in Centro Habana, Cuba

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People's participation is one of the pillars of Cuba's national health system. Thus absence of a well developed methodology to reinforce participatory processes in the planning, implementation and evaluation of health activities can be an obstacle to further improve the empowering potential of participation. We analyzed if and how a methodology called 'comprehensive and participatory planning and evaluation' (CPPE) can be introduced in and adapted to the Cuban health care system. The CPPE process is implemented in Dragones, Centrohabana through an initial workshop with informal leaders of the neighborhood and formal representatives of people's organizations and governmental institutions, including the health sector. A health intervention plan was collectively developed, and implemented over the year 2008. After one year, in a second workshop, the process was evaluated. Based on these results, plans for the following year were made, and a second implementation cycle was started. In the initial workshop, participants decided to address the sanitation problem of their neighborhood. They selected the development of two 'model streets' as the first year's intervention. From the identification of a problem, over the analysis of its causes and of the potential interventions to tackle it, towards the development of a concrete intervention plan, a team was built that could ensure a broader mobilization and participation of the population in the planned activities. The dynamism of the team was maintained all over the year. Inevitably, some conflicts arose with local authorities who initially did not grasp the new dynamics, but as time evolved this attitude radically changed towards full support while more and more neighbors got involved. Instead of the 2 'model streets' initially planned, spontaneous neighborhood involvement multiplied the result to 6 of these streets, all with different local dynamics. The results show the potential of this methodology to reinforce participation processes within the Cuban context. The selection of the initial team of informal and formal leaders is recognized as pivotal. The results of this first year ensured a growing interest, motivation and dynamism. They also gave the evidence base for the next (research) steps related to the multiplication of this experience towards other neighborhoods and the flexible institutionalization of this methodology within the health system.

T1P5-02
Social mobilization for health – maternal & child health weeks

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Child health weeks are regular events organized bi-annually to deliver an integrated package of preventive services for improving child health during which health care services are run at accelerated levels preceded by advocacy activities. Social mobilization

through members of the community is a cheap and effective mechanism of influencing health services uptake. In November 2007, Kenya Red Cross volunteers participated in reaching target population in 50% of districts in Kenya. The aim was promoting child nutrition. Training manuals, localized IEC materials and reporting formats capturing key indicators were developed. 2640 volunteers and 66 coaches were trained. 12 000 villages were targeted. Each volunteer was in-charge of 15 households per day. The messages were targeting various child survival strategies. There was a 30% increase in the health facilities attendance during November and December. This was attributed to intensive social mobilization using integrated methodologies. However due to high turn-out, over 80% of the facilities got stock-out of vaccines and crucial drugs. Maternal and child health weeks were seen as an effective and sustainable way of increasing coverage of crucial child survival interventions. However, if this is to be sustained vaccines and other medical supplies have to be in adequate supply, and mobilization needs to be continuous.

T1P5-03

A community-based randomized trial to promote exclusive breastfeeding in Burkina Faso: Acceptability and impact of the intervention

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Infant health and nutrition remain two major challenges in sub-Saharan Africa. Exclusive breastfeeding (EBF) was shown as one of the most reliable and cheap strategy to reduce infant mortality and morbidity during the half infancy. However its practice by mothers remains a challenge in several African countries and the promotion of EBF is needed. We assessed the acceptability of an intervention consisting of individual peer-counselling sessions on EBF by mothers in 12 rural clusters in Burkina Faso, and measured the impact of this intervention on EBF rates at 12 weeks of the child age. A cluster-randomized trial was conducted in 24 clusters in Banfora health district, South of Burkina Faso. Peer-counsellors were selected by the local communities and trained by our research team to promote EBF through one antenatal and 6 postnatal individual counselling sessions. All pregnant women of the intervention clusters were informed about the service. A random sample of women was recruited and followed up to 6 months with regular data collection on infant feeding practices, morbidity and growth. A survey was conducted at the end of the 6 month-follow-up in a random sample of mothers who had received the intervention package. A random sample of 208 mothers who got the intervention was interviewed. The baseline characteristics of this sample are consistent with the location of our study with high illiteracy (85%), a high proportion of multigravidae (84%), and a high proportion of home delivery (57%). On the interview day, 94% of women were still breastfeeding. Each woman received a median of 5 counselling sessions on EBF. The sessions consisted of household visits of the peer-counsellor (96%), and were held as a private conversation (90%). The main messages of the antenatal and postnatal counselling sessions on EBF were do not give water to your baby up to 6 months and do not give anything else to your baby but breast milk. The intervention was accepted and found to be useful by over 90% of the interviewees. Among the reasons listed by mothers for satisfaction were the few episodes of illness experienced by the child, his nice growth, an earlier walking and a reduced occurrence of diarrheic episodes. The multivariable logistic regression performed on the longitudinal data of these women showed a dose-response relation between the practice of EBF and the intensity of the intervention. Mothers who got 4–7 counselling visits had an OR of EBF of 3.64 (95% CI: 1.6–8.2) compared to those who got <4 visits. Antenatal care visit was also found to increase the OR of EBF with an OR of 2.29 (95% CI: 1.2–4.3). A community-based intervention to promote EBF was feasible, accepted and seems efficacious on EBF rates at week 12 in rural Burkina Faso.

T1P5-04

Community epidemiology as a strategy bridging care delivery and research

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Primary care is increasingly re-proposed as the cornerstone of effective health policies and practices. The experiences developed over more than 15 years in the North of Esmeraldas, Ecuador, based on the protagonist role of non-professional members of the communities (health promoters), document how to bridge the exigencies of a care delivery and research. A network of health promoters was created in each of the 130 dispersed villages of the area of Borbon. The team was trained to assure active epidemiological surveillance of routine care: from mother and child health, and nutritional status, to specific tropical (onchocerciasis, yaws, malaria, TB) and chronic non infectious conditions (hypertension and cardiovascular risk, cervical cancer screening). Translation of the methods and tools of ad hoc programs into routine care practices supports the importance and the yield of considering community based epidemiology as a principal research resource of primary care. Community epidemiology can and must be a reliable and affordable producer of original knowledge and not simply the place where centrally generated and standard guidelines are enforced.

Malaria diagnosis: rapid diagnostic tests (RDTs) and traditional microscopy

T2P7-01

Molecular diagnosis of malaria in the field: development of a novel, one-step nucleic acid lateral flow immuno-assay for the detection of all 4 human *Plasmodium* species and its evaluation in Mbita, Kenya

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We present a simple, fast, sensitive and specific detection system, Nucleic Acid Lateral Flow Immunoassay (NALFIA) for amplified Pan-*Plasmodium* PCR products. Laboratory based evaluation of the NALFIA showed a lower detection limit is 0.3–3 parasites/μl, tenfold more sensitive than gel-electrophoresis analysis. Further evaluation of the Pan plasmodium assay was performed under field conditions. Samples of clinically suspected malaria cases (n = 650) collected during a drug trial were used to assess NALFIA performance. NALFIA were set-up as follows. Nitrocellulose strips were coated with anti-Digoxigenin (α-Dig) antibodies (200 ng/μl). A 0.2% colloidal carbon suspension was conjugated with 350 μg/ml neutravidin. PCR amplification of the 18S ribosomal RNA gene of *Plasmodium* was performed with a 5'Digoxigenin-labelled forward and a 5'Biotin-labelled reverse Pan-*Plasmodium* specific primers. Following amplification 1 μl

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PCR product was mixed with 100 μl running buffer (0.1 M Borate Buffer, 1% BSA, 0.05% Tween-20) and added to a tube containing 1 μl dried carbon coated to the bottom. Following re-suspension of the carbon nano-particles by shortly shaking the tube, a nitrocellulose strip was placed in the tube, and the fluid was allowed to run through the strip for 10 min after which the strips were interpreted. The NALFIA lower detection limit is 0.3–3 parasites/μl, tenfold more sensitive than gel-electrophoresis analysis. Evaluating 650 clinically suspected malaria cases with the Pan-*Plasmodium* assay under field conditions (rural Kenya), revealed that NALFIA detected more positives than microscopy (agreement: 95%; K-value 0.85) and there was an excellent agreement between gel-electrophoresis and NALFIA (98.5%; K-value: 0.96). Thus NALFIA is more sensitive than microscopy and a good alternative to detect PCR products whilst circumventing using electricity or expensive equipment, making NALFIA the first step towards molecular field diagnosis of malaria. This prototype will be further developed in an assay which detects isothermal amplification products and will be used in simplified diagnostics for resistance marker detection within the EU funded project MALACTRES.

T2P7-02

Development and evaluation of a novel magneto-optical test (MOT) for the diagnosis of malaria

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The diagnosis of malaria based on clinical symptoms (e.g. fever) is unreliable and leads to over diagnosis and treatment. Laboratory diagnosis using microscopy and/or rapid diagnostic tests (RDTs) encounter problems in specificity and sensitivity. The objective of the present work was the development of a new magneto-optic technology (MOT) for the rapid diagnosis of malaria based on the detection of haemozoin, the waste product of *Plasmodium*, which is produced in a form that under the action of an applied magnetic field gives rise to an induced optical dichroism characteristic of the haemozoin concentration. The analytical performance of the device will be evaluated under laboratory conditions and in a rural setting in West Kenya. The developed device exploits the change in magnetic state of low spin (Fe^{2+}) diamagnetic oxyhaemoglobin into high spin (Fe^{3+}) paramagnetic haemozoin, which is produced whilst the malaria parasite digests haemoglobin. Heamozoin is deposited as crystals in *Plasmodium* and these are found to exhibit a high level of both magnetic anisotropy and optical dichroism and it is these properties that are identified for exploitation as the basis of a new diagnostic technique. The validity of the MOT device was assessed on measurements on live parasitized erythrocytes obtained from a *Plasmodium in vitro* culture. In a small clinical trial, stored blood samples from confirmed malaria patients, cases of undifferentiated fever, rheumatic-associated disease or heamoglobinpathies, were tested for *Plasmodium* infection with RDT and MOT test. The detection limit of the MOT device, as measured using artificial haemozoin (synthesised β-haematin) to date is 0.01 μg/ml, which corresponds to parasitemia levels approaching 0.0002% (10 parasitized red blood cells/μl), which is as good as expert microscopy and better than the current performance of RDTs. Blind testing of the MOT device revealed that there was an excellent correlation between MOT testing, RDT results and clinical confirmation. The ease with which the system detected a *P. ovale* infection, known for its low parasiteamia, is particularly encouraging. The prototype MOT has a sensitivity/specificity approaching or even exceeding current available diagnostic for malaria. The validity of the device will be further assessed in a large field trial under rural conditions in West Kenya.

T2P7-03

Assessment of two malaria rapid diagnostic tests, with follow-up of positive pLDH test results, in a hyperendemic falciparum malaria area

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Most malaria rapid diagnostic tests (MRDTs) have been based on HRP2 detection, e.g. Paracheck-Pf, but their utility is limited especially in hyperendemic areas by persistent positivity after antimalarial treatment. This is less of a problem with pLDH-based MRDTs, as pLDH is cleared more quickly from the bloodstream after efficacious treatment. But for pLDH tests, sensitivity has been reported as falling below the recommended standard of 95%. A new pLDH test – CareStart™ 3 line P.f/PAN-pLDH, claims to have better sensitivity while continuing rapid conversion to negative. We aimed to (1) compare sensitivity and specificity of CareStart™ to Paracheck-Pf to diagnose falciparum malaria, (2) assess the percentage of positive CareStart™ tests after treatment of blood smear positive patients within 28 days and study the time required for CareStart™ to become negative and (3) evaluate ease of use and inter-reader agreement of both tests. Patients were included if they were aged 2–59 months, presenting at an MSF community health centre in Bo district, eastern Sierra Leone, with suspected malaria defined as fever (axillary temperature >37.5 °C) and/or history of fever in previous 72 hours and no signs of severe disease. Capillary blood was used for the two MRDTs and to perform a blood slide as a reference. All patients with positive blood slide tests were treated for three days (day 0–2) with supervised artesunate and amodiaquine treatment according to the national protocol. Cases where the blood slide was negative by day 2 were followed with repeated CareStart™ and blood slide tests every seven days until CareStart™ became negative or a maximum of 28 days. Sensitivity of Paracheck-Pf was 98.8% (95% CI 95.8–99.8, 2/169) and of CareStart™, 99.4% (95% CI 96.8–100.0, 1/169). Specificity of Paracheck-Pf was 74.7% (95% CI 67.6–81.0, 44/174) and of CareStart™, 96.0% (95% CI 91.9–98.4, 7/174), which was significantly higher ($P < 0.001$). Neither test showed any change in sensitivity with increasing parasitaemia. But only 5.3% blood slides had less than 100 parasites/microlitre and 82.8% had a parasitaemia higher than 1000 parasites/microlitre. Of the 155 eligible study subjects for follow-up CareStart™ test, 63.9% (99/155) had a positive test on day 2, 21.3% (33/155) on day 7, 5.8% (9/155) on day 14, 1.9% (3/155) on day 21 and 0.6% (1/155) on day 28. The median time for the test to become negative during follow-up was seven days. CareStart™ was as easy to use and interpret as Paracheck-Pf with excellent inter-reader agreement. Both MRDTs were highly sensitive, met WHO standards for the detection of falciparum malaria monoinfections where parasitaemia was >100 parasites/microlitre and were easy to use. CareStart™ positivity decreased quickly after successful antimalarial treatment, making it a good choice for an MRDT for a hyperendemic falciparum malaria area.

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T2P7-04

Changes in costs following the implementation of routine microscopy-based diagnosis of malaria in a peripheral health care centre in northern Uganda

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We analysed changes in costs when implementing microscopy-based diagnosis of malaria in all malaria-suspected patients at a peripheral health care centre in a region hyperendemic for *Plasmodium falciparum*. A sequential interventional study was conducted at a peripheral health care centre in Gulu district, Northern Uganda. The study consisted of two phases (P1 and P2), each lasting for two weeks. During P1, usual clinical work was carried out without routine microscopy-based diagnosis of malaria. During P2, routine Giemsa stained thick blood film examination was implemented for all patients with clinical signs of malaria. The remaining clinical work was not affected by the study intervention. Trained research assistants collected data on all consecutive patients' symptoms, diagnoses, and treatments using standardised methods. Costs were calculated as the costs for malaria diagnoses plus the costs for treatments, including anti-malarials and other drugs, and compared between the two study phases. 1576 patients (median age one year, IQR 0–10 years, 54.3% female) were enrolled in the study, 803 in P1 and 773 in P2. No significant difference was observed in the proportion of patients with body temperature >37.5 °C (27.9% vs. 24.7%, $P = 0.150$) between P1 and P2. Proportion of patients with a diagnosis of malaria decreased from 52.9% to 12.7% ($P < 0.001$), proportion of patients with septicaemia increased from 1.1% to 5.1% ($P = 0.003$). Diagnoses of respiratory (41.8% vs. 43.3%) and urinary tract infections (3.8% vs. 3.9%), diarrhoea (15.1% vs. 17.6%), and injury (2.8% vs. 3.4%) showed no significant differences between the study phases. Expenditures for malaria treatments decreased from US$ 242.0 in P1 to US$ 43.6 in P2. Additional costs for malaria microscopy in P2 amounted to US$ 76.4. Use of antibiotics and other drugs increased in P2 leading to US$ 39.3 in extra costs. These figures summed up to US$ 82.7 saved in the two weeks period of P2 corresponding to 15.3% of the overall drug budget of the health care centre. The shift to routine microscopy-based malaria diagnosis at a peripheral health care centre in a region hyperendemic for *Plasmodium falciparum* was associated with substantial cost reduction. The study intervention might have led to an improved case management in patients with febrile illnesses.

T2P7-05

Development of a real time PCR assay for differentiation of *Plasmodium* species in a pediatric sample from Luanda

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We evaluated the results obtained with a real time PCR assay for detection and differentiation of four species of *Plasmodium* that cause human disease, using a single amplification reaction with those observed with a classic microscopic diagnosis. *Plasmodium* DNA was extracted by a proteinase K and phenol-chloroform modified method. A real time PCR assay was used to perform *Plasmodium* detection species by using a Light Cycler instrument and DNA Master SYBR green reagents (Roche). The primers were used to amplify a species specific region of the multicopy 18S ribosomal RNA gene (*P. falciparum, P. vivax, P. malariae, P. ovale*). The blood samples were collected on filter paper from children with clinical symptoms of Malaria from emergency service of the Luanda Paediatrics Hospital. We analysed 235 blood samples and observed that 162 (68.9%) were positive. Most of these positive samples were single species infections caused by *P. falciparum* 108 (66.7%) and *P. vivax* 48 (29.6%) and 6 (3.7%) were mixed infections of these two species. From these patient's samples analysed only 118 had a microscopic diagnosis. We observed that 65 cases were concordant for both methods, 42 microscopically negative samples were positive by real time PCR assay and only 11 microscopically positive results were not detected by this method. The real time PCR assay can be completed in one hour and has the ability to detect and identify four species of *Plasmodium* in a single reaction by using of melting temperature curves analysis. Real time PCR assay is more sensitive than microscopy and would seem well suited to detect mixed infections by precise and objective differentiations of species. The PCR assay revealed a high proportion of *P. vivax* infections not usually found in the literature for this part of Africa. So this rapid, accurate and efficient method can play an important role in the specific diagnosis, epidemiologic and resistance studies of malaria.

P. vivax and others including *P. knowlesi*. Do they really matter?

T2P8-01

Evaluation of *Plasmodium vivax* genotyping markers for molecular epidemiology

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Molecular typing provides novel parameters to assess outcomes of interventions against malaria. We present a genotyping technique that provides a fast and precise approach to study *Plasmodium vivax* infection dynamics where individual parasite clones must be followed over time. PCR fragments were sized by capillary electrophoresis to determine the extent of size polymorphism of 9 potential genetic markers (5 genes of merozoite surface proteins (*msp*) and 4 microsatellites) in 100 *P. vivax* positive blood samples from Papua New Guinea. Multiplex PCR protocols allow the analysis of these markers in parallel. The two microsatellites MS16 and Pv3.27 showed the greatest diversity in the study area with 66 (for MS16) and 31 (for Pv3.27) different alleles found in 100 *P. vivax* positive blood samples, followed by two fragments of *msp1* and two other microsatellites. *msp3α*, *msp4,* and *msp5* revealed limited polymorphism. Even the most diverse markers showed allele frequencies of up to 6% or 13%. These high resolution genotyping techniques were applied to study co-infection of individual clones of both, *P. vivax* and *P. falciparum*. Co-infection with *P. falciparum* led to a higher *P. vivax* multiplicity of infection (number of concurrent clones per carrier) compared to the multiplicity observed in absence of con-infecting species. Capillary electrophoresis based genotyping techniques are robust and suitable for high throughput. They provide the high discrimination power required for longitudinal follow up of individual parasite clones in consecutive blood samples of the same carrier. To reduce the theoretical probability of super-infection with parasites having

the same haplotype as present at baseline, we propose to combine at least two markers for genotyping *P. vivax*.

T2P8-02

Human *Plasmodium knowlesi* infections in Central Vietnam

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Following increasing reports of human *Plasmodium knowlesi* infections in Southeast Asian countries, blood samples collected during two large malariometric surveys (2004 and 2005) carried out in a forested area of Central Vietnam were screened for the presence of this simian malaria species. Blood samples among those found positive for *P. malariae* (mono- or mixed infections by species specific PCR) were randomly selected to be screened by PCR for the presence of *P. knowlesi*. Family members of positive cases included in the survey were also screened. Blood samples collected in 2005 from the same individuals were screened again for *P. knowlesi*. All *P. knowlesi* positive samples were confirmed by sequencing. Among the 210 *P. malariae* mono- or mixed infections identified by species-specific PCR, 95 were screened for *P. knowlesi*. Among the 5 PCR positive cases, 3 were confirmed to be *P. knowlesi* infections by sequencing, 2 young children (<5 year old) and a young man, all asymptomatic at the time of the survey and for the next 6 months after the survey. One child was still positive one year later. Several family members, primarily positive for *P. knowlesi* by PCR, were subsequently not confirmed by sequencing, revealing a substantial amount of aspecific reactions to either human or *P. vivax* DNA. New primers have been designed and are currently developed to improve the performance of the molecular diagnosis of *P. knowlesi*. This is the first report on human infections by the simian malaria parasite *Plasmodium knowlesi* in Vietnam: two out of the three confirmed cases were children under 5, and all three cases were asymptomatic. In one of the young child, the infection may have persisted for at least one more year. Unfortunately, current molecular tools are not very specific, preventing the analysis of a large number of blood samples for the estimation of its prevalence. More reliable diagnostic tools are urgently needed to improve the diagnosis of *P. knowlesi*.

T2P8-03

Naturally acquired antibodies to *Plasmodium vivax* duffy binding protein in rural Amazon

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Plasmodium vivax Duffy binding protein (DBP) plays a critical role on high-affinity binding interactions underlying erythrocyte invasion. Here, we investigate the DBP immune response in an ongoing cohort study carried-out among 366 residents of an agricultural settlement consolidated over the course of several decades in the Brazilian Amazon area. Baseline serum samples from 68 (18.6%) subjects displayed anti-DBP antibodies by ELISA, and, in one-third of these responders, these antibodies inhibited erythrocyte-binding function of the DBP ligand domain (DBP_{II}). Although the overall recognition of DBP decreased during the 15-month of follow-up, the ability of the sera to inhibit DBP_{II} erythrocyte-binding remain relatively stable over the time. Multiple logistic regression models identified cumulative exposure to *P. vivax* as the strongest predictor of the presence of anti-DBP antibodies during the cross-sectional surveys. We conclude that low levels of DBP recognition by semi-immune populations should be addressed in vaccine development strategies involving *P. vivax*.

T2P8-04

Adherence to 7 day primaquine treatment for *Plasmodium vivax* in the Peruvian Amazon

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Treatment adherence to primaquine for the radical cure of *Plasmodium vivax* infection was researched along the Iquitos-Nauta road in the Peruvian Amazon where around 82% of reported malaria cases are caused by this parasite species. Adherence is particularly relevant in order to eliminate the latent hypnozoite reservoir after symptoms abate as the persistent nature of the *P. vivax* in the human liver can produce repeated relapses for years after the initial infection. Quantitative data were retrospectively collected from 1072 *P. vivax* malaria patients treated in the Paujil and Cahuide Health Centers and a survey on adherence was carried out in a random sample of 185 *vivax* patients; information that was triangulated with qualitative research techniques. Despite free-of-charge treatment in nearby health centers, adherence to the current 7 day primaquine treatment for radical cure of *Plasmodium vivax* was estimated at 58.2%. Principal stated reasons for non-adherence were that the treatment physically "*shocked*" people's health (69.9% of survey respondents) after the initial two days of treatment and perceived allergies to the medication (61.2% of respondents). These perceived adverse events relate to local humeral illness conceptions which hold that malaria produces a *hot state* of body which is further aggravated by the characteristically *hot* medical treatment. In general, patients are willing to adhere to the first 3 days of treatment during which symptoms are most apparent and include the characteristic *cold* chills. However as symptoms abate the benefits associated with treatment significantly decrease while the perceived aggravating characteristics of the medication outweigh the advantages of acquiring the remaining 4 days of treatment at the health centre. Improving community awareness on further malaria transmission due to relapses and fostering a realistic system of direct observed intake of the medication organized at community level can be expected to currently offer the most feasible intervention options.

Challenges in HIV and TB diagnosis

T3P5-01

Clinical, radiological and bacteriological profile of tuberculosis in a West African country: preliminary data from the national reference centre for tuberculosis in Bissau, Guinea Bissau

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Tuberculosis (TB) diagnosis in Guinea Bissau relies on clinical examination and direct smear observation. Chest X-rays, when

available, are performed only in case of negative smear. Control analyses are performed only after two months of treatment. The changing clinical pattern of TB due to the HIV/TB co-infection (miliariform TB and immune reconstitution syndromes affecting the lungs) and to the spread of MDR and XDR TB, suggest the need for improved diagnostic and treatment protocols across Africa. Description of clinical, radiological and bacteriological profile of TB in adult patients admitted to the National Reference Centre Hospital for TB in Bissau at time of diagnosis, after one month and after two months of treatment. The description of TB profile could aid in defining targeted diagnostic priorities in limited resource settings. Since July 2007 patients admitted with suspect of TB received clinical evaluation, BMI measurement, Chest X-rays, direct smear observation and complete blood count. During the month of July, routine HIV testing and antiretroviral treatment were also offered. The above mentioned analyses were performed at time of TB diagnosis, after one month of treatment and after two months of treatment. First line treatment consisted of the standard four drug regimen (R/H/E/P) except for relapsed patients who received five drug regimen (R/H/E/P/S) according to the National Protocol. All analyses and treatment were free of charge; three meals per day were also given for free. 309 patients were admitted. 169 M, 140 F. 245 were adults (mean age 40.18 yrs, range: 15–93) and 64 were children <15 yrs. Main symptoms on admission were: cough (91%), fever (88.5%), chest pain (78%), weight loss (71%). 175/245 (71.4%) adults had TB diagnosis confirmed and 51.2% were smear positive. Chest X-rays were performed in 155/175 (85.8% of smear positive, 91.3% of smear negative). Lobar infiltrate and apical infiltrate were the images observed more frequently (78% of X-rays). Mean BMI at admission was 17, while mean Hb was 9.2 g/dl. The 62 patients tested for HIV showed a 48% of TB/HIV co-infection (69.8% HIV1, 20% HIV2, 10.2% HIV1/2). After 1 month of treatment, 45% of smear positive patients persisted positive while this percentage dropped to 13% after 2 months. The majority of patients who were positive after two months, did not repeat a smear after three months. Mean BMI improved to 17.9 after 1 month and to 19.11 after 2 months. Mean Hb rose to 10.1 g/dl after 1 month and to 11.3 g/dl after 2 months. 4 HIV patients presented pulmonary immune reconstitution syndrome with worsening of previous chest X-rays. TB Reference Hospitals in West Africa should modify diagnostic analyses, timing and type of follow-up analyses performed to monitor TB evolution during treatment, due to the changing profile of TB infection.

T3P5-02

Missed opportunities for early tuberculosis case detection among patients with cough of less than two weeks: a study among outpatients in urban Dar-es-Salaam, Tanzania

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We conducted a cross sectional hospital based study in six health facilities in Dar es Salaam, between September and October 2007. All patients with cough were screened for pulmonary tuberculosis (PTB) by smear microscopy. Patients were divided into two groups, those who coughed for less than two weeks (<2 wks) and those who coughed for two weeks or more (≥2 wks) of 65 530 patients attended outpatients department (OPD). Out of these, 2274 (3.5%) patients reported cough. Among patients who reported cough, 2214 (3.4%) remembered their cough duration. One thousands nine hundred seventy three patients (89.1%) coughed for ≥2 wks as compared to 241 (10.9%) patients who coughed for <2 wks. Of those who coughed for two weeks or more, 250 (12.7%) had smear positive PTB, and of those who had coughed for less than two weeks, 21 (8.7%) had smear positive PTB. There was no statistically significant difference when comparing proportions of patients with smear positive among the two groups (Pearson Chi-Square 3.2; P = 0.074). Detection of smear positive PTB among patients who coughed for less than two weeks was as high as for those who coughed for more than two weeks. We therefore recommend reviewing criteria for TB screening.

T3P5-03

Evaluation of chitin-sedimentation and sonication for concentrating *Mycobacterium tuberculosis* in diagnostic sputum samples

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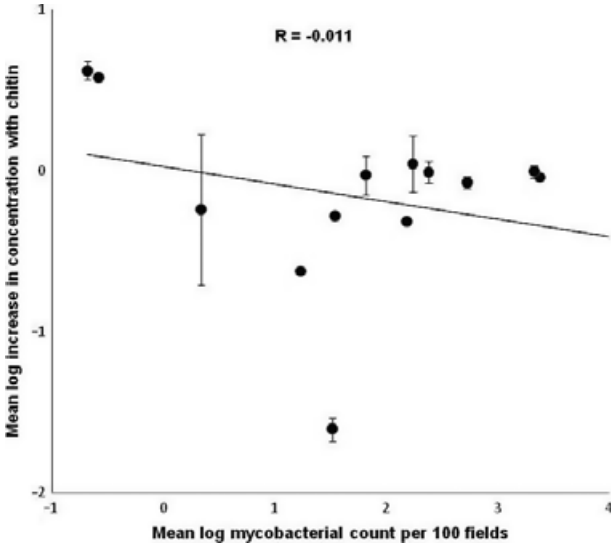
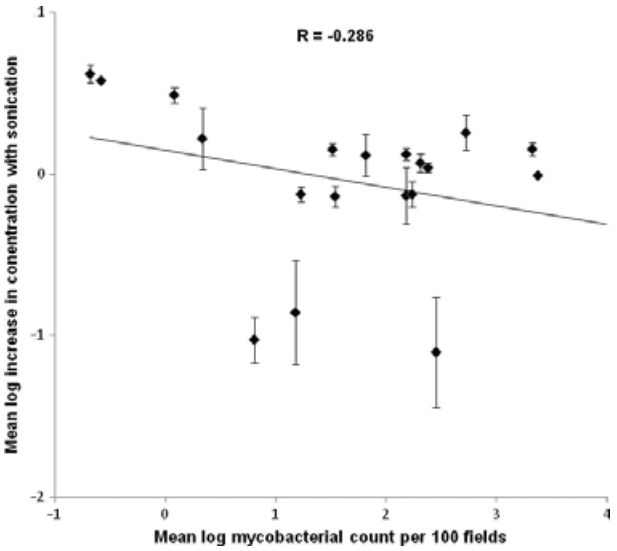
Direct sputum-smear microscopy for tuberculosis diagnosis is insensitive, although rapid and inexpensive. Chitin-sedimentation and sonication of sputum samples may concentrate mycobacteria into the volume visualised by microscopy thus improving sensitivity and slide-reading time. These relatively inexpensive interventions might therefore be of diagnostic use in high-prevalence, resource-poor settings, but their efficacies have not been fully defined. We evaluated quantitatively the mycobacterial concentrating abilities of chitin-sedimentation and sonication, using clinical sputum samples (n = 32) from newly-diagnosed tuberculosis patients. For chitin-sedimentation studies (n = 13), 1 ml of sputum was mixed with 0.25 ml of dissolved chitin, vortexed for 5 seconds and left to stand for 30 min before resuspension after





discarding the supernatant. The remainder of the samples (n = 19) were placed in bijou tubes and sonicated for 60 min in a jewellery sonicator. Triplicate slides were made from each sample pre- and post-processing using a standardised 40 μl of sputum. The slides made pre-processing were used as controls. The number of mycobacteria per 100–300 fields was counted in a blinded manner by three experienced microscopists for the total of 192 Ziehl-Neelsen stained smears produced. To ensure reliability, two microscopists cross-read approximately 10% of the slides.

There was good inter-observer agreement (R = 0.967, P = 0.0001). Compared with controls, chitin-sedimentation and sonication caused slight decreases in mycobacterial counts, but these were not statistically significant (Figures 1 and 2; R = -0.01, P = 0.333 and R = -0.286, P = 0.687 respectively). Slide-reading time was reduced by an average of 0.6 and 1.2 min respectively with chitin-sedimentation and sonication. Using our methods, chitin-sedimentation and sonication did not concentrate mycobacteria in clinical sputum samples. The study was limited by the use of only microscopy-positive samples, as the aim of these interventions is to increase diagnostic sensitivity sufficiently to detect mycobacteria in samples currently deemed microscopy-negative but which turn out to be culture-positive. Nevertheless, these techniques have potential to be further developed for clinical use, given their positive effects on slide-reading efficiency. The next step will therefore be to identify the optimal conditions under which they will concentrate mycobacteria.

T3P5-04

Rapid drug sensitivity testing of mycobacteria by culture on a highly porous ceramic support

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Phenotypic, culture-based methods for drug sensitivity testing (DST) of *Mycobacterium tuberculosis* (Mtb) are relatively simple and may be particularly appropriate to resource-limited settings where tuberculosis (TB) is most prevalent. However, these methods can be slow and generate significant amounts of infectious waste. Low-cost digital imaging and a unique porous ceramic support for cell culture (Anopore) may offer opportunities to improve this situation. We tested a rapid DST method based on fluorescence microscopy of mycobacteria grown for a few generations on Anopore. Mycobacteria were cultured and the resultant microcolonies were heat killed and stained with the fluorogenic dye Syto16. Microscopy, image-capture with a charge-coupled device camera and digital processing were used to quantify the inhibition of growth by drugs. Rapid DST for rifampicin and isoniazid was performed for 10 clinical isolates of Mtb and 10 atypical strains. Mycobacteria could be cultured, killed, stained and imaged on Anopore. For DST, the Anopore method gave an accurate result in 3 days. This is unprecedented speed for culture-based DST for this group of organisms and results in minimal infectious waste (<10 000 cfu). Additionally, analysis of mycobacteria by fluorescence and electron microscopy on Anopore opens up research possibilities.

T3P5-05

Molecular analysis of isoniazid resistance in different genotypes of *Mycobacterium tuberculosis* isolates from Iran

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Significant increase of isoniazid-resistance in Iranian *Mycobacterium tuberculosis* isolates in the last few years would present a serious need for rapid detection and effective management of INH-resistance tuberculosis in Iran. The aim of present study was to investigate the prevalence of mutations in the three most commonly reported loci associated with INH-resistance, *katG* codon 315, the *fabG1-inhA* regulatory region and *oxyR-ahpC* intergenic region. To investigate the mutations associated with isoniazid resistance, drug susceptibility tests were performed initially and then parts of the coding sequence of *katG* gene and *fabG1-inhA* and *oxyR-ahpC* regulatory regions were analyzed in a sample of 48 isoniazid-resistant and 25 isoniazid-sensitive isolates using IS6110 RFLP, Spoligotyping and nucleotide sequencing. The R463L polymorphism in *katG* gene was detected with high frequency in both Isoniazid resistant and sensitive isolates. The *ahpC* 46A was the most common mutation in the *oxyR-ahpC* intergenic region which was present in 31.2% of resistant and 16.0% of susceptible isolates. Mutations at *katG* codon 315 or the *fabG1-inhA* regulatory region were identified in 77.0% of the isoniazid-resistant isolates. Spoligotyping and IS6110 RFLP patterns revealed that most of the isolates contained *ahpC* 46A and *katG* 463Leu polymorphism belonged to CAS super family. Mutations at *katG* codon 315 or the *fabG1-inhA* regulatory region were identified in 77.0% of the isoniazid-resistant isolates and in none of the isoniazid-sensitive strains and are highly predictive of isonizid resistance in Iranian isolates.

T3P5-06

Caring for African caregivers: morbidity profile among the hospital staff in Tete, Mozambique

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Specific care for health care workers (HCW) is a neglected area in African settings despite the numerous infectious hazards health staff is exposed to. Our aim was to assess the morbidity profile of HCW in a hospital in Southern Africa. In 2008, an occupational

health program was implemented in the Provincial Hospital of Tete (PHT), Mozambique. It consists of a one-stop service providing prevention and clinical consultations, morbidity screening and drug delivery if needed. All staff was invited. Clinical and laboratory data were collected prospectively. After one year of implementation, 156 out of 299 HCW attended the occupational consultation (50%). About 30% of the HCW who attended the occupational program were diagnosed with a previously unknown serious pathology, mainly HIV and tuberculosis. Another 30%, most of them HIV infected, could benefit of the advantages of the one-stop approach used. Chest X-rays and serological tests brought the highest diagnostic yield in this specific, most of the time asymptomatic, population. The high HIV prevalence makes even more pressing the need of infection control measures for occupational hazards.

T3P5-07

Implementing opt-out testing strategy in a provincial hospital in Mozambique

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The Provincial Hospital of Tete (Mozambique), referral secondary level of care, has made continuous efforts to increase HIV awareness, counseling and testing, and treatment access for HIV patients since the start of the program in 2003. In 2006 an evaluation of provider-initiated HIV-testing (based on clinical criteria) in adult medical wards showed an HIV prevalence of 54%, 30% of all admitted patients getting newly diagnosed with HIV and 40% testing uptake amongst symptomatic patients (non-published data). Since 2008, a provider-initiated opt-out HIV testing strategy was implemented in the hospital wards. We aim to evaluate outcomes of this strategy. A prospective cohort evaluation of all patients admitted in PTH adult medical wards was conducted from February to April 2009. During this period, 732 patients were included. The male: female ratio was 1:1 and median age was 29.38 years (range: 8-90). The proportion of patients tested before admission was 33.6% (246). Of them, 67.5% (166) was HIV-positive (22.7% of total admissions), 15% (37) known HIV-negative (tested within 3 months before admission) and 17.5% (43) did not disclose results. Hence, a total of 72.3% (529/732) were admitted patients with a not known serological status (either not tested or not disclosing to the health care system). Of those, 70% (371) consented in HIV testing during admission; resulting in 16% (116/732) newly diagnosed HIV patients. The proportion of known HIV-positive patients admitted and not yet on HAART was 44.6% (74/166). The overall HIV prevalence in the adult wards is 38.2%; 41% (143) and 36% (139) in female and male ward respectively. Looking at the 2006 analysis in the same setting, the proportion of patients admitted with an already known HIV status, the proportion of new diagnosis and the HIV prevalence in the medical wards decreased. After 6 years of efforts to improve access to HIV diagnosis and care in a province of high HIV prevalence (13%), still 70% of the admitted adult patients refer not knowing their HIV status. One out of six patients, generally admitted in advanced disease stage, has been newly diagnosed with HIV during their hospitalization. Moreover, an important proportion of HIV-positive patients were not yet on HAART evidencing that HIV awareness and advocacy activities with community testing involvement, as well as pre-HAART retention in care merit more emphasis.

