Microbiological laboratory diagnostics of neglected zoonotic diseases (NZDs)

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Palavras-chave

Culture, Diagnostic, Laboratory, Molecular diagnosis, NZD, Neglected tropical disease, Neglected zoonotic disease, PCR, Reliability, Sensitivity, Serology, Specificity

Resumo (Abstract)

This review reports on laboratory diagnostic approaches for selected, highly pathogenic neglected zoonotic diseases, i.e. anthrax, bovine tuberculosis, brucellosis, echinococcosis, leishmaniasis, rabies, Taenia solium-associated diseases (neuro-/cysticercosis & taeniasis) and trypanosomiasis. Diagnostic options, including microscopy, culture, matrix-assisted laser-desorption-ionisation time-of-flight mass spectrometry, molecular approaches and serology are introduced. These procedures are critically discussed regarding their diagnostic reliability and state of evaluation. For rare diseases reliable evaluation data are scarce due to the rarity of samples. If bio-safety level 3 is required for cultural growth, but such high standards of laboratory infrastructure are not available, serological and molecular approaches from inactivated sample material might be alternatives. Multiple subsequent testing using various test platforms in a stepwise approach may improve sensitivity and specificity. Cheap and easy to use tests, usually called “rapid diagnostic tests” (RDTs) may impact disease control measures, but should not preclude developing countries from state of the art diagnostics.

Corpo do Texto

Chagas disease (ChD)

The acute phase mostly remains asymptomatic, but few patients experience mild symptoms within 7-14 days after vector-borne transmission, including fever, malaise, oedema, and chagoma or Romaña sign at the parasite's entry site.

Mortality varies depending on transmission route, phase, clinical presentation and progression of ChD (Nunes et al., 2013; Rassi et al., 2010).

Patients infrequently develop lethal complications, but usually symptoms resolve within 2 months without treatment, until 10-30 years later approximately 40% of patients are diagnosed with chronically persistent manifestations, such as megaviscera and dilated cardiomyopathy.

Cutaneous and mucocutaneous Leishmaniasis

Skin scraping with a blade (Gazozai et al., 2010) from the margins of the ulcer is applied as a smear on multiple slides for microscopic evaluation thus reaching sensitivities up to 80%.

Lesions that appear youngest and most active should be chosen for skin-scrapings and biopsy (CDC, 2014).

Skin for biopsy is prepared by injection of local anaesthetics (e.g. 1% lidocaine preferentially with epinephrine 1:100,000) through intact skin cleansed with 70% alcohol into the dermis underlying the area that will be sampled (Dar and Khurshid, 2005).

The portion placed in leishmania culture medium can also be used for PCR (CDC, 2014).

Sterile full-thickness, punch-biopsy specimens (4 or 6 mm in diameter) should be taken at the active border of the lesion and divided into 3 portions, one for impression smears, one for cultural growth (leishmania, bacteria, mycobacteria, and fungi) and one for histologic examination of tissue sections (fixed in 10% formalin; embedded in paraffin) stained with H&E, Giemsa, and other special stains to exclude mycobacterial, fungal, and other infectious aetiologies.

The specimen is gently pressed - with a rolling or circular motion - onto several glass slides for microscopy, air-dried, fixed and stained according to Giemsa (CDC, 2014).

Several techniques should be applied simultaneously and several specimens per technique should be taken.

For tissue impression smears (touch preparations), bioptic specimens are carefully grasped with forceps and excess blood removed.

Diagnostic issues

Furthermore, in rural areas serological and molecular methods, allowing diagnosis in the chronic stage, are usually not provided (Ndao et al., 2010; Porras et al., 2015).

In America diagnostics for ChD are available and implemented in urban settings, however, accuracy is limited and improved tests are needed for diagnosis and prognosis as for blood bank screening to reduce transfusion associated transmission.

Realisation of large-scale HAT screening programmes, allowing early diagnosis before the meningo–encephalitic stage, which is lethal if left untreated, is limited by lack of human and material resources (Brun et al., 2010; Matovu et al., 2012; Mitashi et al., 2012; Njiru et al., 2008; Sternberg et al., 2014).

Discussion and conclusion

To sensitise the reader for the need of careful interpretation of test results, we close this review on the diagnosis of hp-NZDs with some general remarks on the interpretation of test results and the diagnosis as sequel of multiple subsequent tests (Discussion II).

Due to the pathological potential of the causative agents, laboratory safety has to be taken into account.

Most hp-NZDs are diagnosed in poor countries, where the lack of diagnostic laboratory facilities will not allow for carrying out some of the above-mentioned tests.

Diagnostic capacities are essential for an operative health system that serves the population (Petti et al., 2006).

Activities to improve health care in poor countries often address prevention and treatment of infectious diseases, considering the reliable diagnosis as given.

We described laboratory diagnostic tests for 8 highly pathogenic neglected zoonotic diseases (hp-NZDs), anthrax, bovine tuberculosis, brucellosis, echinococcosis, leishmaniasis, rabies, Taenia solium-associated diseases (neuro-/cysticercosis & taeniasis) and trypanosomiasis and also addressed challenges around the diagnostical methods that we tried to concisely summarise in Table 8.

If health care improvements are not only measured as “number of patients treated”, but also take the success of treatment into account, it becomes clear that reliable diagnosis is a prerequisite for proper treatment.

In contrast, there might be severe side effects of treatment in case of a false positive diagnosis.

Treatment will be covered by other reviews in this Acta Tropica special edition.

However, we want to remind the reader that some drugs used, e.g. for treating leishmaniasis or trypanosomiasis, are quite toxic.

We therefore discuss such laboratory safety considerations in the absence of a BSL-3 laboratory (Discussion I).

When considering the consequences of false diagnoses of such hp-NZDs for the individual, one has to consider the harmful effects of the disease in case of a false negative diagnosis.

Discussion I: diagnostic management in the absence of a BSL-3 laboratory

In case of rare infectious disease, even reliable respective information may be scarce.

The interpretation of each diagnostic test should generally consider information on the diagnostic procedure and its performance (sensitivity, specificity, lower detection limit, positive and negative predictive value), on limitations, possible errors, disturbances, interference, and cross reactions, availability of quality control procedures as well as known reference values, and sample quality.

If abstinence from cultural approaches is required for safety reasons, serology and traditional microscopy or molecular approaches have to be considered.

Such undesirable situations do not necessarily lead to laboratory infections, if good laboratory practice is obeyed, direct contacts are minimised, and appropriate hand hygiene agents are applied (CDC, 1999; Weber et al., 2003).

Examples for such easy-to-use point-of-care solutions comprise, e.g. the PCR-based GenXpert system (Cepheid, Sunnyvale, CA, USA), the FilmArray system (BioFire Diagnostics, LLC, Salt Lake City, UT, USA), the cobas Liat system (Roche, Basel, Switzerland), and the loop-mediated amplification (LAMP)-based Genie II device (amplex, Gießen, Germany).

Of course, the above-mentioned general rule also applies to culture-dependent approaches.

Heat >65 °C, direct UV radiation, ethylene oxide, formaldehyde vapour, chlorine compounds, 70% ethanol (in non-protein-containing materials), 2% alkaline glutaraldehyde, peracetic acid, iodophors depending on the presence of organic matter, and stabilised hydrogen peroxide can be used for the inactivation of Mycobacterium spp. (Best et al., 1990).

For resource-limited settings without highly developed laboratory infrastructure, point-of-care molecular diagnostic systems are usually the method of choice.

Spores and mycolic acid containing cell walls of, e.g. mycobacteria, are particularly resistant in the environment and to inactivating procedures (Logan et al., 2007; Mitscherlich and Marth, 1984; Weber et al., 2003).

E.g. release of large quantities of human DNA from the sample or of heme from lyzed erythrocytes may inhibit PCR reactions (Alaeddini, 2012).

Reliable inactivation of anthrax spores demands 5% formaldehyde or glutaraldehyde solution, a pH 7-adjusted 1:10 dilution of household bleach, or an aqueous solution of 500 mg/L chlorine dioxide (Logan et al., 2007).

As shown in the pathogen-specific chapters, various alternatives to cultural diagnostic approaches exist but all non-cultural approaches of direct pathogen detection have limitations.

If no BSL-3 laboratory facilities are available, any diagnostic procedure with vital organisms of BSL-3 category, in particularly cultural growth or enrichment, should be discouraged.

Preferably, they should be performed with inactivated samples if the diagnostic procedures are validated for such materials.

The extent of quality control procedures, which should usually comprise extraction and inhibition control reactions for molecular diagnostic procedures is usually defined by the manufacturer for fully automatic molecular diagnostic devices.

Accordingly, diagnostic procedures always have to be evaluated together with the complete pre-analytic procedure to ensure reliable and reproducible results.

However, inadvertent cultural growth in case of lacking clinical suspicion even of pathogens like Bacillus anthracis under BSL-2 conditions occurs.

If no vital pathogen can be isolated and subjected to extensive further analyses to ensure its identity, alternative, usually non-cultural diagnostic approaches have to be chosen.

Therefore, reference laboratories with BSL-3 safety standards are needed even in resource-limited settings.

Diagnostic procedures with inactivated biological material are preferable whenever possible without loss of diagnostic quality.

Testing of reliable inactivation should comprise titration of the least harsh, but securely inactivating approach and the measurement of time-inactivation-curves as recently demonstrated for rickettsiae (Frickmann and Dobler, 2013).

Some procedures, e.g. the measurement of antimicrobial resistant patterns and several typing approaches as described in the pathogen-specific chapters, make cultural approaches yet desirable.

It is an issue of current debate whether deviations from the strict regulations for molecular labs can be accepted for such fully-automated, closed systems to save effort and money.

Harsh inactivation procedures can affect the quality of subsequent diagnostic approaches.

Validated procedures for inactivation depend on the kind of pathogen.

Evaluated pre-analytic procedures have to be maintained in the routine diagnostic setting.

Discussion II: some general remarks on diagnosis as sequel of multiple subsequent tests

Such people have a much higher relative frequency of the real disease than the general population.

An accurate test result is not only important for the care seeker.

Not the test accuracy and performance of a lab test, which is reflected by the sensitivity and specificity given in the accompanying information of the laboratory test assay, matter to the clinician.

Finally, the diagnostic accuracy of the whole diagnostic procedure is a function of the functions of the test accuracy for the clinical and laboratory diagnostic elements.

A false negative result leads to disadvantages for the patient, who will not receive a required treatment, while a false positive result may burden the patient with side effects of subsequent treatment measures.

If l tests are conducted and each of them has its own sensitivity and specificity, the overall accuracy for the laboratory-based diagnosis is a function of l sensitivities and l specificities.

Each individual laboratory diagnostic test is therefore only one test in a sequel of multiple subsequent tests.

In this concept, “preselecting through assessing disease typical symptoms” is a test to select for the population of individuals to be tested.

A set of initial symptoms can thus be regarded as requirement for each laboratory test.

Each k test has its own sensitivity and specificity.

The first step is to define, which cases have to be selected for a laboratory diagnostic test.

Proving each symptom is a sequel of multiple subsequent tests, too.

Therefore, every diagnostic procedure has to be evaluated for its accuracy if it is planned to conduct it in scientific context.

Following this concept, individuals presenting with disease typical symptoms belong to the “population of disease typical symptoms”.

Instead, reliable results of the “combined test” are of importance, consisting of the sequel of multiple subsequent tests including symptom assessment, clinical examination, the actual laboratory test and the steps during the test preparations, where handling errors can additionally influence the test performance.

We provided an overview of diagnostic tests for NZDs.

For the interpretation of a test result and its consequence, for example regarding treatment, the clinician also has to keep in mind that all diagnostic tests have limitations.

Every test step has its own test accuracy.

The system of the sequel of multiple subsequent (clinical and laboratory) tests can be described as follows:

The overall sensitivity and specificity of the clinical symptom combination is therefore a function of its k sub-sensitivities and k specificities.

The clinical requirement to confirm the need of a laboratory diagnostic test is a combination of k tests that prove clinical symptoms.

When assessing the risk for false (positive or negative) test results, one has to consider the sensitivity and specificity of a test and the relative frequency of the disease in the population, to which the tested individual belongs to.

The positive predictive value of the test will consequently be higher, and the negative predictive value lower.

Every of these “symptom tests” has a sensitivity and specificity.

If it is not a screening test, this selection commonly depends on a couple of symptoms.

Ideally sensitivity and specificity of a test are 100%, however, hardly any diagnostic test reaches these values.

Sensitivity and specificity of a diagnostic procedure is influenced by the complexity of the diagnostic procedure itself, the test accuracy of each single sub-test and of course the “human factor”.

The same is true for the laboratory diagnostic approach.

The laboratory test is a combination of several steps (e.g. sampling of material for the test, accurate labelling, transport under appropriate conditions, etc.).

Providing reliable test accuracy information is important for reliable estimations of prevalence (Gart and Buck, 1966; Rogan and Gladen, 1978) or treatment effects (Lachenbruch, 1998) in epidemiological studies and in clinical trials.

Discussion III: simple rapid diagnostic tests are needed, but should not preclude developing countries from state of the art diagnostics

Validity is more important than rapidity for diagnostic test results and incorrect test results can lead to worse consequences for the patient than no results at all because they mislead the differential-diagnostic thinking of the physician.

As part of such a composite reference standard the abovementioned sophisticated technologies can be precious instruments for the development of new RDTs.

Yet it is unlikely that such approaches may substantially impact disease control measures for NTDs or NZDs on the short term, as they will hardly be available on a large scale for the affected.

Beyond population-based infectious disease screenings by epidemiologists, reliable test results for the individual patient are the most important goal for the physician in charge.

In the absence of a gold standard, comparative test methods in combination could be used as a composite reference standard to classify a sample as being “true positive” or “true negative”.

Therefore one should keep in mind that RDTs with limited sensitivity and specificity can only be bridging technologies for resource-limited settings as long as better alternatives are not available.

This is part of a TDR/WHO recommended strategy for evaluating new diagnostic methods in the absence of a gold standard (WHO-TDR-Diagnostics-Evaluation-Expert-Panel et al., 2010).

Sensitivities and specificities that are sufficient for epidemiological assessments might be deleterious for the individual by leading to wrong therapy or – even worse – cohort

isolation with truly infected patients with highly contagious diseases and resulting nosocomial infections.

Nucleic acid sequence specific molecular rapid tests as mentioned above are alternatives of increasing importance even in the tropics (Scott et al., 2014; Wekesa et al., 2014).

Before such protein- or nucleic acid-based tests can be used in disease diagnostics and control programmes, their performance (sensitivity and specificity) has to be assessed and demonstrated to be sufficient.

To assess the real value of a new test, one need to be able to compare positive and negative test results against truly-infected versus non-infected (true positive and true negative) samples.

Large impact can rather be expected from cheap and easy to use tests that are usually called “rapid diagnostic tests” (RDTs).

Designing reliable composite reference panels is crucial in the planning phase of studies assessing the performance of a new test.

Usually RDTs are strip tests containing antibodies to detect the diagnostic agent, i.e., a pathogen specific antigen in urine or serum.

However, the implementation of state-of-the-art technologies in all parts of the world has to be aspired on the long term (Petti et al., 2006).

In our review, we included some very sophisticated diagnostic techniques from the frontline of scientific development, such as MALDI-TOF or next generation sequencing.

Test assessments are usually made against an established method considered to be a standard.

Disease

The encephalitic course is characterised by hydrophobia, pharyngeal spasms, fever, agitation, and hyper-salivation; the paralytic course by increasing flaccid paresis, similar to Guillan Barré syndrome (Fishbein and Robinson, 1993; Hattwick, 1972; Hattwick et al., 1972; Hemachudha et al., 2002; Rupprecht et al., 2002).

Approximately 29% (about 14.5 million) of epilepsy cases in endemic countries are associated with neurocysticercosis making it the most frequent preventable cause of epilepsy in the developing world, therefore it was included in the WHO NZD list (WHO, 2014).

Case fatality rate is about 2-5% with 80% of deaths due to endocarditis with heart insufficiency (Young, 1995a).

Leishmania are known co-factors in the pathogenesis of HIV-1 infection, mediate HIV-1 activation by cytokine secretion and cellular-signalling, and up-regulate HIV-1 replication, both in monocytoid and lymphoid cells in vitro and in co- infected individuals (Olivier et al., 2003).

If cysts localise in the brain, so-called neurocysticercosis manifests with headaches, depression, brainstem dysfunction, cerebellar ataxia, sensory deficits, involuntary movements, stroke-like symptoms, extrapyramidal signs, dementia, Bruns syndrome, Kluver-Bucy syndrome, cortical blindness, and, most notably, epileptic seizures (Carpio, 2002).

Adult or larval stages of E. granulosus and E. multilocularis cause cystic (CE) and alveolar echinococcosis (AE), respectively (Jiang et al., 2005; Khuroo, 2002; McManus et al., 2003; Raether and Hanel, 2003; Thompson et al., 1995).

Lyssaviruses occur worldwide, only the Australian continent is declared to be free.

Almost 90% of mucocutaneous leishmaniasis cases are observed in Bolivia, Brazil, and Peru (Haouas et al., 2005; Jamjoom et al., 2004; Magill, 2005; Mahdi et al., 2005; Mendonca et al., 2004; Silveira et al., 2004).

According to WHO estimations, approximately 60,000 individuals die from rabies every year (WHO, 2013).

In spite of long-lasting combined antibiotic therapy, primary therapy failure and recurrence are frequent due to persistence and replication of bacteria in phagosomes of macrophages (Kohler et al., 2002; Kohler et al., 2003).

Untreated visceral leishmaniasis leads to death (Mondal et al., 2010), in particular in co-existence with HIV (Harms and Feldmeier, 2005).

Over 90% of visceral leishmaniasis cases occur in six countries: Bangladesh, Brazil, Ethiopia, India, South Sudan, and Sudan.

Mean incubation time is 1-3 months but can vary from a few days to several weeks (Boland et al., 2014; Hemachudha et al., 2002).

Once rabies manifests, it is virtually 100% fatal.

Due to fear of bioterrorism, non-cutaneous forms are a main concern today.

Vaccinations are not routinely recommended for travellers (Beyer, 2004) but restricted to veterinarians, outbreak situations or specialised armed forces personnel.

To reduce the disease burden in developing countries control programmes have to incorporate veterinary transmission chains in carnivores and ungulates.

Visceral leishmaniasis affects bone marrow, liver and spleen and presents with undulating fever, hepatosplenomegaly and pancytopenia.

Humans accidentally ingesting embryonated eggs may also become incidental intermediate hosts.

The mortality rate is up to 50% when cysticercotic meningitis with hydrocephalus occurs (Cardenas et al., 2010; Sotelo and Marin, 1987).

Prae- and postexposure prophylaxis exist (Manning et al., 2008; Rupprecht et al., 2002).

Previous vaccine trials for humans failed (Live, 1958; Vershilova, 1961).

Due to the low infectious dose of only 10 colony forming units, brucellosis is the most frequent laboratory infection worldwide (Young, 1995a).

Ingestion by humans or ungulate intermediate hosts leads to the development of hydrated cysts, predominantly in liver (70%) and lung (20%) (Zhang and McManus, 2006).

Bovine tuberculosis is clinically and radiologically indistinguishable from M. tuberculosis-induced tuberculosis in humans.

Disease starts with an unspecific prodromal state comprising fever, nausea, headache, and paraesthesia at the inoculation site.

After formation of muscular cysts, clinical symptoms of cysticercosis like eosinophilia, fever, myositis, muscular pseudohypertrophy followed by atrophy and fibrosis develop.

The definite hosts of E. granulosus are carnivores, which shed eggs and proglottides in their faeces.

After an incubation period between 14 days and several months, acute brucellosis manifests as febrile systemic disease with unspecific flulike symptoms, undulating fever, fatigue, tiredness, headache and body aches.

Sources of infection comprise the consumption of unpasteurised milk products like cheese from sheep or goats and raw meat, contact with infected animals or their excrements, aerosols during meat processing, veterinary-obstetrics and processing of clinical samples in the laboratory.

Human AE is a chronic, often fatal disease with infiltrative growing liver cysts, leading to destruction of liver parenchyma, bile ducts and blood vessels (Zhang and McManus, 2006).

Symptoms are non-specific like chronic cough, fever, weight loss and sweating at night (Cassidy, 2006).

Human-to-human transmission, e.g. due to sexual intercourse or transplantation, is rare.

Case-fatality rate is nearly 100%, in spite of antibiotic therapy and intensive care medicine (Sweeney et al., 2011).

However, a high percentage of neurocysticercosis patients remain asymptomatic (Carpio, 2002).

Postexposure prophylaxis with 100 mg doxycycline twice daily and 600 mg rifampicin (rifampin) four times daily for 3 weeks is poorly evaluated, but may be considered in case of relevant exposition (Yagupsky and Baron, 2005).

Systemic spread with lethal outcome results in about 20% of non-treated patients.

The disease can present as cutaneous, mucocutaneous, or visceral leishmaniasis (Jacobs et al., 2005).

Brucellosis is worldwide endemic (Godfroid et al., 2005) and with 500.000 human cases per year a frequent (Pappas et al., 2006) zoonotic disease which, is particularly common in the Mediterranean, on the Arabic peninsula, in the Middle East, in Africa and in Middle and South America (Young, 1995b).

Lyssaviruses cause fatal encephalitis, leading to coma, respiratory paralysis and finally death (Hankins and Rosekrans, 2004).

Chronicity is frequent with night sweat, weight loss, hepatosplenomegaly, lymphadenitis as well as organ manifestations like spondylitis, sakroileitis, neurobrucellosis and endocarditis.

Granulomatous lesions manifest in a variety of organs, in particular infections of the gastrointestinal tract occur.

Gastrointestinal intake of insufficiently boiled infected meat may lead to gut-necrosis.

Neurons of the central nervous system are infected by retrograde axonal transport with a speed of 8-20 mm / day (Hemachudha et al., 2002).

Later, a paralytic (about 20%) or an encephalitic (about 80%) course develops.

Rabies virus is transmitted by saliva of infected mammals, in particular dogs.

The majority of cutaneous leishmaniasis cases occur in Afghanistan, Algeria, Brazil, Colombia, Iran, Pakistan, Peru, Saudi Arabia, and Syria.

AE infections become only symptomatic in advanced stage, which often delays the diagnosis for many years (Moro et al., 2008)

Pulmonary anthrax is extremely rare and results from inhalation of contaminated aerosols, e.g. in workers dealing with animal skins.

Endemic areas are found in Mexico, Central America, and South America - from northern Argentina to Texas (not in Uruguay, Chile, or Canada) -, southern Europe, Asia (not Southeast Asia), but especially in the Middle East, and in Africa particularly in East and North Africa (Haouas et al., 2005; Jamjoom et al., 2004; Magill, 2005; Mahdi et al., 2005; Mendonca et al., 2004; Silveira et al., 2004).

Cutaneous anthrax, comprising 95% of cases, is induced by infected skin lesions and characterised by red skin efflorescence, oedematous swelling, secretion filled vesicles and necrotic ulcers, the so-called “pustula malignans”.

E. multilocularis transmission is maintained in a sylvatic cycle involving wild carnivores, small mammals, but also domestic dogs as definite hosts (Craig et al., 2000; Kern et al., 2004; Wang et al., 2006).

The cutaneous form presents with skin ulcers, the mucocutaneous form with purulent ulcerations in the nasal area and parts of the oral cavity (Antinori et al., 2005).

Neural cell adhesion protein (CD56) may confer neuronal attachment (Thoulouze et al., 1998).

Human African trypanosomiasis (HAT)

The acute haemo–lymphatic stage presents few days to weeks after infection with unspecific symptoms such as fever, headache, malaise, myalgia, lymphadenopathy, or a trypanosomal chancre.

Without treatment, patients usually die within 6 months, when infected with T. brucei rhodesiense, or within 3 years, if disease is caused by T. brucei gambiense (Brun et al., 2010; Chappuis et al., 2005; Franco et al., 2014).

The second meningo–encephalitic stage is characterised by neuropsychiatric symptoms and abnormal sleeping patterns due to parasitic penetration into the central nervous system.

Introduction

Somebody who is not infected by the suspected agent but tests falsely positive may suffer from treatment side effects, stigmatisation or be exposed to health facilities and acquire an infection after being admitted with other (really) infected individuals.

We discuss strengths and weaknesses of different tests for each disease, also keeping resource-limited settings in mind and impact of test results on patient care and management.

Following the World Health Organisation (WHO) Neglected Tropical Diseases (NTDs) Initiative, the recognition of special requirements for research and control programme planning brought about by the zoonotic transmission pattern lead to the assembling of a list of neglected zoonotic diseases (NZDs) as a subset of the NTD list.

On the other hand, false negative results may hinder targeted treatment and infectious individuals may infect other people.

For diseases that can cause outbreaks, diagnosing the causative agent can be essential for infection control, and for the fate of an individual with a suspected infection the result of a diagnostic test may have immediate consequences:

Some zoonotic diseases are difficult to handle due to their high infectivity requiring special facilities (e.g. biosafety level 3, see Table 1).

Many of the causative agents of these diseases require biosafety level 3 (BSL-3) facilities for safe handling.

Without claiming to be exhaustive, the WHO initially listed 7 diseases as NZDs: Anthrax, bovine tuberculosis, brucellosis, cysticercosis and neurocysticercosis, cystic echinococcosis or hydatid disease, rabies, zoonotic sleeping sickness or human African trypanosomiasis (HAT) (WHO, 2014).

We decided to focus our review on diagnosis of the 7 diseases from the initial list, additionally addressed Chagas disease, which like HAT is also caused by trypanosomes, and furthermore added leishmaniasis on request by the Acta Tropica editor.

Different other diseases are mentioned in different releases on NZDs.

Finally, we reflect on laboratory diagnostic options in regions with no stationary BSL-3 facilities (Discussion I), i.e. the use of deployable BSL-3 labs or diagnostic approaches from inactivated sample material.

Most newly emerging infections in humans are of zoonotic origin (Quammen, 2012) and may be transmitted to humans via infected meat during preparation and ingestion or close contact to animals, e.g. when hunting, slaughtering or herding animals (Karesh et al., 2012).

We provide an overview on laboratory diagnostic tests for 8 highly pathogenic neglected zoonotic diseases (hp-NZDs): anthrax, bovine tuberculosis, brucellosis, echinococcosis, leishmaniasis, rabies, Taenia solium-associated diseases (neuro-/ cysticercosis & taeniasis) and trypanosomiasis.

Zoonoses are diseases that are transmitted from animals (in some definitions vertebrates) to humans.

Our closing remarks address general aspects on interpretation of diagnostic tests (Discussion II).

Diagnostic tests can provide incorrect results with serious consequences for the individual or the community.

Molecular diagnostic approaches

PCR is mainly used for seronegative patients, when imaging is suggestive for AE or CE.

PCR methods are not able to assess viability and a negative PCR cannot rule out disease (Brunetti et al., 2010).

E. multilocularis and E. granulosus specific sequences can be amplified from tissue biopsies and FNAC (Brunetti and Junghanss, 2009; Diebold-Berger et al., 1997; Georges et al., 2004; Kern et al., 1995).

Pathogen

T. brucei is directly transmitted by the bite of the tsetse fly, whereas T. cruzi is transmitted indirectly by contaminated faeces of triatomine bugs.

Oncospheres migrate to striated muscles, liver, brain, and other tissues.

Humans are the main reservoir of T. brucei gambiense, which is found in central and West Africa and accounts for more than 90% of sleeping sickness (Barrett et al., 2003; Brun et al., 2010; Franco et al., 2014; Mitashi et al., 2012).

The causative agents of brucellosis are Brucella spp., Gram-negative, rod-shaped bacteria with close phylogenetic relationship to Bartonella spp., Ochrobacterium spp., and Agrobacterium spp. (Moreno et al., 1990).

Human pathogenic trypanosomes (protozoan haemoflagellates) are Trypanosoma cruzi, causal agent of the American trypanosomiasis (Chagas disease), transmitted mainly in the Americas, and T. brucei, which causes human African trypanosomiasis (sleeping sickness) in Sub-Saharan Africa.

They settle in these organs and form cysts called cysticerci (Peters and Pasvol, 2007).

In the porcine intestine, eggs hatch and unleash motile oncospheres that enter lymphatic and blood vessels.

Like Corynebacteriaceae, Nocardiaceae, and Tsukumurellaceae, Mycobacterium spp. are Actinomycetales (Tortoli, 2003; Tortoli et al., 2006a; Tortoli et al., 2006b).

Reported incidences are 2/100,000 in WHO region Africa, 7/100,000 in WHO region America and 30/100,000 in WHO region Europe (Muller et al., 2013).

Humans get infected by eating meat containing at least one larva – the Cysticercus cellulosae.

Together with vaccination strain Bacillus Calmette-Guérin and M. tuberculosis, M. africanum, M. microti, M. pinnipedii, and M. canetti, they form the Mycobacterium tuberculosis complex.

Detection of spores in environmental samples like powders or clothes is particularly challenging (Irenge and Gala, 2012).

The main causative agents of bovine tuberculosis are M. bovis ssp. bovis and – to a lesser extent – M. bovis ssp. caprae (Ayele et al., 2004; Cosivi et al., 1998).

Species-depending tissue specificities cause differing clinical manifestations of the various forms of leishmaniasis (Boecken et al., 2011).

Cattle represent the major reservoir of bovine tuberculosis, while human-to-human transmission is rare (Evans et al., 2007).

E. granulosus occurs worldwide, E. multilocularis mainly in the northern hemisphere (Eckert and Deplazes, 2004; Jenkins et al., 2005; Romig et al., 2006).

Taenia solium, the pork tapeworm, is an intestinal parasite, which passes through swine, as intermediate hosts, into humans as definite hosts.

Tapeworms (cestodes) of the genus Echinococcus comprise six species of which E. granulosus and E. multilocularis are of major medical importance.

Only sleeping sickness due to the subspecies T. brucei rhodesiense in southern and East Africa is considered a zoonosis, involving cattle and other mammals as reservoirs.

Virulent pathogens harbour two plasmids, encoding the components of the synthesis apparatus for the forming of a poly-gamma-D-glutamic acid capsule on the plasmid pXO2 and the protective antigen (83.5 kDa), the edema factor (an adenylylcyclase of 88.8 kDa), and the lethal factor (a metalloprotease of 90.2 kDa) on plasmid pXO1.

Infections of humans occur by direct contact to infected animals and alimentary intake of spores or vegetative cells (Mitscherlich and Marth, 1984; Sweeney et al., 2011).

Human infection is caused by 21 of 30 species that infect mammals.

Infection with trypanosomes can also occur via needle-stick injuries and blood transfusions (Barrett et al., 2003; Herrera, 2014; Urdaneta-Morales, 2014).

It principally occurs worldwide, but is most prevalent in countries where pork is frequently eaten if swine populations are infected.

Diagnosis is done most of the time on clinical criteria and sometimes by direct microscopic examination with and without previous culture.

The different species are morphologically indistinguishable, but can be differentiated by isoenzyme analysis, molecular methods, or with monoclonal antibodies (Cupolillo et al., 2000; Fraga et al., 2010; Garcia et al., 2005; Schonian et al., 2010).

The bullet shaped rabies virus contains a single-stranded non-segmented RNA genome of negative polarity, which codes for 5 proteins (Fishbein and Robinson, 1993).

Rabies is caused by varies species of the genus Lyssavirus (family Rhabdoviridae, enveloped viruses of 100-430 nm x 45-100 nm in size), to which also belong species like Aravan virus, Australian bat lyssavirus, Duvenhage virus, European bat lyssavirus 1 & 2, Irkut virus, Khujand virus, Lagos bat virus, and Mokola virus, respectively (Kuzmin et al., 2005; Warrell and Warrell, 2004).

The genus Brucella comprises nine closely related species with sequence homology >90%, from which three are further differentiated in biovars (Verger et al., 1985) (Table 3).

These include the L. donovani complex with 2 species (L. donovani, L. infantum) [also known as L. chagasi in the New World]; the L. mexicana complex with 3 main species (L. mexicana, L. amazonensis, and L. venezuelensis); L. tropica; L. major; L. aethiopica; and the subgenus Viannia with 4 main species (L. (V.) braziliensis, L. (V.) guyanensis, L. (V.) panamensis, and L. (V.) peruviana).

After entering the small intestine, a Cysticercus releases the scolex and anchors itself to the mucosa, grows within 12 weeks to an adult worm, reproduces by self-fertilisation, and releases proglottides containing eggs to the faeces.

Bacillus anthracis is a spore-forming, world-wide distributed bacterium whose spores can long persist in soil.

Diagnosis is mainly of epidemiologic interest.

Swine ingest the embryonated eggs with food contaminated with human excreta.

Leishmaniasis is a vector-borne disease caused by obligate intracellular protozoa of the genus Leishmania and spread by the bite of infected female phlebotomine sandflies.

Procedures

Restriction fragment length polymorphism (RFLP) after PCR allows for further differentiation on species or strain level (Al Dahouk et al., 2005; Vizcaino et al., 2000), variable-number tandem repeat (VNTR), RNA mismatch cleavage (Bricker, 1999) and Fourier transform infrared spectroscopy (Miguel Gomez et al., 2003) on strain level (Bricker et al., 2003; Le Fleche et al., 2006).

Alternative molecular discriminative approaches comprise the use of gene probes like, e.g. AccuProbes (bioMérieux), strip hybridisation assays like, e.g. GenoType CM/AS (HAIN LifeScience), and INNO-LiPA MYCOBACTERIA v2 (Innogenetics, Gent, Belgium) or the analysis of single nucleotide polymorphisms within the gyrase B gene (gyrB) (Kasai et al., 2000; Niemann et al., 2000) and spoligotyping showing differences within the “direct repeat” (DR-) region (Kamerbeek et al., 1997).

Serological screening based upon crude antigens of E. granulosus or E. multilocularis, can lead to non-specific reactions, due to high genetic homology of E. multilocularis and E. granulosus antigens (Ito et al., 2003; Jiang et al., 2001).

The kinetoplast differentiates Leishmania from other small organisms such as Histoplasma (Arechavala et al., 2010; Gazozai et al., 2010; Mbati et al., 1995; Meymandi et al., 2010).

Further methods comprise indirect agglutination latex testing, indirect immunofluorescence (IIF), enzyme-linked immuno sorbent assays (ELISA), and immune trypanolysis test (TL) (Brun et al., 2010; Mitashi et al., 2012; Sullivan et al., 2013).

Detection of visceral leishmaniasis antigens in urine by direct agglutination (Attar et al., 2001) and dipstick testing (Bern et al., 2000) have shown to be affordable and easy-to-apply rapid tests for resource-limited countries in several studies (Chappuis et al., 2006a; Chappuis et al., 2006b; Rijal et al., 2004).

In laboratory animals (such as hamsters, mice or guinea pigs), the parasite can be inoculated via mucous membranes or the intraperitoneal and intrasplenic routes with infected specimen, followed by the microscopical demonstration in bioptic specimens (Mbati et al., 1995).

Mycobacteria can be visualised as acid-fast rod-shaped bacteria after Ziehl-Neelsen or Kinyoun staining (Fandinho et al., 1990) by light microscopy at 1000× magnification.

Capillary or anticoagulated venous blood is used for wet blood films, Giemsa-stained thick and thin blood films or concentration methods, comprising mini haematocrit centrifugation technique (mHCT), quantitative buffy coat (QBC), and miniature anion-exchange centrifugation technique (mAECT).

Serum agglutination tests (SAT) demonstrate the binding of agglutinative antibodies against the s(smooth)-LPS of B. abortus, B. melitensis, and B. suis with Brucella-LPS in phenol-inactivated bacteria of the reference strain B. abortus 1119-3 USDA in tube-agglutinaton assays and in faster micro-agglutination assays (Al Dahouk et al., 2003a).

Trypanosomes can be detected by mouse inoculation (Holland et al., 2001; Rickman and Robson, 1970) or by haemoculture in HAT (Chappuis et al., 2005) and in the acute phase of ChD (Santamaria et al., 2014).

PCR-protocols for the identification of B. anthracis preferably target sequences on both virulence plasmids pXO1 and pXO2 and on the bacterial chromosome (Agren et al., 2013; Antwerpen et al., 2008; Beyer et al., 2003; Easterday et al., 2005; Ellerbrok et al., 2002; Hoffmaster et al., 2002; Marston et al., 2006; Qi et al., 2001) (Table 2).

They are inclusions in neurons between 1 and 7 μm in diameter containing viral nucleocapsids.

Antibodies against T. brucei gambiense can be detected by the card agglutination test for trypanosomiasis (CATT) in blood, plasma or serum after 5 min incubation or by lateral flow rapid diagnostic tests, detecting low antibody concentrations from finger prick blood within 15 minutes (Sternberg et al., 2014; Sullivan et al., 2014).

Pre-incubation at 70 °C for 30 minutes may inactivate vegetative, thermo-labile colonisers.

Antibodies against T. cruzi are detected by IIF, indirect haemagglutination, ELISA and immunoblot.

A mix-ELISA, combining recombinant antigens, has been described for potential use (Lescure et al., 2010; Ricciardi and Ndao, 2015).

Genus-specific fluorescence in situ hybridisation (FISH) targeting the 18S rRNA gene (Frickmann et al., 2012) and ISH (Dinhopl et al., 2011) targeting Leishmania-specific

5.8S RNA use a short labeled genus-specific DNA-oligonucleotide probe and even work in difficult sample materials such as paraffin-embedded tissue specimens.

After inoculation of sample material and incubation for 2-4 days, viral growth can be visualised using immunofluorescence-labelled anti-lyssavirus-antibodies (Webster and Casey, 1996).

Neurocysticercosis needs to be ruled out by specific ELISA or immunoblotting (Ito et al., 2003).

Older colonies (R-variants) may autoagglutinate.

If such technologies are not available, traditional ISH based on hybridisation of kinetoplast DNA probes (Barker, 1989; Kennedy, 1984; Schoone et al., 1991; van Eys et al., 1987) can be used.

As an alternative to DFA, direct rapid immunohistochemical testing (DRIT) with biotinylated monoclonal antibodies against rabies nucleo-capsid proteins can be used (Lembo et al., 2006).

Auramine stained slides (Holani et al., 2014) are analysed under a fluorescence microscope at 400× magnification.

Negri bodies act as sites of viral transcription and replication.

Leishmania spp. diagnosis by various nucleic acid amplification techniques (NAT) comprise DNA hybridisation, real-time PCR with and without quantification, high-resolution melt analysis, PCR-RFLP (restriction fragment length polymorphism analysis), sequencing, and DNA microarrays (Antinori et al., 2009; Castilho et al., 2008; Disch et al., 2005; el Tai et al., 2000; Foulet et al., 2007; Meymandi et al., 2010; Paiva et al., 2004; Rodriguez et al., 1994; Roelfsema et al., 2011; Salotra et al., 2001; Talmi-Frank et al., 2010; Tavares et al., 2003; van der Meide et al., 2008; Volpini et al., 2006; Zelazny et al., 2005).

Brain tissue, in particular cross-sections of brain stem and cerebellum, should be used post-mortem (Rudd et al., 2005).

The taeniid cysts are exposed to 10% bile in order to examine the evaginated rostellum.

Viral growth in mice is possible as well (Valleca and Forester, 1981).

For DNA detection on subgenus level (T. brucei genome), satellite, kinetoplast or ribosomal DNA, ITS1 or ESAG 6/7 are targeted by PCR.

Centrifugation-lysis techniques and mechanised blood-culture systems like BACTEC (Becton Dickinson, East Rutherford, New Jersey, USA) or BAC/ALERT (bioMérieux, Marcy-l'Étoile, France) can increase isolation rates.

After cultural isolation, parasites can be characterised to the species-complex and sometimes to the species level using isoenzyme analysis (Jamjoom et al., 2004).

Many approaches rely on the binding of Brucella-LPS (lipopolysaccharide)-antibodies to whole-cell-antigens.

For electron microscopy, fixed suspension is put on a carrier net and analyzed after a negative contrast procedure (Gelderblom, 1991).

Microscopic diagnoses of T. solium associated diseases splits into diagnosing taeniasis and diagnosing cysticercosis.

Genus-specific identification of Brucella-DNA has been described for various targets, e.g. omp2, omp2b, bcsp31 (e.g. targeting a 223-bp-long amplicon) (primers B4: 5′-TTG-CTC-GGT-TGC-CAA-TAT-CAA-3′, B5: 5′-CGC-GCT-TGC- CTT-TCA-GGT-CTG-3′), IS711 (IS6501), 16S-23S rRNA spacer region and the 16S rRNA gene (Al Dahouk et al., 2003b; Bricker, 2002), also as real-time approaches (Al Dahouk et al., 2004; Probert et al., 2004; Redkar et al., 2001).

For the diagnosis of ChD an OC-PCR, the T. cruzi OligoC-TesT (Deborggraeve et al., 2009), targeting the satellite DNA sequence, is commercially available, whilst many other PCR methods still require standardisation and optimisation (Lescure et al., 2010; Ricciardi and Ndao, 2015).

For AE diagnostics in endemic areas, both primary screening and confirmation should be performed with Em2-, Em2plus-, Em10-, Em18-ELISA or Em18-Western blots.

Specificity depends upon the antigen or epitope used (Saha et al., 2005) with recombinant antigens improving the specificity (Braz et al., 2002).

Contamination of the culture media by bacteria or yeast species or other fungi can be avoided by sterile techniques and by the addition of antibiotics and antifungal drugs (Schur and Jacobson, 1988; Sundar et al., 2001).

Antibody testing is irrelevant due to insufficient sensitivity and specificity (Steingart et al., 2011; Steingart et al., 2007).

A frequent target for molecular approaches, which also allows for the discrimination of New World leishmania is hsp70 (da Silva et al., 2010; Fraga et al., 2010; Fraga et al., 2012; Graca et al., 2012; Montalvo et al., 2012; Requena et al., 2012).

If applied to formalin-fixed tissue, proteinase K pre-treatment dissociates chemical bonds and exposes rabies virus epitopes (Whitfield et al., 2001).

Smears of aspirated fluid from suspected E. granulosus cysts can be examined microscopically for acid-fast protoscolex hooklets as described before (Handa et al., 2001; Hira et al., 1988).

Biochemical reactions include need for CO2 for growth, H2S-production, splitting of urea, sensitivity against the stains fuchsine and thionine, sensitivity against phages, and agglutination with polyvalent as well as specific antisera (Al Dahouk et al., 2003a; Alon et al., 1988; Jahans et al., 1997; Scholz et al., 2008).

For the second HAT stage CSF is centrifuged for microscopic examination (Chappuis et al., 2005; Mitashi et al., 2012; Njiru et al., 2008).

Robust neutralisation assays for serosurveillance have been described (Wright et al., 2009).

Spores are stained with malachite-green / safranin or carbol fuchsin / methylene blue (Hamouda et al., 2002).

Traditional histological assessment by Seller's staining allows for the detection of Negri bodies (De Brito et al., 1973; Lahaye et al., 2009).

Most established PCR assays are designed for simultaneous detection and differentiation of T. solium and T. saginata.

In pulmonary CE infections, protoscolices might be found in sputum or bronchial washings (Moro and Schantz, 2009).

If none is available, M. bovis spp. bovis and M. bovis spp. caprae share the biochemical features negative niacin testing, negative nitrate reduction, low need for O2 on Lebek agar (Meissner and Schroder, 1969), sensitivity against 1 mg/L furoic acid hydrazide, and sensitivity against cycloserine (Lumb et al., 2007).

The antigens ESAT 6 und CFP 10, which are used for IGRA testing, can be found in M. tuberculosis complex but not in the Bacillus Calmette Guerin vaccination strain (Ferrara et al., 2006; Mack et al., 2009; Pai et al., 2008).

For isolation from primary unsterile sites, in-house selective agars containing amphotericin B, bacitracin, cycloheximide/natamycin, D-cycloserine, nalixidic acid, polymyxin B, and vancomycin are suitable for most strains (Alon et al., 1988).

Primarily ubiquitous target sequences present in both Taenia species were chosen, e.g. the oncosphere-specific protein gene tso31 (Mayta et al., 2007), the cytochrome c oxidase subunit 1 gene cox1 (Yamasaki et al., 2004b), the internal transcribed spacer 1 and spacer 2 (ITS-1 and ITS-2) (Garcia et al., 2002; Praet et al., 2013), and the non-coding DNA fragments HDP1 and HDP2 (Gonzalez et al., 2000).

Apart from in-house ELISAs and Western blots for the detection of antibodies against protective antigen (PA), edema factor (EF), and lethal factor (LF), a validated, commercially available anti-PA-IgG-ELISA (Virion/Serion Ltd., Würzburg, Germany) can be purchased.

Culture is followed by molecular methods or MALDI-TOF-MS (Quinlan et al., 2014).

Next to SAT, complement binding reaction (CBR) (Diaz and Moriyon, 1989) and ELISA techniques (Caravano et al., 1987) are established.

In areas, where both AE and CE are endemic, a combination of very sensitive genus-specific screening and species-specific confirmation tests (e.g. Echinococcus IgG Western Blot) should be used (Pawłowski et al., 2001).

Neutralising antibodies against the G protein of rabies can be assessed by RFFIT/FAVN (rapid fluorescent focus inhibition testing / fluorescence antibody virus neutralisation) (Briggs et al., 1998; Cliquet et al., 1998; Smith et al., 1973).

Nucleic acid-based amplification (NASBA) provides a technique for RNA amplification under isothermal conditions.

Culture tubes are inoculated with 1 to 2 drops of bone marrow or spleen aspirate and incubated at 22-28 °C.

Strout's method (Diez et al., 2007) is a serum precipitate concentration technique used for the diagnosis of ChD.

In contrast, loop-mediated isothermal amplification (LAMP) assays mainly target the PFRA gene or the repetitive insertion mobile element (RIME), allowing amplification of DNA sequences under isothermal conditions (Table 7).

It is important to see the nucleus and the rod-shaped kinetoplast, a mitochondrial structure containing extra-nuclear DNA, to diagnose leishmaniasis.

Specific antibodies can further be detected by immunoblotting (Brito et al., 2000; Kaur and Kaur, 2013).

Next generation sequencing (NGS) makes differentiation of mycobacteria even on strain level possible (Outhred et al., 2014).

Tiny colonies are visible not earlier than after 48-72 hours of incubation on blood-containing agars.

Incubation should be performed for 8 weeks, if clinical suspicion persists for 12 weeks (Pfyffer, 2007; Richter, 2009).

Traditional methods for anti-Leishmania-antibody detection include gel diffusion, complement fixation testing, indirect haemagglutination testing, immunofluorescence assays, and counter-current immunoelectrophoresis.

To ease sample acquisition in a non-invasive way, ELISAs from urine have been introduced as well (Islam et al., 2008).

Co-occurrence of young smooth (S) and older rough (R) colony variants may resemble a mixed culture.

Microscopic assessment of suspected rabies comprises direct fluorescence antibody (DFA) testing (Rudd et al., 2005) with monoclonal or polyclonal antibodies from at least 20 biopsies of vital patients from the nuchal skin with hair follicles.

Increased CO2 concentration of 5-10% during the incubation of agar media facilitates mycobacterial growth and thus increases sensitivity (Isenberg, 2004; Pfyffer, 2007).

Lyssaviruses can be cultured under BSL-3 conditions (Orciari and Rupprecht, 2007) in mouse neuroblastoma cells (cell lines NA C 1300 or CCL 131).

For three well-established PCR assays, please see Table 5.

Subspecies-depending natural resistance against this first line tuberculostatic drug (de Jong et al., 2005) makes reliable discrimination useful.

A range of insensitive and non-specific tests has been replaced by indirect haemagglutination assays, ELISAs and immunoblots (Auer et al., 2009; Zhang et al., 2003).

Incubation time should be prolonged to 3 weeks (Kolman et al., 1991; Ruiz et al., 1997; Yagupsky, 1994).

For PCR from agar colonies, simple boiling releases sufficient DNA while more complex sample materials may require DNA preparation kits (Beyer et al., 2003).

Methods of choice are Interferon gamma release assays (IGRA), commercially available in an ELISPOT format (T-SPOT-TB, Oxford Immunotec, Oxford, UK) and in an ELISA variant (QuantiFERON-TB Gold in tube, Cellestis Ltd., Carnegy, Australia).

Molecular in situ hybridisation (ISH) using kinetoplast DNA probes is used to identify Leishmania in tissue slides (Barker, 1987, 1989; Kennedy, 1984; Schoone et al., 1991; van Eys et al., 1987).

Sensitivity and specificity of ELISA in diagnosing visceral leishmaniasis could be increased by using soluble antigens derived from promastigotes cultivated in a protein-free medium (Rajasekariah et al., 2001).

Two variable regions of the 16S rRNA gene (Kirschner et al., 1993; Springer et al., 1996) are best analysed for sequence-based species discrimination of mycobacteria (100% matching).

E.g. degenerated primers for the detection of the N gene of rabies virus strains found in the United States (Orciari and Rupprecht, 2007) were described, comprising six forward primers (21 g: 5′-ATG-TAA-CAC-CTC- TAC-AAT-G-3′, 10 g: 5′-CTA-CAA-CGG-ATG-CCG-AC- 3′, 1066 deg: 5′-GA(AG)-AGA-AGA-TTC-TTC-AG(AG)-GA-3′, 1087i: 5′-GAG-AA(AG)-GAA- CTT-CA(AG)-GAi-TA-3′, 1087s deg: 5′-GAG-AA(AG)-GAA-CTT-CA(AG)-GA-3′, 1004s: 5′- TCA-TGA-TGA-ATG-GAG-GT-3′) and one reverse primer (304: 5′-TTG-ACG-AAG-ATC-TTG-CTC-AT- 3′).

Diagnostic approaches comprise MALDI-TOF-MS, (Dybwad et al., 2013; Lasch et al., 2009) gamma phage lysis of capsule-free, vegetative B. anthracis cells (Schuch et al., 2002), capsule induction through addition of 0.7% sodium bicarbonate to the agar with

subsequent incubation at 12-15% CO2, capsule staining according to M'Fadyean (M'Fadyean, 1903), and proof of penicillin-sensitivity (Doganay and Aydin, 1991).

Light microscopic approaches comprise Gram stain as well as capsule staining according to Foth or M'Fadyean (M'Fadyean, 1903).

Leishmania strains can be maintained as promastigotes in artificial culture medium, e.g. monophasic (Schneider's insect medium, M199, or Grace's medium) or biphasic media (Novy-McNeal Nicolle medium and Tobies medium) (Sundar et al., 2001).

For patients at risk for HAT, fresh aspirates from suspicious cervical lymph nodes are obtained (Mitashi et al., 2012).

For HAT, conventional polymerase chain reaction (PCR), real-time PCR and oligochromatography-PCR (OC-PCR) were described and evaluated.

If any, Gram-staining (Claus, 1992) might be considered.

Microscopic mobility testing, using the “hanging drop” procedure (Tittsler and Sandholzer, 1936), requires vital bacteria and BSL-3 facilities.

Reverse transcriptase PCR (RT-PCR) and LAMP (loop mediated amplification) approaches show high sensitivity for the detection of lyssavirus infections already ante mortem and allow for discrimination on molecular level from tissue, saliva and cerebrospinal fluids (Coertse et al., 2010; Crepin et al., 1998; Fooks et al., 2009; Mani and Madhusudana, 2013; Wunner and Briggs, 2010).

For discrimination within the M. tuberculosis complex, sequences of other genes, like internal transcribed spacer (ITS), heat shock protein (hsp65), and rpoB gene have to be added (Adekambi et al., 2003).

Fluorescence in situ hybridisation (FISH) can identify Brucella spp. from blood and agar cultures (Wellinghausen et al., 2006).

However, these procedures require specialised personnel, laboratory bio-safety 2 or 3 (in case of ChD suspicion) conditions and about one month of time (Diez et al., 2007).

A laboratory infection via the airborne route has been described (Winkler et al., 1973).

Identification of Brucella spp. by MALDI-TOF-MS from colony material is possible (Karger et al., 2013).

Biochemical testing by API 50CH kits (bioMérieux, Nürtingen, Germany) cannot discriminate B. anthracis from B. cereus but from various other Bacillus spp. (Rao et al., 2010).

A stepwise dilution of the material is applied in thin layers on slides carrying infected cell culture material and, e.g. neutralising antibodies like protein G specific antibodies are assessed (Orciari and Rupprecht, 2007).

Chromogenic agars like, e.g. “Cereus ident” agar (Heipha, Eppelheim, Germany), are in use (Rao et al., 2010; Tomaso et al., 2006).

Discrimination beyond the species level of Leishmania spp. is nowadays possible by modern typing methods such as multilocus enzyme typing (MLEE), multilocus sequence typing (MLST), and multilocus microsatellite typing (MLMT) (Schonian et al., 2011).

Furthermore, OC represents a dipstick solution in HAT diagnostics for the detection of previously amplified DNA or RNA by PCR or NASBA (Deborggraeve and Buscher, 2012; Mitashi et al., 2012).

To discriminate T. brucei gambiense and T. brucei rhodesiense, PCRs and LAMPs, targeting the TgsGP and SRA genes, are available.

Multi-locus variable-number tandem repeat analysis (MLVA) or single nucleotide polymorphism (SNP) can differentiate species (Lista et al., 2006; Stratilo et al., 2006; Van Ert et al., 2007).

The so-called AMOS-PCR can differentiate frequent Brucella spp. and biovars (Bricker and Halling, 1994) targeting the non-coding insertion sequence IS711 of B. abortus (biovars 1, 2, 4), B. melitensis (biovars 1-3), B. ovis, and B. suis (biovar 1) (Table 4), next to other procedures (Garcia-Yoldi et al., 2006).

Furthermore, biomarkers strongly associated with ChD, have been identified in sera by the use of SELDI-TOF and matrix-assisted laser-desorption-ionisation time-of-flight mass spectrometry (MALDI-TOF MS) (Ndao et al., 2010; Santamaria et al., 2014).

Standardised in-house or commercially available ELISA systems for the detection of anti-rabies virus antibodies have been introduced (Welch et al., 2009).

Different PCR protocols are available for the diagnosis of taeniasis and cysticercosis for simplex PCR (Gonzalez et al., 2000; Sreedevi et al., 2012), nested PCR (Mayta et

al., 2007), multiplex PCR (Yamasaki et al., 2004a), and real-time quantitative PCR (Praet et al., 2013).

While M. bovis spp. bovis is resistant to pyrazinamide, M. bovis spp. caprae is sensitive (Lumb et al., 2007).

Detection of trypanosomes by traditional microscopy requires 400x magnification.

While the diagnosis of taeniasis is based on morphologic identification of proglottides in stool samples stained with India ink (Peters and Pasvol, 2007; Soulsby, 1982), the diagnosis of cysticercosis relies on microscopic examination of cysts that were dissected from muscle tissue, subcutaneous tissue, and in case of neurocysticercosis from cerebral material.

Serological antigen detection kits (Burans et al., 1996) with sufficient sensitivity and specificity are not available at present.

Brucella spp. are catalase, and, with few exemptions, also urease and oxidase positive.

Brucella spp. show optimal cultural growth at 35–37 °C and 5–10% CO2.

Surface-enhanced laser-desorption-ionisation time-of-flight mass spectrometry (SELDI-TOF MS) has been successfully combined with data-mining tools for the detection of specific proteins in serum, expressed in HAT (Papadopoulos et al., 2004).

Cultural growth of mycobacteria at 37 °C and 30 °C (Pfyffer, 2007; Richter, 2009) is possible from solid media and broths.

If bacterial vitality is not required, fixation procedures should be performed, e.g. heat fixation or fixation in 10% formalin solution for light microscopy or fixation in 4% formaline / 0.5% glutaraldehyde in 0.5 M HEPES buffer, pH 7.2, for electron microscopy for 1 hour.

Aseptically collected blood (1 to 2 ml) is diluted with 10 ml of citrated saline; after centrifugation the cellular deposit obtained is inoculated in culture media.

Material from unsterile compartments should be decontaminated from accompanying bacterial flora prior to mycobacterial culture by N-actetyl-l-cysteine (NALC) or by sodium dodecylsulfate (SDS, unsuitable for cultural growth in several fluid media with automated detection), both in combination with NaOH (Pfyffer, 2007).

After screening for CE in endemic areas using crude antigens (hydatid cyst fluid) subsequent confirmatory testing with specific E. granulosus antigens (e.g. antigen B) is required.

Fluid culture media, e.g. Middlebrook 7H9, Middlebrook 7H12, BACTEC MGIT (BD, Heidelberg, Germany), or BacT/Alert MP (bioMérieux, Marcy l'Étoile, France) (Pfyffer, 2007), are recommended by WHO (WHO, 2007) even for low-income countries due to the shortened time-to-positivity by 1-2 weeks (Pfyffer, 2007).

A high diversity among lyssavirus variants result in a lack of non-degenerate universal primers, so multiple sets of degenerate primers have to be used if RT-PCR is used.

Numerous well validated commercial nucleic acid amplification (NAT) tests for the detection and identification of M. tuberculosis complex are available, e.g. Amplified Mycobacterium Tuberculosis Direct Test (AMTD) (Gen-Probe Inc., San Diego, CA, USA), BD ProbeTec ET System (BD Diagnostics, Sparks, MD, USA), COBAS TaqMan Mycobacterium tuberculosis MTB-Test (Roche Diagnostics, Mannheim, Germany), Artus M. tuberculosis PCR Kit CE (Qiagen Ltd., Hilden, Germany), GenoType Mycobacteria Direct (GTMD) (HAIN Lifescience, Nehren, Germany), Loop-Mediated Isothermal Amplification (LAMP) (Eiken Chemical Co. Ltd., Tokyo, Japan), RealArt M. tuberculosis TM PCR Reagents (Abbott Laboratories, Abbott Park, Illinois, USA), and GeneXpert System (Cepheid, Sunnyvale, CA, USA) (CLSI, 2008).

Growth on solid media, e.g. egg-based according to Löwenstein-Jensen or agar-based according to Middlebrook, allows for macroscopic assessment of colonies (Muddaiah et al., 2013; Sanders et al., 2004).

Amastigotes can be visualised by both Giemsa and hematoxylin-eosin (HE) staining (Arechavala et al., 2010), differential staining of DNA and RNA with acridine orange (Arechavala et al., 2010; Gazozai et al., 2010; Mbati et al., 1995; Meymandi et al., 2010; Perez-Cordero et al., 2011), and immunohistochemical staining (Ismail et al., 1997).

Blood containing standard agars can be used in BSL-3 facilities to demonstrate lacking haemolysis around B. anthracis colonies.

Sequence based typing makes use of N-gene-sequences (Kuzmin et al., 2004; Nadin-Davis et al., 1994; Smith et al., 1995), supplemented by sequencing of the G, P, and L-genes (Bourhy et al., 2005; Kuzmin et al., 2004; Nadin-Davis et al., 2006)

IgG and IgM antibodies from blood and cerebrospinal fluid can be detected using immunofluorescence assays (IFA).

Reliability and critical interpretation of test result

Few infected patients have neutralising antibodies by day six of illness, 50% by day 8 and 100% by day 15.

Any antibody titres in cerebrospinal fluid are diagnostically relevant and specific oligoclonal bands in cerebrospinal fluid confirm infection of the central nervous system (Alvarez et al., 1994).

RFFIT/FAVN testing is used for the assessment of vaccination state (Moore and Hanlon, 2010).

Reliability and critical interpretation of test results

In vivo growth with demonstration of the capsule serves to discriminate B. anthracis from other spore-forming bacteria.

Specific antibodies are not detectable in the critical early stages of the disease.

Errors, deviation from protocols, and lacking experience with autofluorescent detritus after Auramine staining can lead to false results.

Western blots can be used for predicting cases at highest risk of developing symptomatic leishmaniasis (Cota et al., 2012; Deniau et al., 2003).

Multiplexing various PCR targets (Beyer et al., 2003) can avoid non-specific reactions (Helgason et al., 2000)(Hoffmaster et al., 2002).

Of note, SAT testing based on B. abortus 1119-3 USDA antigens does not indicate antibodies against R-variant-LPS of B. canis (Al Dahouk et al., 2003a).

Increased IgG-titres can persist for years in spite of successful therapy (Smits et al., 1999).

Sequences of amplicons from traditional PCR approaches should be confirmed.

In case of very high Brucella titres, inhibition of agglutination (high-dose hook effect) in SAT has to be overcome by serial dilutions (Lucero and Bolpe, 1998).

For microscopic detection of T. brucei gambiense, blood concentration methods may be required due to short and low parasitaemia (Brun et al., 2010; Chappuis et al., 2005; Matovu et al., 2012).

Vital cells are immobile.

Decreasing the pH-value can increase specificity of SAT (Lucero and Bolpe, 1998).

PCR methods for HAT have a sensitivity between 70–100% and a specificity of 92–100%, with reduced performance for OC-PCR.

In some Bacillus anthracis strains one or even both virulence plasmids are missing, potentially leading to false negative results in multiplex assays (Turnbull et al., 1992).

In comparison, TL might have a sensitivity of 97-100% and specificity of 100%, however, TL use is limited by equipment requirements and high infection risk for laboratory personnel (Mitashi et al., 2012).

For lymph node aspiration sensitivity is reported to be only 19-64% (Mitashi et al., 2012), with higher sensitivity in the acute stage (Brun et al., 2010).

Antibodies remain detectable following surgical removal or effective drug treatment of cysts.

While anergy to tuberculin limits the diagnostic value of tuberculin testing in sarcoidosis patients with suspected tuberculosis, the results of IGRA testing are not similarly affected (Gupta et al., 2011).

Only few PCR targets (Agren et al., 2013) are not affected by this problem.

However, some cysts are sterile (acephalocysts) as their brood capsules are absent or not developed.

MALDI-TOF-MS from culture material is sensitive and specific and provides reliable results (Lasch et al., 2009).

PCR is the most sensitive routine diagnostic approach for leishmaniasis (Faber et al., 2003; Gangneux et al., 2003; Oliveira et al., 2005; Romero et al., 2001).

Immunofluorescence procedures (Phillips et al., 1983) are not yet sufficiently standardised.

Sequencing of the 16S rRNA gene is unsuitable for differentiation below the genus level due to perfect sequence conservation among Brucella spp. (Gee et al., 2004).

Accordingly, the positive predictive of test results is low in non-selected groups in low-endemicity settings.

The distinction between active or progressive and cured CE patients is not yet standardised (Zhang and McManus, 2006).

Phage-resistant and penicillin-resistant B. anthracis strains have been infrequently described (Abshire et al., 2005).

Modified single centrifugation of CSF allows detection of less than 2 trypanosomes/ml in less than 15 minutes in second stage HAT (Buscher et al., 2009).

The 18 kDa antigen (Em18) proved to be highly species-specific (96.8%) and sensitive (97%), and correlated with the presence of active lesions whereas a loss or decrease correlated with inactive infection, resection or long-term antiparasitic chemotherapy.

Lateral flow RDTs were 82-88% sensitive and 94-97% specific (Sternberg et al., 2014).

High SAT-titres (≥1:160 in non-endemic settings) or a titre increase by factor 4 are demanded for the diagnosis of active brucellosis (Lucero and Bolpe, 1998).

Positivity increases in later stages of the disease (Rudd et al., 2005).

Sensitivity of blood culture for the diagnosis of ChD is limited (Bhattacharyya et al., 2014) and varies when used for HAT (Chappuis et al., 2005).

Negri bodies are only detectable in a small percentage of infected cells (Jackson and Fenton, 2001; Jackson et al., 2001).

As applicable for all diagnostic procedures, positive and negative predictive values depend on prevalence.

For whole-cell-antigen tests, cross-reacting antibodies against Afipia clevelandensis, E. coli O:157, Francisella tularensis, Salmonella spp., Stenotrophomonas maltophilia, Vibrio cholerae, and Yersinia enterocolitica O:9 have to be considered (Drancourt et al., 1997; Lucero and Bolpe, 1998).

Brucella spp. are visible as small (400 × 800 nm), Gram-negative, coccoid to rod-shaped bacteria that are poorly stainable according to Gram (Meyer and Shaw, 1920).

Sensitivity of cultural growth is about 50-70% in case of acute brucellosis but time-to-positivity is long.

Therefore the crude EgHF-ELISA has been recommended for genus specific screening (Pawłowski et al., 2001).

High T. brucei rhodesiense parasitaemia in the acute stage allows diagnosis by wet or Giemsa stained thin and thick blood films.

Neither selective agars nor biochemical approaches can unambiguously discriminate between B. anthracis and closely related Bacillus spp. (Rao et al., 2010).

Em18 is a good candidate for differentiation between CE and AE, in regions where both infections are prevalent.

E. granulosus hydatid cyst fluid (EgHF) is used for antibody detection (Carmena et al., 2006), with sensitivities ranging from 75 to 95% (Zhang et al., 2003).

In case of doubtful Auramine results, decolorisation and subsequent Ziehl-Neelsen staining allows for morphological assessment of suspicious structures at 1000x magnification (Fandinho et al., 1990).

Chimeric antigens to serologically test for visceral leishmaniasis have a specificity of about 99% (Boarino et al., 2005).

CATT is reported to be 87-98% sensitive and 95% specific (Brun et al., 2010; Sullivan et al., 2014).

Bacteria other than mycobacteria are at least partially acid-fast, e.g. Nocardia spp. or Rhodococcus spp., so confusion might occur (Jones et al., 2004).

In regions, where CE and AE co-circulate, highly specific E. multilocularis antigens are required (Craig et al., 2000; Gottstein et al., 1993; Helbig et al., 1993; Ito et al., 1999; Ito et al., 1993; Ito et al., 2002; Jiang et al., 2001; Liance et al., 2000; Sarciron et al., 1997; Siles-Lucas and Gottstein, 2001).

Positive Leishmania PCR results can be obtained even from poor-quality sample materials like Giemsa-stained slides (Pandey et al., 2010), in case of forensic need, even decades after the sample has been taken (Volpini et al., 2006).

In doubtful instances, diagnostic inoculation in animals might be considered (Rao et al., 2010).

Regarding the clinical relevance of the results, T-SPOT and Quantiferon were reported to be equivalent (Diel et al., 2010; Mack et al., 2009).

DFA is positive in about 50% of samples during the first week with symptoms if multiple samples are stained.

Infections with M. kansasii, M. marinum and M. szulgai were shown to be associated with reactive IGRA as well (Thijsen et al., 2008).

Cylindrical, rod-shaped (1–1.25 × 3–5 μm) B. anthracis bacteria are usually arranged in chains.

A meta-analysis of commercially available NAT systems showed an average sensitivity of 85% for microscopically positive and negative samples, while the average specificity was 97% (Ling et al., 2008).

Successful diagnosis from decomposed brain material is also possible with RT-PCR (Whitby et al., 1997).

DFA testing lasts 3-4 h. Sensitivity and specificity are close to 100%.

Specificity is considered to be 98% (Diel et al., 2011).

The assessment of the rostellum is relatively simple and unambiguous.

Em2-ELISA detected antibodies do not always correlate with disease activity, since some patients with inactive lesions remain seropositive (Rausch et al., 1987).

Strout's method or mHCT are considered as diagnostic reference methods for ChD (Lescure et al., 2010).

As such strains lack their virulence genes, negative PCR results are acceptable if technically adequate execution is confirmed by positive and negative controls.

The Echinococcus Western Blot IgG kit (Echinococcus Western Blot IgG; LDBIO Diagnostics, Lyon, France) differentiated well between AE and CE patients (Ito et al., 1999; Jiang et al., 2001).

ELISA systems facilitate differentiated adjustment to a specific state of the disease by identifying very small differences of concentrations of different antibody classes (Caravano et al., 1987).

Elliptic, light-breaking spores are in the middle of the spore-forming cell and do not protrude from the cell.

Identification of Negri bodies in rabid animals shows a sensitivity of only 50-80% even if correctly performed (Perl and Good, 1991).

Serodiagnostic performance seems to depend on factors, such as cyst location, cyst stage, and cyst size (Brunetti et al., 2011). .

DNA can be detected in clinical samples earliest 10 days after infection with a higher sensitivity than blood culture and a theoretical detection limit of as low as 10 genome equivalents (Al Dahouk et al., 2003b; Bricker, 2002).

Sensitivity and specificity of DRIT are comparable to DFA (Lembo et al., 2006).

Subsequently, false positive results can be detected with more specific confirmatory tests.

Less than 50 trypanosomes/ml may be detected by mAECT as the most sensitive method, which can even be improved if used with buffy coats (mAECT-BC) and combined with lymph node aspiration (Camara et al., 2010; Mumba Ngoyi et al., 2014).

A negative microscopy result can therefore not rule out CE infection.

Serological antibody detection for CE is less reliable than for AE (McManus et al., 2003).

Positive PCR signals from primary patient materials, however, should trigger isolation of the causative agent to ensure specificity.

Other patients with CE do not demonstrate a detectable immune response (Dottorini et al., 1985; Force et al., 1992; Lorenzo et al., 2005).

IgM-antibodies against LPS dominate the first week after infection, followed by an IgG-titre increase in the second week and a peak of both 1 month after infection.

Brucella spp.

Therefore, serological testing to diagnose acute anthrax is futile.

Batch specific specificity problems have been reported.

Sensitivity of microscopy from bone marrow smears is about 60 to 85%, from spleen aspirates more than 95% (Sundar and Rai, 2002).

For dipstick testing, sensitivity and specificity of 100% (Bern et al., 2000) were reported with animal specimens (Toz et al., 2004).

For ChD and the T. cruzi OligoC-TesT, sensitivity of 94% and specificity of 100% were reported (Deborggraeve and Buscher, 2012; Matovu et al., 2012; Mitashi et al., 2012).

MALDI-TOF-MS is the method of choice for identification from colony material (Karger et al., 2013).

The Em2plus ELISA, a combination of Em2- antigen and the recombinant protein II/3–10, increased sensitivity for detection of AE to 97% (Gottstein et al., 1993).

Culture unambiguously demonstrates the presence of active lyssavirus and allows for an enrichment for subsequent assessments, e.g. sequencing for epidemiological typing (Bourhy et al., 2005; Kuzmin et al., 2004; Kuzmin et al., 2003; Nadin-Davis et al., 1994; Nadin-Davis et al., 2006; Smits et al., 1999).

Repeated tuberculin testing further reduces specificity of tuberculin testing due to booster effects (Menzies, 1999).

Low antibody titres close to the detection limit are typical in early stages and for chronic courses of the disease (Ariza et al., 1992) and serology can fail (Naha et al., 2012).

Cross reactivity can occur with Trypanosoma cruzi (Boecken et al., 2011).

In the acute phase of ChD, T. cruzi can be detected in blood smears, however, only with a low sensitivity (WHO, 2012).

Antibodies against antigen B (AgB) or antigen 5 (Ag5) have shown a specificity between 77 and 91%, but commonly cross-react with E. multilocularis.

If subspecies differentiation by LAMP is desired, LOD decreases to an acceptable level (1-10 parasites), compared to PCR (LOD ≈ 100 parasites).

In contrast, healthy farmers, butchers or veterinarians can show increased anti-Brucella-IgG titres in case of repeated exposition to the antigen in absence of an active infection (Karimi et al., 2003).

The most sensitive PCRs target the satellite and ribosomal DNA, providing a detection limit per reaction (LOD) below 1 parasite, but in comparison, RIME LAMP (Table 7) is the most sensitive method for DNA detection (LOD < 0.001 parasites), followed by RNA detection by NASBA (0005 parasites).

Although IgM-titres slowly decrease with antibiotic therapy, IgM may persist for more than a year.

Best sensitivity can be achieved from brain tissue (Fooks et al., 2009; Mani and Madhusudana, 2013; Wunner and Briggs, 2010).

Em2-ELISA had sensitivities ranging between 77 and 92% (Zhang and McManus, 2006).

Testing of 193 sera of patients with other parasitic infections, including T. saginata tapeworm infection, indicated a specificity of 100% (Wilkins et al., 1999).

Antibody detection is useful for visceral leishmaniasis but of limited value for cutaneous disease, in which measurable antibody responses are rare.

Em2, Em10 and Em18 antigens are used for the detection of E. multilocularis antibodies.

Diagnostic reliability of PCR largely depends on sample material, mode of nucleic acid extraction, and the applied PCR protocol.

However, Em18-ELISA and Em18-Western blots revealed minor cross-reactivity with neurocysticercosis and schistosomiasis (Ito et al., 2002).

Automated biochemical identification systems like API 20NE (bioMérieux) frequently fail to identify Brucella spp. (Barham et al., 1993).

Weakly positive results may not always be reproducible (Felber and Graninger, 2013).

T. solium and T. saginata eggs cannot be differentiated by microscopy, and should be discriminated using PCR (Jimenez et al., 2010).

For detection of antibodies against T. cruzi, IIF and ELISA are the most sensitive ones among the standardised tests, although use of the mix-ELISA might offer advantages (Ricciardi and Ndao, 2015).

MALDI-TOF-MS recently showed 82.8% correct identifications (Quinlan et al., 2014).

An ELISA detecting antibodies against Em10 antigen revealed a sensitivity of 93.2% and a specificity of 96.8% (Helbig et al., 1993).

Rapid FISH-based genus-identification has not been standardised beyond a proof-of-principle evaluation (Wellinghausen et al., 2006).

Identification of M. bovis spp. bovis by its pyrazinamide-resistance is unreliable (Hlavsa et al., 2008).

Latex agglutination of visceral leishmaniasis antigens showed 93-100% specificity and 68-100% sensitivity (Attar et al., 2001).

Newly observed increases of IgM-titre indicate therapy failure or recurrence.

More than 15 lateral uterine branches in the proglottid are characteristic for T. saginata, while less than 12 to 15 branches are typical for T. solium (Peters and Pasvol, 2007; Soulsby, 1982).

CBR for IgG1 is used for confirmation testing due to its higher specificity and is even more reliable than SAT during the incubation period of infection and in case of chronic brucellosis (Diaz and Moriyon, 1989).

Use of purified antigens improves specificity of serological assays but may subvert sensitivity (Gadea et al., 2000; Zhang et al., 2003).

Microscopy of cystic fluid proves infection and cyst viability (Brunetti and Junghanss, 2009).

SELDI-TOF MS showed 100% sensitivity and 98.6% specificity for the use in patients with HAT (Papadopoulos et al., 2004).

In HIV positive patients, PCR is the first indicator of relapse (Pizzuto et al., 2001).

Culture in fluid media is the most sensitive method for the detection of mycobacteria (CLSI, 2008; Dinnes et al., 2007) with a detection limit of 10–100 bacteria (Pfyffer, 2007).

False negative IGRA results have been observed in about 10% of latently infected patients (Diel et al., 2009).

Sensitivity for microscopic detection of T. brucei gambiense in blood varies from 4-54% for wet or thin blood films and 26-100% for thick blood films, but can be increased using concentration techniques (Mitashi et al., 2012).

A major disadvantage of IGRA is its unsuitability to discriminate active from latent tuberculosis (Whittaker et al., 2008).

RT-PCR allows determination of geographic origin of the virus and host species origin regarding the biological reservoir (Arai et al., 1997; Nadin-Davis, 1998).

Comparable accuracy for identified ChD biomarkers via SELDI and MALDI-TOF has been reported (Santamaria et al., 2014).

Sensitivity of the Wilkins's immunoblot assay was 95% (69 of 73) using sera of patients with confirmed T. solium tapeworm infections.

Serology in patients who are HIV-positive at the time of infection can remain negative and should not be used to rule out visceral leishmaniasis.

In patients infected first with leishmania and afterwards with HIV, even low titres have diagnostic value when combined with the clinical case definition.

In patients with progressive AE, Western blot bands at 18 kDa increased (Ito et al., 1995; Ito et al., 1993; Tappe et al., 2008).

Compared to other diagnostic procedures including imaging, clinical, immunological, and microscopic methods, PCR ensures sufficient specificity and differentiates between T. solium and T. saginata.

Immunohistochemistry can increase detection rate of leishmania in tissue from 20% after H&E staining to 88% (Ismail et al., 1997).

The test specificity (50-82%) (Moro et al., 2005) is reduced due to frequent cross-reactions in patients with tumours, liver cirrhosis, nematode, trematode and other cestode infections (Craig et al., 2007; Dottorini et al., 1985; Eckert and Deplazes, 2004; Ito et al., 1995; Ito et al., 1993; Khuroo, 2002; Maddison et al., 1989; Ortona et al., 2000; Poretti et al., 1999; Shepherd and McManus, 1987; Siracusano et al., 1991; Wen and Craig, 1994; Zhang and McManus, 2006).

The EITB was 98% sensitive and 100% specific (Tsang et al., 1989).

Sampling and pre-analytic considerations

Cultural growth requires BSL-3 conditions.

Material for post-mortem rabies diagnostics comprises brain biopsies, e.g. from the brainstem, hippocampus, thalamus, cerebellum, or medulla oblongata.

A set of graded criteria including clinical, imaging, immunological, and epidemiological data is used to classify suspected cases as definitive or probable (Del Brutto, 2012; Del Brutto et al., 2001; Del Brutto et al., 1996; Yancey et al., 2005).

Serum should be shipped cooled or frozen (Moreno and Moriyon, 2011); (Young, 1995a).

detection of T. solium-specific antibodies in serum and cerebrospinal fluid.

Sampling and pre-analytic aspects for suspected rabies are summarised in the WHO Expert Consultation on Rabies: second report (WHO, 2013).

The clinical diagnosis of neurocysticercosis can be difficult because of the non-specificity of clinical manifestations and neuroimaging findings (Garcia et al., 2002).

If brucellosis is suspected, blood cultures should be taken repeatedly.

Direct detection of the pathogen requires ultrasound-guided fine-needle aspiration cytology (FNAC) of cyst fluid or biopsies of liver.

The laboratory diagnosis of taeniasis and cysticercosis is based on (i.) microscopic detection of proglottides in stool and taeniid cysts in muscle or cerebral biopsies, on (ii.)

For serology, whole blood, serum or plasma is required.

Diagnostic materials from vital patients comprise bioptic materials (5 -6 µm) from the nuchal skin with hair follicles (Dacheux et al., 2008) and secretions like saliva, cerebrospinal fluid, tears or serum.

Isolation of the pathogen from bone marrow is more often successful, sometimes also from tissue samples, cerebrospinal fluid, synovial fluid, abscess material, spleen and liver tissue or from consumables like milk, cheese or raw meat.

In case of suspected pulmonary tuberculosis, 3 putrid morning sputa should be collected in sterile tubes.

Sample transport has to be rapid and cultural growth should start within 1-2 hours after sample taking.

Samples for cultural growth under BSL-3 conditions should be taken prior to the onset of antibiotic therapy (Gotuzzo et al., 1986).

If diagnostic procedures allow prior inactivation, it should be considered, e.g. by heating to 65 °C for at least 30 minutes (Best et al., 1990).

For longer transport times, clinical samples should be cooled to 2-8 °C, tissue samples have to stay moist during transport (Moreno and Moriyon, 2011).

Sample preparation under a laminar flow workbench is advisable for samples from suspected tuberculosis patients, as long as inactivation is not possible.

Post-mortal, heart blood, lung and spleen tissue should be considered.

Alternative sample materials, depending on the site of infection, comprise urine, menstrual blood, lymphatic node tissue, bioptic materials, sperm, bone marrow, blood culture material in case of systemic spread, stool, and cerebrospinal fluid (CDC, 1999).

For transport at ambient temperature, samples should be stabilised in 50% glycerine-saline.

detection of T. solium-specific DNA in stool samples and muscle or cerebral biopsies, as well as (iii.)

An interdisciplinary team of clinicians, radiologists and microbiologists needs to differentiate echinococcal cysts from benign cysts, cavitary tuberculosis, mycoses, abscesses, and benign or malignant neoplasms.

Blood, lymph node aspirates and cerebral spine fluid (CSF) for microscopy have to be processed immediately, or within few hours after sampling if kept cool and dark, to prevent lysis of trypanosomes (Brun et al., 2010; Chappuis et al., 2005).

Clinical samples comprise swabs from skin lesions and in case of lung anthrax or gastrointestinal anthrax blood, sputum, and stool samples.

Radiologic imaging is used as a screening tool to diagnose and evaluate liver lesions (Group, 2003; Junghanss et al., 2008), which are further confirmed by antibody assays (Moro and Schantz, 2009).

Long-term storage should be avoided.

Samples should be transported cooled but not frozen in sterile vessels, blood additionally in inoculated blood culture media (Rao et al., 2010) to BSL-3 facilities.

If fasting secretion from the stomach is collected via endoscopy, e.g. in children, it has to be buffered prior to transport to maintain viability of mycobacteria.

Fluid samples should be enriched by centrifugation at 3300 × g. Saliva, dried swabs, pooled sputum or urine, and sample storage or transport time >7 days are inacceptable for diagnostic purposes (Paramasivan et al., 1983).

Due to intermitting virus shedding, 3 saliva samples in intervals of 3-6 hours should be taken into a sterile container, and for transport and storage cooled or frozen, preferably on dry ice.

For molecular diagnostics whole blood, buffy coat (BC), lymph node aspirates, tissues (Diez et al., 2007), or CSF (Mitashi et al., 2012) can be used.

Serological approaches

Tsang and co-workers developed on the basis of lentil-lectin, affinity-purified glycoprotein antigens an enzyme-linked immunoelectrotransfer blot (EITB) that can be used to test serum as well as cerebrospinal fluid (CSF) samples (Tsang et al., 1989).

Several T. solium tapeworm antigen preparations have been developed, allowing identification of tapeworm carriers (Ferrer et al., 2007; Hancock et al., 2004; Hancock et al., 2006; Levine et al., 2004; Wilkins et al., 1999).

The earliest serologic test, an immunoblot assay developed by Wilkins and co-workers, used secretory antigens collected from in vitro cultured T. solium tapeworms (Wilkins et al., 1999).

Value of cultural approaches in the diagnostic process

Cultures are useful for obtaining a sufficient number of organisms to use as an antigen for immunologic diagnosis and typing, for obtaining parasites to be used to inoculate susceptible experimental animals, for in vitro screening of drug sensitivity, and finally as an additional possibility for diagnosing the infection.

In spite of its long incubation time, cultural growth under BSL-3 conditions remains the diagnostic gold standard (Richter, 2009; Rusch-Gerdes and Hillemann, 2008).

Diagnostic culture is rarely performed.

Inoculation of mice has been abandoned because it is not superior to cell culture (Valleca and Forester, 1981).

Whilst the need of a fast-established diagnosis disqualifies blood culture as diagnostic tool for HAT in the field (Chappuis et al., 2005), it is still described as an option for diagnosis of ChD (Bhattacharyya et al., 2014; Lescure et al., 2010).

Value of cultural diagnostic approaches in the diagnostic process

MALDI-TOF-MS from colonies may be used as a diagnostic stand-alone technology (Lasch et al., 2009).

Biochemical techniques require BSL-3 laboratory conditions and usually do not allow for unambiguous results (Rao et al., 2010).

Value of cultural isolation in the diagnostic process

Cultural isolation of Brucella spp. is considered as the diagnostic gold standard.

Value of microscopic approaches in the diagnostic process

FNAC, followed by microscopy of aspirated fluid can confirm the diagnosis (Hira et al., 1988; Pawłowski et al., 2001).

The demonstration of acid-fast rod-shaped bacteria by Ziehl–Neelsen or Auramine staining is used for rapid assessment of infectiousness, even in resource-limited settings (Sawadogo et al., 2012), but fails to discriminate on species level.

DFA or DRIT (Lembo et al., 2006; Rudd et al., 2005) are still in use.

DFA from postmortem brain tissue is the standard, by which other diagnostic approaches are evaluated (Orciari and Rupprecht, 2007).

Value of microscopic methods in the diagnostic process

Microscopy is still the most commonly performed procedure for initial screening in many laboratories.

Value of microscopic procedures in the diagnostic process

Staging of HAT, based on white blood cell count and presence of trypanosomes determined in CSF, is essential for the choice of treatment (Matovu et al., 2012; Mumba Ngoyi et al., 2013).

Apart from chronic phase of ChD (WHO, 2012), detection of trypanosomes in blood, and cerebral spine fluid (CSF), lymphatic or chancre fluid for HAT, remains the gold standard for the confirmation of trypanosomiasis (Ricciardi and Ndao, 2015).

Value of microscopy in the diagnostic process

Histological/microscopic demonstration of the parasite from biopsy of a brain or spinal cord lesion is one of the unambiguous criteria for the diagnosis of cysticercosis.

Microscopy can contribute to but not ensure the diagnosis of anthrax.

Microscopy is no method of choice for the diagnosis of brucellosis.

The method is limited because cerebral material can often not be gained before autopsy.

Value of molecular diagnostic approaches in the diagnostic process

Portable integrated systems with high reproducibility fulfilling high quality standards are required.

For HAT, LAMP and NASBA require less equipment and provide operational benefits, while showing equal or improved sensitivity compared to PCR, which remains a helpful technique for scientific or epidemiological use and travel medicine.

In developing countries, in particular in tropical regions, these assays should be transformed into loop-mediated isothermal amplification (LAMP) assays.

PCR can be applied for confirmation testing from colony material, in case of false negative or non-interpretable cultural results from spiked control samples and as a

parallel diagnostic procedure in case of non-selective enrichment (Hoffmaster et al., 2002).

In the process of taeniasis and cysticercosis diagnosis, especially nested-PCR (Mayta et al., 2008) but also simplex PCR (Garcia et al., 2002) and qPCR (Praet et al., 2013) from stool samples are the tools of choice to increase sensitivity and specificity in comparison to microscopic observation of eggs.

The GeneXpert system is broadly used for tuberculosis screening in Africa (Scott et al., 2014; Wekesa et al., 2014), suggesting an increasing importance of molecular procedures for the routine diagnosis of mycobacteria worldwide.

NGS could replace older typing approaches like spoligotyping or mycobacterial interspersed repetitive unit-variable number tandem repeat (MIRU-VNTR) (Ramos et al., 2014).

As microscopic skills get lost in non-endemic settings, molecular procedures become more important.

For new world leishmaniasis they provide tools for species diagnosis to differentiate species responsible for cutaneous from species responsible for mucocutaneous forms (Graca et al., 2012).

Modern typing methods such as multilocus enzyme typing (MLEE), multilocus sequence typing (MLST), and multilocus microsatellite typing (MLMT) (Schonian et al., 2011) widely replaced laborious and time-consuming ISH for typing.

LAMP systems that are already successfully used in the tropics, are the Genie® system (Amplex Biosystems GmbH, Gießen, Germany) or the Realtime Turbidimeter LA-200 (Eiken Chemical Co. LTD., Tokyo, Japan).

LAMP is the only molecular technique, which might qualify for diagnosis in the field, whereas by targeting RNA, the field use of NASBA is limited by its high vulnerability for degradation, although it might be favourable for therapy control (Deborggraeve and Buscher, 2012; Matovu et al., 2012; Mitashi et al., 2012).

If region specific primers (Orciari and Rupprecht, 2007) are available, PCR is the method of choice for rabies diagnostics and has widely replaced alternative approaches (Fooks et al., 2009; Mani and Madhusudana, 2013; Wunner and Briggs, 2010).

For ChD, PCR could provide a sensitive method for congenital screening, follow up, and reactivation monitoring in immunocompromised patients (Lescure et al., 2010; Ricciardi and Ndao, 2015).

Multiplex PCR from proglottid samples or taeniid cysts dissected from muscle tissue of mammals are the tools of choice for the species-specific diagnosis of T. asiatica, T. saginata, and T. solium and for the differentiation of the two T. solium genotypes (Yamasaki et al., 2004b).

The commercially available T. cruzi OligoC-TesT can be used in laboratories with midlevel equipment and its simplicity might even be improved by implementing NASBA or LAMP methods (Deborggraeve et al., 2009).

Value of PCR methods in the diagnostic process

PCR is rapid with better sensitivity in comparison to culture but cannot replace culture as diagnostic gold standard allowing antimicrobial sensitivity testing (Navarro et al., 2004; Queipo-Ortuno et al., 2005; Redkar et al., 2001).

Value of serological and IGRA approaches in the diagnostic process

IGRA testing is not suitable for diagnosing acute tuberculosis due to lacking sensitivity and specificity (Diel et al., 2009; Sester et al., 2011).

Further IGRA testing can identify early immunoconversions and should be performed in contact persons after potential transmission events to decide on preventive isoniazide therapy, although observed progression rates in immunocompetent individuals are low (Nienhaus and Costa, 2013).

IGRA testing can detect latent tuberculosis prior to iatrogenic immunosuppression (Mack et al., 2009; Pai et al., 2008).

Value of serological approaches in the diagnostic process

Brucella serology also helps monitoring the course of the disease (Smits et al., 1999).

The TL could be a useful tool for HAT surveillance (Jamonneau et al., 2010).

ChD serology plays an important role for screening of blood donors at risk and diagnosis of chronic stages, for which positive results by at least 2 different serological

methods, determined with the same sample, are required (Lescure et al., 2010; Ricciardi and Ndao, 2015).

Serological antibody assessment may help for retrospective assessments, differential diagnostic considerations or post-vaccination assessments.

Simple and fast screening for infection with T. brucei gambiense is performed by CATT or thermostable CATT-D10 (Hasker et al., 2010) and may be simplified cost effectively by the use of lateral flow RDTs, whilst screening for infection with T. brucei rhodesiense is limited to history of exposure and clinical signs of individuals (Brun et al., 2010; Matovu et al., 2012; Mitashi et al., 2012; Njiru et al., 2008; Sternberg et al., 2014).

Despite standardisation and cross-reactivity problems, the combination of screening and confirmatory serological tests in conjunction with radiologic imaging represents the method of choice for the diagnosis of Echinococcus spp. infections.

Rapid antigen tests are important for early diagnosis and management of visceral leishmaniasis in resource-limited settings.

Serology is restricted to suspected visceral disease, direct proof of the pathogen is preferable.

Detection of anticysticercal antibodies with the serum EITB is one of the major criteria and a positive result in a CSF ELISA for detection of cysticercal antigens or anticysticercal antibodies belong to the minor criteria (Del Brutto, 2012; Del Brutto et al., 2001; Del Brutto et al., 1996; Yancey et al., 2005) for reliable diagnosis (Table 6).

If cultural or molecular proof of Brucella spp. fails, high titres or titre-increases by factor 4 indicate acute infection in case of suspicious symptoms (Centers for Disease and Prevention, 1994; Young, 1995a).

Serological assessment is of very limited value for the diagnosis of acute rabies due to the late occurence of detectable antibodies (Alvarez et al., 1994).

Value of time-of-flight (TOF) mass spectrometry approaches in the diagnostic process

MALDI-TOF, and its refined variation SELDI-TOF work with small amounts of (even haemolytic) serum, but require accurate and time-consuming protocols and technical

expensive equipment (Agranoff et al., 2005; Papadopoulos et al., 2004; Ricciardi and Ndao, 2015).

Visceral Leishmaniasis (kalar azar)

Amastigote density can be logarithmically scored from 0 (no parasite per 1000× magnified oil immersion fields) to 6 (>100 parasites per field).

Hospital assessment of tissue specimens comprises Giemsa or standard hematoxylin-eosin staining (Arechavala et al., 2010).

Amastigote parasites can be demonstrated in spleen or bone marrow, lymph nodes, liver biopsy, aspirates or tissue specimens or even in the buffy coat of peripheral blood.

For imprint cytology from spleen, liver, or lymph node, flat tissue cuts are pressed on microscopic slides, fixed with absolute alcohol, and stained according to Giemsa.

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DOI: N/A

7. **Artigo:** *Laboratory-based diagnosis of brucellosis - A review of the literature*
Autores: Al Dahouk, Sascha; Tomaso, Herbert; Nöckler, Karsten; Neubauer, Heinrich; Frangoulidis, Dimitrios
Detalhes: N/A (2003)
DOI: N/A

8. **Artigo:** *Identification of Brucella species and biotypes using polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP)*
Autores: Al Dahouk, Sascha; Tomaso, Herbert; Prenger-Berninghoff, Ellen; Splettstoesser, Wolf D.; Scholz, Holger C.; Neubauer, Heinrich
Detalhes: N/A (2005)
DOI: 10.1080/10408410500304041

9. **Artigo:** *Forensic implications of PCR inhibition - A review*
Autores: Alaeddini, Reza
Detalhes: N/A (2012)
DOI: 10.1016/j.fsigen.2011.08.006

10. **Artigo:** *Partial recovery from rabies in a nine-year-old boy*
Autores: Alvarez, H. L.; Fajardo, V. R.; Lopez, M. E.; Pedroza, R. R.; Hemachudha, T.; Kamolvarin, N.; Cortes, C. G.; Baer, G. M.
Detalhes: N/A (1994)
DOI: 10.1097/00006454-199412000-00020

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Autores: Antinori, Spinello; Calattini, Sara; Piolini, Roberta; Longhi, Erika; Bestetti, Giovanna; Cascio, Antonio; Parravicini, Carlo; Corbellino, Mario
Detalhes: N/A (2009)
DOI: N/A

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    Autores: Antinori, Spinello; Gianelli, E.; Calattini, S.; Longhi, E.; Gramiccia, M.; Corbellino, M.
    Detalhes: N/A (2005)
    DOI: 10.1111/j.1469-0691.2004.01046.x

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    Autores: Antwerpen, Markus H.; Zimmermann, Pia; Bewley, Kevin; Frangoulidis, Dimitrios; Meyer, Hermann
    Detalhes: N/A (2008)
    DOI: 10.1016/j.mcp.2008.06.001

14. **Artigo:** *Nucleoprotein gene analysis of fixed and street rabies virus variants using RT-PCR*
    Autores: Arai, Y. T.; Yamada, K.; Kameoka, Y.; Horimoto, T.; Yamamoto, K.; Yabe, S.; Nakayama, M.; Tashiro, M.
    Detalhes: N/A (1997)
    DOI: 10.1007/s007050050197

15. **Artigo:** *Giemsa stain in the differential diagnosis of infectious diseases with cutaneous involvement*
    Autores: Arechavala, A. I.; Bianchi, M. H.; Santiso, G. M.; Lehmann, E. A.; Walker, L.; Negroni, R.
    Detalhes: N/A (2010)
    DOI: N/A

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    Autores: Ariza, Javier; Pellicer, T.; Pallares, R.; Foz, A.; Gudiol, F.
    Detalhes: N/A (1992)
    DOI: 10.1093/clinids/14.1.131

17. **Artigo:** *Latex agglutination test for the detection of urinary antigens in visceral leishmaniasis*
    Autores: Attar, Zamil J.; Chance, Michael L.; El-Safi, Sayda; Carney, James; Azazy, Ahmed; El-Hadi, Maha; Dourado, Cibele; Hommel, Marcel
    Detalhes: N/A (2001)
    DOI: 10.1016/S0001-706X(00)00155-8

18. **Artigo:** *Sensitivity and specificity of new commercial tests for the detection of specific Echinococcus antibodies*
    Autores: Auer, Herbert; Stöckl, Cornelia; Suhendra, Susanne; Schneider, Renate
    Detalhes: N/A (2009)
    DOI: 10.1007/s00508-009-1233-4

19. **Artigo:** *Bovine tuberculosis: An old disease but a new threat to Africa*
    Autores: Ayele, Wuhib Y.; Neill, S. D.; Zinsstag, J.; Weiss, M. G.; Pavlik, I.

Detalhes: N/A (2004)
DOI: N/A

20. **Artigo:** *Misidentification of bruceila species with use of rapid bacterial identification systems*
Autores: Barham, William B.; Church, Preston; Brown, John E.; Paparello, Scott
Detalhes: N/A (1993)
DOI: 10.1093/clinids/17.6.1068

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Autores: Barker, D. C.
Detalhes: N/A (1987)
DOI: 10.1016/0169-4758(87)90174-8

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Autores: Barker, D. C.
Detalhes: N/A (1989)
DOI: 10.1017/S0031182000083463

23. **Artigo:** *The trypanosomiases*
Autores: Barrett, Michael P.; Burchmore, Richard J.S.; Stich, August; Lazzari, Julio O.; Frasch, Alberto Carlos; Cazzulo, Juan José; Krishna, Sanjeev
Detalhes: N/A (2003)
DOI: 10.1016/S0140-6736(03)14694-6

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Autores: Bern, Caryn; Jha, Shambhu Nath; Joshi, Anand B.; Thakur, G. D.; Bista, Mahendra Bahadur
Detalhes: N/A (2000)
DOI: 10.4269/ajtmh.2000.63.153

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Autores: Best, M.; Sattar, S. A.; Springthorpe, V. S.; Kennedy, M. E.
Detalhes: N/A (1990)
DOI: N/A

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Autores: Beyer, Wolfgang
Detalhes: N/A (2004)
DOI: N/A

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Autores: Beyer, W.; Bartling, C.; Neubauer, H.
Detalhes: N/A (2003)
DOI: N/A

28. **Artigo:** *Development of Peptide-Based Lineage-Specific Serology for Chronic Chagas Disease: Geographical and Clinical Distribution of Epitope Recognition*
Autores: Bhattacharyya, Tapan; Falconar, Andrew K.; Luquetti, Alejandro O.; Costales, Jaime A.; Grijalva, Mario J.; Lewis, Michael D.; Messenger, Louisa A.; Tran, Trang T.; Ramirez, Juan David; Guhl, Felipe; Carrasco, Hernan J.; Diosque, Patricio; Garcia, Lineth; Litvinov, Sergey V.; Miles, Michael A.
Detalhes: N/A (2014)
DOI: 10.1371/journal.pntd.0002892

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Autores: Boarino, A.; Scalone, A.; Gradoni, L.; Ferroglio, E.; Vitale, F.; Zanatta, R.; Giuffrida, M. G.; Rosati, S.
Detalhes: N/A (2005)
DOI: 10.1128/CDLI.12.5.647-653.2005

30. **Artigo:** *Diagnosis and therapy of cutaneous and mucocutaneous Leishmaniasis in Germany*
Autores: Boecken, Gerhard; Sunderkötter, Cord; Bogdan, Christian; Weitzel, Thomas; Fischer, Marcellus; Müller, Andreas; Löbermann, Micha; Anders, Gerlind; Von Stebut, Esther; Schunk, Mirjam; Burchard, Gerd; Grobusch, Martin; Bialek, Ralf; Harms-Zwingenberger, Gundel; Fleischer, Bernhard; Pietras, Mathias; Faulde, Michael; Erkens, Kay
Detalhes: N/A (2011)
DOI: 10.1111/j.1610-0379.2011.07820.x

31. **Artigo:** *Phylogenetic and epidemiologic evidence of multiyear incubation in human rabies*
Autores: Boland, Torrey A.; McGuone, Declan; Jindal, Jenelle; Rocha, Marcelo; Cumming, Melissa; Rupprecht, Charles E.; Barbosa, Taciana Fernandes Souza; De Novaes Oliveira, Rafael; Chu, Catherine J.; Cole, Andrew J.; Kotait, Ivanete; Kuzmina, Natalia A.; Yager, Pamela A.; Kuzmin, Ivan V.; Hedley-Whyte, E. Tessa; Brown, Catherine M.; Rosenthal, Eric S.
Detalhes: N/A (2014)
DOI: 10.1002/ana.24016

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Autores: Bourhy, H.; Cowley, J. A.; Larrous, F.; Holmes, E. C.; Walker, P. J.
Detalhes: N/A (2005)
DOI: 10.1099/vir.0.81128-0

33. **Artigo:** *The sensitivity and specificity of Leishmania chagasi recombinant K39 antigen in the diagnosis of American visceral leishmaniasis and in differentiating active from subclinical infection*
Autores: Braz, Regina F.S.; Nascimento, Eliana T.; Martins, Daniella R.A.; Wilson, Mary E.; Pearson, Richard D.; Reed, Steven G.; Jeronimo, Selma M.B.
Detalhes: N/A (2002)
DOI: 10.4269/ajtmh.2002.67.344

34. **Artigo:** *Differentiation of hard-to-type bacterial strains by rna mismatch cleavage*
    Autores: Bricker, Betsy J.
    Detalhes: N/A (1999)
    DOI: N/A

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    Autores: Bricker, Betsy J.
    Detalhes: N/A (2002)
    DOI: 10.1016/S0378-1135(02)00228-6

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    Autores: Bricker, Betsy J.; Ewalt, Darla R.; Halling, Shirley M.
    Detalhes: N/A (2003)
    DOI: 10.1186/1471-2180-3-15

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    Autores: Bricker, B. J.; Halling, S. M.
    Detalhes: N/A (1994)
    DOI: N/A

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    Autores: Briggs, Deborah J.; Smith, Jean S.; Mueller, Francis L.; Schwenke, James; Davis, Rolan D.; Gordon, Chandra R.; Schweitzer, Kristen; Orciari, Lillian A.; Yager, Pamela A.; Rupprecht, Charles E.
    Detalhes: N/A (1998)
    DOI: 10.1006/biol.1998.0162

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    Autores: Brito, Maria Edileuza F.; Mendonça, Mitzi G.; Gomes, Yara M.; Jardim, Márcio L.; Abath, Frederico G.C.
    Detalhes: N/A (2000)
    DOI: 10.1128/CDLI.7.2.318-321.2000

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    Autores: Brun, Reto; Blum, Johannes; Chappuis, Francois; Burri, Christian
    Detalhes: N/A (2010)
    DOI: 10.1016/S0140-6736(09)60829-1

41. **Artigo:** *Cystic echinococcosis: Chronic, complex, and still neglected*
    Autores: Brunetti, Enrico; Garcia, Hector H.; Junghanss, Thomas

Detalhes: N/A (2011)
DOI: 10.1371/journal.pntd.0001146

42. **Artigo:** *Update on cystic hydatid disease*
Autores: Brunetti, Enrico; Junghanss, Thomas
Detalhes: N/A (2009)
DOI: 10.1097/QCO.0b013e328330331c

43. **Artigo:** *Expert consensus for the diagnosis and treatment of cystic and alveolar echinococcosis in humans*
Autores: Brunetti, Enrico; Kern, Peter; Vuitton, Dominique Angèle
Detalhes: N/A (2010)
DOI: 10.1016/j.actatropica.2009.11.001

44. **Artigo:** *Improved models of mini anion exchange centrifugation technique (mAECT) and modified single centrifugation (MSC) for sleeping sickness diagnosis and staging*
Autores: Büscher, Philippe; Ngoyi, Dieudonné Mumba; Kaboré, Jacques; Lejon, Veerle; Robays, Jo; Jamonneau, Vincent; Bebronne, Nicolas; Van Der Veken, Wim; Biéler, Sylvain
Detalhes: N/A (2009)
DOI: 10.1371/journal.pntd.0000471

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Autores: Camara, Mamadou; Camara, Oumou; Ilboudo, Hamidou; Sakande, Hassan; Kaboré, Jacques; N'Dri, Louis; Jamonneau, Vincent; Bucheton, Bruno
Detalhes: N/A (2010)
DOI: 10.1111/j.1365-3156.2010.02546.x

46. **Artigo:** *Application of immunoenzymatic techniques for epidemiological surveys on brucellosis among human populations*
Autores: Caravano, R.; Chabaud, F.; Oberti, J.
Detalhes: N/A (1987)
DOI: 10.1016/0769-2609(87)90079-2

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Autores: Cárdenas, Graciela; Jung, Helgi; Ríos, Camilo; Fleury, Agnes; Soto-Hernández, José Luís
Detalhes: N/A (2010)
DOI: 10.4269/ajtmh.2010.09-0347

48. **Artigo:** *Antigens for the immunodiagnosis of Echinococcus granulosus infection: An update*
Autores: Carmena, David; Benito, Aitziber; Eraso, Elena
Detalhes: N/A (2006)
DOI: 10.1016/j.actatropica.2006.02.002

49. **Artigo:** *Neurocysticercosis: An update*
Autores: Carpio, Arturo
Detalhes: N/A (2002)
DOI: 10.1016/S1473-3099(02)00454-1

50. **Artigo:** *The pathogenesis and pathology of bovine tuberculosis with insights from studies of tuberculosis in humans and laboratory animal models*
Autores: Cassidy, J. P.
Detalhes: N/A (2006)
DOI: 10.1016/j.vetmic.2005.11.031

51. **Artigo:** *A real-time polymerase chain reaction assay for the identification and quantification of American Leishmania species on the basis of glucose-6-phosphate dehydrogenase*
Autores: Castilho, Tiago Moreno; Camargo, Luís Marcelo Aranha; McMahon-Pratt, Diane; Shaw, Jeffrey Jon; Floeter-Winter, Lucile Maria
Detalhes: N/A (2008)
DOI: N/A

52. **Artigo:** *Options for field diagnosis of human African trypanosomiasis*
Autores: Chappuis, François; Loutan, Louis; Simarro, Pere; Lejon, Veerle; Büscher, Philippe
Detalhes: N/A (2005)
DOI: 10.1128/CMR.18.1.133-146.2005

53. **Artigo:** *Field validity, reproducibility and feasibility of diagnostic tests for visceral leishmaniasis in rural Nepal*
Autores: Chappuis, François; Rijal, Suman; Jha, Uma Kant; Desjeux, Philippe; Karki, Bal Man Singh; Koirala, Shekhar; Loutan, Louis; Boelaert, Marleen
Detalhes: N/A (2006)
DOI: 10.1111/j.1365-3156.2005.01533.x

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Autores: Chappuis, François; Rijal, Suman; Soto, Alonso; Menten, Joris; Boelaert, Marleen
Detalhes: N/A (2006)
DOI: 10.1136/bmj.38917.503056.7C

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Autores: Claus, D.
Detalhes: N/A (1992)
DOI: 10.1007/BF01198764

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Autores: Cliquet, F.; Aubert, M.; Sagné, L.

Detalhes: N/A (1998)
DOI: 10.1016/S0022-1759(97)00212-3

57. **Artigo:** *Classification of Brucella spp. isolated from marine mammals by DNA polymorphism at the omp2 locus*
Autores: Cloeckaert, Axel; Verger, Jean Michel; Grayon, Maggy; Paquet, Jean Yves; Garin-Bastuji, Bruno; Foster, Geoff; Godfroid, Jacques
Detalhes: N/A (2001)
DOI: 10.1016/S1286-4579(01)01427-7

58. **Artigo:** *Improved PCR methods for detection of african rabies and rabies-related lyssaviruses*
Autores: Coertse, Jessica; Weyer, Jacqueline; Nel, Louis H.; Markotter, Wanda
Detalhes: N/A (2010)
DOI: 10.1128/JCM.01256-10

59. **Artigo:** *Zoonotic tuberculosis due to Mycobacterium bovis in developing countries*
Autores: Cosivi, O.; Grange, J. M.; Daborn, C. J.; Raviglione, M. C.; Fujikura, T.; Cousins, D.; Robinson, R. A.; Huchzermeyer, H. F.A.K.; De Kantor, I.; Meslin, F. X.
Detalhes: N/A (1998)
DOI: 10.3201/eid0401.980108

60. **Artigo:** *The diagnostic accuracy of serologic and molecular methods for detecting visceral leishmaniasis in HIV infected patients: Meta-analysis*
Autores: Cota, Gláucia Fernandes; de Sousa, Marcos Roberto; Demarqui, Fábio Nogueira; Rabello, Ana
Detalhes: N/A (2012)
DOI: 10.1371/journal.pntd.0001665

61. **Artigo:** *An epidemiological and ecological study of human alveolar echinococcosis transmission in south Gansu, China*
Autores: Craig, P. S.; Giraudoux, P.; Shi, D.; Bartholomot, B.; Barnish, G.; Delattre, P.; Quere, J. P.; Harraga, S.; Bao, G.; Wang, Y.; Lu, F.; Ito, A.; Vuitton, D. A.
Detalhes: N/A (2000)
DOI: 10.1016/S0001-706X(00)00134-0

62. **Artigo:** *Prevention and control of cystic echinococcosis*
Autores: Craig, Philip S.; McManus, Donald P.; Lightowlers, Marshall W.; Chabalgoity, Jose A.; Garcia, Hector H.; Gavidia, Cesar M.; Gilman, Robert H.; Gonzalez, Armando E.; Lorca, Myriam; Naquira, Cesar; Nieto, Alberto; Schantz, Peter M.
Detalhes: N/A (2007)
DOI: 10.1016/S1473-3099(07)70134-2

63. **Artigo:** *Intravitam diagnosis of human rabies by PCR using saliva and cerebrospinal fluid*
Autores: Crepin, P.; Audry, L.; Rotivel, Y.; Gacoin, A.; Caroff, C.; Bourhy, H.

Detalhes: N/A (1998)
DOI: N/A

64. **Artigo:** *A revised classification for Leishmania and Endotrypanum*
Autores: Cupolillo, E.; Medina-Acosta, E.; Noyes, H.; Momen, H.; Grimaldi, G.
Detalhes: N/A (2000)
DOI: 10.1016/S0169-4758(99)01609-9

65. **Artigo:** *Sequence analysis and PCR-RFLP profiling of the hsp70 gene as a valuable tool for identifying Leishmania species associated with human leishmaniasis in Brazil*
Autores: da Silva, Leonardo Alves; de Sousa, Cíntia dos Santos; da Graça, Grazielle Cardoso; Porrozzi, Renato; Cupolillo, Elisa
Detalhes: N/A (2010)
DOI: 10.1016/j.meegid.2009.11.001

66. **Artigo:** *A reliable diagnosis of human rabies based on analysis of skin biopsy specimens*
Autores: Dacheux, Laurent; Reynes, Jean Marc; Buchy, Philippe; Sivuth, Ong; Diop, Bernard M.; Rousset, Dominique; Rathat, Christian; Jolly, Nathalie; Dufourcq, Jean Baptiste; Nareth, Chhor; Diop, Sylvie; Iehlé, Catherine; Rajerison, Randrianasolo; Sadorge, Christine; Bourhy, Hervé
Detalhes: N/A (2008)
DOI: 10.1086/592969

67. **Artigo:** *Comparison of skin smears and biopsy specimens for demonstration of leishmania tropica bodies in cutaneous leishmaniasis*
Autores: Dar, Nasser Rashid; Khurshid, Tariq
Detalhes: N/A (2005)
DOI: N/A

68. **Artigo:** *Ultrastructure of the Negri body in human rabies*
Autores: De Brito, T.; De Fátima Araujo, Maria; Tiriba, A.
Detalhes: N/A (1973)
DOI: 10.1016/0022-510X(73)90170-6

69. **Artigo:** *Does resistance to pyrazinamide accurately indicate the presence of Mycobacterium bovis?*
Autores: De Jong, Bouke C.; Onipede, Anthony; Pym, Alex S.; Gagneux, Sebastien; Aga, Roxanne S.; DeRiemer, Kathryn; Small, Peter M.
Detalhes: N/A (2005)
DOI: 10.1128/JCM.43.7.3530-3532.2005

70. **Artigo:** *Recent progress in molecular diagnosis of sleeping sickness*
Autores: Deborggraeve, Stijn; Büscher, Philippe
Detalhes: N/A (2012)
DOI: 10.1586/erm.12.72

71. **Artigo:** *T. cruzi oligoC-tesT: A simplified and standardized polymerase chain reaction format for diagnosis of Chagas disease*
Autores: Deborggraeve, Stijn; Coronado, Ximena; Solari, Aldo; Zulantay, Ines; Apt, Werner; Mertens, Pascal; Laurent, Thierry; Leclipteux, Thierry; Stessens, Tim; Dujardin, Jean Claude; Herdewijn, Piet; Büscher, Philippe
Detalhes: N/A (2009)
DOI: 10.1371/journal.pntd.0000450

72. **Artigo:** *Diagnostic criteria for neurocysticercosis, revisited*
Autores: Del Brutto, Oscar H.
Detalhes: N/A (2012)
DOI: 10.1179/2047773212Y.0000000025

73. **Artigo:** *Proposed diagnostic criteria for neurocysticercosis*
Autores: Del Brutto, Oscar H.; Rajshekhar, V.; White, A. C.; W. Tsang, V. C.; Nash, T. E.; Takayanagui, O. M.; Schantz, P. M.; W. Evans, C. A.; Flisser, A.; Correa, D.; Botero, D.; Allan, J. C.; Sarti, E.; Gonzalez, A. E.; Gilman, R. H.; García, H. H.
Detalhes: N/A (2001)
DOI: 10.1212/WNL.57.2.177

74. **Artigo:** *Proposal of diagnostic criteria for human cysticercosis and neurocysticercosis*
Autores: Del Brutto, Oscar H.; Wadia, Noshir H.; Dumas, Michel; Cruz, Marcelo; Tsang, Victor C.W.; Schantz, Peter M.
Detalhes: N/A (1996)
DOI: 10.1016/0022-510X(96)00130-X

75. **Artigo:** *The biological diagnosis of leishmaniasis in HIV-infected patients*
Autores: Deniau, M.; Cañavate, C.; Faraut-Gambarelli, F.; Marty, P.
Detalhes: N/A (2003)
DOI: N/A

76. **Artigo:** *Cytologic Diagnosis of Isolated Pancreatic Alveolar Hydatid Disease with Immunologic and PCR Analyses*
Autores: Diebold-Berger, Sophie; Khan, Haleem; Gottstein, Bruno; Puget, Evelyne; Frossard, Jean Louis; Remadi, Sami
Detalhes: N/A (1997)
DOI: 10.1159/000333544

77. **Artigo:** *Interferon-γ release assays for the diagnosis of latent Mycobacterium tuberculosis infection: A systematic review and meta-analysis*
Autores: Diel, R.; Goletti, D.; Ferrara, G.; Bothamley, G.; Cirillo, D.; Kampmann, B.; Lange, C.; Losi, M.; Markova, R.; Migliori, G. B.; Nienhaus, A.; Ruhwald, M.; Wagner, D.; Zellweger, J. P.; Huitric, E.; Sandgren, A.; Manissero, D.
Detalhes: N/A (2011)
DOI: 10.1183/09031936.00115110

78. **Artigo:** *Comparative performance of tuberculin skin test, Quanti FERON-TB-Gold in tube assay, and T-SpotTB test in contact investigations for tuberculosis*
Autores: Diel, Roland; Loddenkemper, Robert; Meywald-Walter, Karen; Gottschalk, Rene; Nienhaus, Albert
Detalhes: N/A (2009)
DOI: 10.1378/chest.08-2048

79. **Artigo:** *Evidence-Based comparison of commercial Interferon-γ Release assays for detecting active TB a metaanalysis*
Autores: Diel, Roland; Loaddenkemper, Robert; Nienhaus, Albert
Detalhes: N/A (2010)
DOI: 10.1378/chest.09-2350

80. **Artigo:** *Usefulness of PCR strategies for early diagnosis of Chagas' disease reactivation and treatment follow-up in heart transplantation*
Autores: Diez, M.; Favaloro, L.; Bertolotti, A.; Burgos, J. M.; Vigliano, C.; Lastra, M. P.; Levin, M. J.; Arnedo, A.; Nagel, C.; Schijman, A. G.; Favaloro, R. R.
Detalhes: N/A (2007)
DOI: 10.1111/j.1600-6143.2007.01820.x

81. **Artigo:** *In situ hybridisation for the detection of Leishmania species in paraffin wax-embedded canine tissues using a digoxigenin-labelled oligonucleotide probe*
Autores: Dinhopl, N.; Mostegl, M. M.; Richter, B.; Nedorost, N.; Maderner, A.; Fragner, K.; Weissenböck, H.
Detalhes: N/A (2011)
DOI: 10.1136/vr.d5462

82. **Artigo:** *A systematic review of rapid diagnostic tests for the detection of tuberculosis infection*
Autores: Dinnes, J.; Deeks, J.; Kunst, H.; Gibson, A.; Cummins, E.; Waugh, N.; Drobniewski, F.; Lalvani, A.
Detalhes: N/A (2007)
DOI: 10.3310/hta11030

83. **Artigo:** *Leishmania (Viannia) subgenus kDNA amplification for the diagnosis of mucosal leishmaniasis*
Autores: Disch, Jolande; Pedras, Mariana Junqueira; Orsini, Marcela; Pirmez, Claude; De Oliveira, Maria Cláudia; Castro, Marcelo; Rabello, Ana
Detalhes: N/A (2005)
DOI: 10.1016/j.diagmicrobio.2004.10.005

84. **Artigo:** *Antimicrobial susceptibility of bacillus anthracis*
Autores: Doĝanay, Mehmet; Aydin, Neriman
Detalhes: N/A (1991)
DOI: 10.3109/00365549109024319

85. **Artigo:** *Echinococcus granulosus: Diagnosis of hydatid disease in man*
Autores: Dottorini, S.; Sparvoli, M.; Bellucci, C.; Magnini, M.
Detalhes: N/A (1985)
DOI: 10.1080/00034983.1985.11811887

86. **Artigo:** *Afipia clevelandensis antibodies and cross-reactivity with Brucella spp. and Yersinia enterocolitica O:9*
Autores: Drancourt, Michel; Brouqui, Philippe; Raoult, Didier
Detalhes: N/A (1997)
DOI: N/A

87. **Artigo:** *Rapid identification of bacillus anthracis spores in suspicious powder samples by using matrix-assisted laser desorption ionization-time of flight mass spectrometry (MALDI-TOF MS)*
Autores: Dybwad, Marius; van Der Laaken, Anton L.; Blatny, Janet Martha; Paauw, Armand
Detalhes: N/A (2013)
DOI: 10.1128/AEM.01724-13

88. **Artigo:** *Specific detection of Bacillus anthracis using a TaqMan® mismatch amplification mutation assay*
Autores: Easterday, William R.; Van Ert, Matthew N.; Zanecki, Shaylan; Keim, Paul
Detalhes: N/A (2005)
DOI: 10.2144/05385ST03

89. **Artigo:** *Biological, Epidemiological, and Clinical Aspects of Echinococcosis, a Zoonosis of Increasing Concern*
Autores: Eckert, Johannes; Deplazes, Peter
Detalhes: N/A (2004)
DOI: 10.1128/CMR.17.1.107-135.2004

90. **Artigo:** *Genetic heterogeneity of ribosomal internal transcribed spacer in clinical samples of Leishmania donovani spotted on filter paper as revealed by single-strand conformation polymorphisms and sequencing*
Autores: El Tai, N. O.; Osman, O. F.; El Fari, M.; Presber, W.; Schönian, G.
Detalhes: N/A (2000)
DOI: 10.1016/S0035-9203(00)90093-2

91. **Artigo:** *Rapid and sensitive identification of pathogenic and apathogenic Bacillus anthracis by real-time PCR*
Autores: Ellerbrok, Heinz; Nattermann, Herbert; Özel, Muhsin; Beutin, Lothar; Appel, Bernd; Pauli, Georg
Detalhes: N/A (2002)
DOI: 10.1016/S0378-1097(02)00837-6

92. **Artigo:** *Cluster of human tuberculosis caused by Mycobacterium bovis: evidence for person-to-person transmission in the UK*

Autores: Evans, Jason T.; Smith, E. Grace; Banerjee, Ashis; Smith, Robert MM; Dale, James; Innes, John A.; Hunt, David; Tweddell, Alan; Wood, Annette; Anderson, Charlotte; Hewinson, R. Glyn; Smith, Noel H.; Hawkey, Peter M.; Sonnenberg, Pam
Detalhes: N/A (2007)
DOI: 10.1016/S0140-6736(07)60598-4

93. **Artigo:** *Value of diagnostic techniques for cutaneous leishmaniasis*
Autores: Faber, William R.; Oskam, Linda; van Gool, Tom; Kroon, Nel C.M.; Knegt-Junk, Kristine J.; Hofwegen, Henk; van der Wal, Allard C.; Kager, Piet A.
Detalhes: N/A (2003)
DOI: 10.1067/mjd.2003.492

94. **Artigo:** *A comparison of the Ziehl-Neelsen and Kinyoun methods in staining smears from leprosy patients*
Autores: Fandinho, F. C.O.; Orsi-Souza, A. T.; Salem, J. I.
Detalhes: N/A (1990)
DOI: N/A

95. **Artigo:** *Weakly positive tests and chronologic variation of the QuantiFERON assay: A retrospective appraisal of usefulness*
Autores: Felber, Anja; Graninger, Winfried
Detalhes: N/A (2013)
DOI: 10.1016/j.tube.2013.07.006

96. **Artigo:** *Use in routine clinical practice of two commercial blood tests for diagnosis of infection with Mycobacterium tuberculosis: a prospective study*
Autores: Ferrara, Giovanni; Losi, Monica; D'Amico, Roberto; Roversi, Pietro; Piro, Roberto; Meacci, Marisa; Meccugni, Barbara; Dori, Ilaria Marchetti; Andreani, Alessandro; Bergamini, Barbara Maria; Mussini, Cristina; Rumpianesi, Fabio; Fabbri, Leonardo M.; Richeldi, Luca
Detalhes: N/A (2006)
DOI: 10.1016/S0140-6736(06)68579-6

97. **Artigo:** *Molecular cloning and characterisation of Ts8B1, Ts8B2 and Ts8B3, three new members of the Taenia solium metacestode 8 kDa diagnostic antigen family*
Autores: Ferrer, Elizabeth; Bonay, Pedro; Foster-Cuevas, Mildred; González, Luis Miguel; Dávila, Iris; Cortéz, María Milagros; Harrison, Leslie J.S.; Parkhouse, R. Michael E.; Gárate, Teresa
Detalhes: N/A (2007)
DOI: 10.1016/j.molbiopara.2006.12.003

98. **Artigo:** *Rabies*
Autores: Fishbein, Daniel B.; Robinson, Laura E.
Detalhes: N/A (1993)
DOI: 10.1056/NEJM199311253292208

99. **Artigo:** *Emerging technologies for the detection of rabies virus: Challenges and hopes in the 21st century*
Autores: Fooks, Anthony R.; Johnson, Nicholas; Freuling, Conrad M.; Wakeley, Philip R.; Banyard, Ashley C.; McElhinney, Lorraine M.; Marston, Denise A.; Dastjerdi, Akbar; Wright, Edward; Weiss, Robin A.; Müller, Thomas
Detalhes: N/A (2009)
DOI: 10.1371/journal.pntd.0000530

100. **Artigo:** *Evaluation of eight serological tests in the diagnosis of human echinococcosis and follow-up*
Autores: Force, Lluís; Torres, Josep M.; Carrillo, Alfonso; Buscà, Joaquím
Detalhes: N/A (1992)
DOI: 10.1093/clind/15.3.473

101. **Artigo:** *Brucella ceti sp. nov. and Brucella pinnipedialis sp. nov. for Brucella strains with cetaceans and seals as their preferred hosts*
Autores: Foster, Geoffrey; Osterman, Bjorn S.; Godfroid, Jacques; Jacques, Isabelle; Cloeckert, Axel
Detalhes: N/A (2007)
DOI: 10.1099/ijs.0.65269-0

102. **Artigo:** *Detection and identification of Leishmania species from clinical specimens by using a real-time PCR assay and sequencing of the cytochrome b gene*
Autores: Foulet, Françoise; Botterel, Françoise; Buffet, Pierre; Morizot, Gloria; Rivollet, Danièle; Deniau, Michèle; Pratlong, Francine; Costa, Jean Marc; Bretagne, Stéphane
Detalhes: N/A (2007)
DOI: 10.1128/JCM.02555-06

103. **Artigo:** *Phylogeny of Leishmania species based on the heat-shock protein 70 gene*
Autores: Fraga, Jorge; Montalvo, Ana Margarita; De Doncker, Simonne; Dujardin, Jean Claude; Van der Auwera, Gert
Detalhes: N/A (2010)
DOI: 10.1016/j.meegid.2009.11.007

104. **Artigo:** *Accurate and rapid species typing from cutaneous and mucocutaneous leishmaniasis lesions of the New World*
Autores: Fraga, Jorge; Veland, Nicolas; Montalvo, Ana M.; Praet, Nicolas; Boggild, Andrea K.; Valencia, Braulio M.; Arévalo, Jorge; Llanos-Cuentas, Alejandro; Dujardin, Jean Claude; Van der Auwera, Gert
Detalhes: N/A (2012)
DOI: 10.1016/j.diagmicrobio.2012.06.010

105. **Artigo:** *Epidemiology of human African trypanosomiasis*
Autores: Franco, Jose R.; Simarro, Pere P.; Diarra, Abdoulaye; Jannin, Jean G.

Detalhes: N/A (2014)
DOI: 10.2147/CLEP.S39728

106. **Artigo:** *Rapid identification of Leishmania spp. in formalin-fixed, paraffin-embedded tissue samples by fluorescence in situ hybridization*
Autores: Frickmann, Hagen; Alnamar, Yaser; Essig, Andreas; Clos, Joachim; Racz, Paul; Barth, Thomas F.; Hagen, Ralf M.; Fischer, Marcellus; Poppert, Sven
Detalhes: N/A (2012)
DOI: 10.1111/j.1365-3156.2012.03024.x

107. **Artigo:** *Immunological diagnosis of human hydatid cyst relapse: Utility of the enzyme-linked immunoelectrotransfer blot and discriminant analysis*
Autores: Gadea, I.; Ayala, G.; Diago, M. T.; Cuñat, A.; Garcia De Lomas, J.
Detalhes: N/A (2000)
DOI: 10.1128/CDLI.7.4.549-552.2000

108. **Artigo:** *Prospective value of PCR amplification and sequencing for diagnosis and typing of Old World Leishmania infections in an area of nonendemicity*
Autores: Gangneux, Jean Pierre; Menotti, Jean; Lorenzo, Frédéric; Sarfati, Claudine; Blanche, Hélène; Bui, Hung; Pratlong, Francine; Garin, Yves Jean François; Derouin, Francis
Detalhes: N/A (2003)
DOI: 10.1128/JCM.41.4.1419-1422.2003

109. **Artigo:** *American tegumentary leishmaniasis: Antigen-gene polymorphism, taxonomy and clinical pleomorphism*
Autores: Garcia, A. L.; Kindt, A.; Quispe-Tintaya, K. W.; Bermudez, H.; Llanos, A.; Arevalo, J.; Bañuls, A. L.; De Doncker, S.; Le Ray, D.; Dujardin, J. C.
Detalhes: N/A (2005)
DOI: 10.1016/j.meegid.2004.07.003

110. **Artigo:** *Current consensus guidelines for treatment of neurocysticercosis*
Autores: García, Hector H.; Evans, Carlton A.W.; Nash, Theodore E.; Takayanagui, Osvaldo M.; White, A. Clinton; Botero, David; Rajshekhar, Vedantam; Tsang, Victor C.W.; Schantz, Peter M.; Allan, James C.; Flisser, Ana; Correa, Dolores; Sarti, Elsa; Friedland, Jon S.; Martinez, S. Manuel; Gonzalez, Armando E.; Gilman, Robert H.; Del Brutto, Oscar H.
Detalhes: N/A (2002)
DOI: 10.1128/CMR.15.4.747-756.2002

111. **Artigo:** *Multiplex PCR assay for the identification and differentiation of all Brucella species and the vaccine strains Brucella abortus S19 and RB51 and Brucella melitensis Rev1 [13]*
Autores: García-Yoldi, David; Marín, Clara M.; De Miguel, María J.; Muñoz, Pilar M.; Vizmanos, José L.; López-Goñi, Ignacio
Detalhes: N/A (2006)
DOI: 10.1373/clinchem.2005.062596

112. **Artigo:** *Comparison of a screening test and a reference test in epidemiologic studies: II. A probabilistic model for the comparison of diagnositc tests*
Autores: Gart, John J.; Buck, Alfred A.
Detalhes: N/A (1966)
DOI: 10.1093/oxfordjournals.aje.a120610

113. **Artigo:** *Comparison of diagnostic methods in cutaneous leishmaniasis (histopathology compared to skin smears)*
Autores: Gazozai, Sana Ullah; Iqbal, Javeid; Bukhari, Ishrat; Bashir, Sajid
Detalhes: N/A (2010)
DOI: N/A

114. **Artigo:** *Use of 16S rRNA gene sequencing for rapid confirmatory identification of Brucella isolates*
Autores: Gee, Jay E.; De, Barun K.; Levett, Paul N.; Whitney, Anne M.; Novak, Ryan T.; Popovic, Tanja
Detalhes: N/A (2004)
DOI: 10.1128/JCM.42.8.3649-3654.2004

115. **Artigo:** *Negative staining in diagnostic virology*
Autores: Gelderblom, H. R.; Renz, H.; Özel, M.
Detalhes: N/A (1991)
DOI: 10.1016/0739-6260(91)90061-4

116. **Artigo:** *Usefulness of PCR analysis for diagnosis of alveolar echinococcosis with unusual localizations: Two case studies*
Autores: Georges, Sophie; Villard, Odile; Filisetti, Denis; Mathis, Alexander; Marcellin, Luc; Hansmann, Yves; Candolfi, Ermanno
Detalhes: N/A (2004)
DOI: 10.1128/JCM.42.12.5954-5956.2004

117. **Artigo:** *From the discovery of the Malta fever's agent to the discovery of a marine mammal reservoir, brucellosis has continuously been a re-emerging zoonosis*
Autores: Godfroid, Jacques; Cloeckaert, Axel; Liautard, Jean Pierré; Kohler, Stephan; Fretin, David; Walravens, Karl; Garin-Bastuji, Bruno; Letesson, Jean Jacques
Detalhes: N/A (2005)
DOI: 10.1051/vetres:2005003

118. **Artigo:** *Differential diagnosis of Taenia saginata and Taenia solium infection by PCR*
Autores: González, Luis Miguel; Montero, Estrella; Harrison, Leslie J.S.; Parkhouse, R. Michael E.; Garate, Teresa
Detalhes: N/A (2000)
DOI: N/A

119. **Artigo:** *Improved primary immunodiagnosis of alveolar echinococcosis in humans by an enzyme-linked immunosorbent assay using the Em2(plus) antigen*
Autores: Gottstein, B.; Jacquier, P.; Bresson-Hadni, S.; Eckert, J.
Detalhes: N/A (1993)
DOI: N/A

120. **Artigo:** *An evaluation of diagnostic methods for brucellosis—the value of bone marrow culture*
Autores: Gotuzzo, Eduardo; Carrillo, Carlos; Guerra, Jorge
Detalhes: N/A (1986)
DOI: 10.1093/infdis/153.1.122

121. **Artigo:** *Development and validation of PCR-based assays for diagnosis of American cutaneous leishmaniasis and identification of the parasite species*
Autores: da Graça, Grazielle Cardoso; Volpini, Angela Cristina; Romero, Gustavo Adolfo Sierra; Neto, Manoel Paes de Oliveira; Hueb, Marcia; Porrozzi, Renato; Boité, Mariana Côrtes; Cupolillo, Elisa
Detalhes: N/A (2012)
DOI: 10.1590/S0074-02762012000500014

122. **Artigo:** *International classification of ultrasound images in cystic echinococcosis for application in clinical and field epidemiological settings*
Autores: Macpherson, C. N.L.; Vuitton, D. A.; Gharbi, H. A.; Caremani, M.; Frider, B.; Brunettii, E.; Perdomo, R.; Schantz, P. M.; Felice, C.; Teggi, A.; Da Silva, A.; Pawlowski, Z. S.; Todorov, T.; Pelaez, V.; Salama, H.; Tinelli, M.; Guarnera, E.; Lapini, L.; Akhan, O.; Hao, W.
Detalhes: N/A (2003)
DOI: 10.1016/S0001-706X(02)00223-1

123. **Artigo:** *Interferon gamma release assay (QuantiFERON-TB gold in tube) in patients of sarcoidosis from a population with high prevalence of tuberculosis infection*
Autores: Gupta, Dheeraj; Kumar, S.; Aggarwal, A. N.; Verma, I.; Agarwal, R.
Detalhes: N/A (2011)
DOI: N/A

124. **Artigo:** *A rapid staining technique for the detection of the initiation of germination of bacterial spores*
Autores: Hamouda, T.; Shih, A. Y.; Baker, J. R.
Detalhes: N/A (2002)
DOI: 10.1046/j.1472-765x.2002.01047.x

125. **Artigo:** *Characterization and cloning of GP50, a Taenia solium antigen diagnostic for cysticercosis*
Autores: Hancock, Kathy; Pattabhi, Sowmya; Greene, Ryan M.; Yushak, Melinda L.; Williams, Fatima; Khan, Azra; Priest, Jeffrey W.; Levine, Min Z.; Tsang, Victor C.W.
Detalhes: N/A (2004)
DOI: 10.1016/j.molbiopara.2003.10.001

126. **Artigo:** *Characterization and cloning of T24, a Taenia solium antigen diagnostic for cysticercosis*
Autores: Hancock, Kathy; Pattabhi, Sowmya; Whitfield, Fatima W.; Yushak, Melinda L.; Lane, William S.; Garcia, Hector H.; Gonzalez, Armando E.; Gilman, Robert H.; Tsang, Victor C.W.
Detalhes: N/A (2006)
DOI: 10.1016/j.molbiopara.2006.02.004

127. **Artigo:** *Cytodiagnosis of hydatid disease presenting with Horner's syndrome: A case report*
Autores: Handa, U.; Mohan, H.; Ahal, S.; Mukherjee, K. K.; Dabra, A.; Lehl, S. S.; Yadav, T. D.

Detalhes: N/A (2001)
DOI: 10.1159/000328306

128. **Artigo:** *Overview, Prevention, and Treatment of Rabies*
Autores: Hankins, Daniel G.; Rosekrans, Julia A.
Detalhes: N/A (2004)
DOI: 10.4065/79.5.671

129. **Artigo:** *Anthroponotic cutaneous leishmaniasis in Tunisia: Presence of Leishmania killicki outside its original focus of Tataouine*
Autores: Haouas, Najoua; Chargui, N.; Chaker, E.; Ben Said, M.; Babba, H.; Belhadj, S.; Kallel, K.; Pratlong, F.; Dedet, J. P.; Mezhoud, H.; Azaiez, R.
Detalhes: N/A (2005)
DOI: 10.1016/j.trstmh.2004.11.012

130. **Artigo:** *The impact of HIV infection on tropical diseases*
Autores: Harms, Gundel; Feldmeier, Hermann
Detalhes: N/A (2005)
DOI: 10.1016/j.idc.2004.10.002

131. **Artigo:** *A new format of the CATT test for the detection of Human African Trypanosomiasis, designed for use in peripheral health facilities*
Autores: Hasker, E.; Mitashi, P.; Baelmans, R.; Lutumba, P.; Jacquet, D.; Lejon, V.; Kande, V.; Declercq, J.; Van Der Veken, W.; Boelaert, M.
Detalhes: N/A (2010)
DOI: 10.1111/j.1365-3156.2009.02446.x

132. **Artigo:** *Reactions to Rabies*
Autores: Hattwick, Michael A.
Detalhes: N/A (1972)
DOI: 10.1056/NEJM197212072872318

133. **Artigo:** *Recovery from rabies. A case report.*
Autores: Hattwick, M. A.; Weis, T. T.; Stechschulte, C. J.; Baer, G. M.; Gregg, M. B.

Detalhes: N/A (1972)
DOI: 10.7326/0003-4819-76-6-931

134. **Artigo:** *Serological differentiation between cystic and alveolar echinococcosis by use of recombinant larval antigens*
Autores: Helbig, M.; Frosch, P.; Kern, P.; Frosch, M.
Detalhes: N/A (1993)
DOI: N/A

135. **Artigo:** *Bacillus anthracis, Bacillus cereus, and bacillus thuringiensis - One species on the basis of genetic evidence*
Autores: Helgason, Erlendur; Økstad, Ole Andreas; Caugant, Dominique A.; Johansen, Henning A.; Fouet, Agnes; Mock, Michéle; Hegna, Ida; Kolstø, Anne Brit
Detalhes: N/A (2000)
DOI: 10.1128/AEM.66.6.2627-2630.2000

136. **Artigo:** *Human rabies: A disease of complex neuropathogenetic mechanisms and diagnostic challenges*
Autores: Hemachudha, Thiravat; Laothamatas, Jiraporn; Rupprecht, Charles E.
Detalhes: N/A (2002)
DOI: 10.1016/S1474-4422(02)00041-8

137. **Artigo:** *Trypanosoma cruzi, the causal agent of Chagas disease: Boundaries between wild and domestic cycles in Venezuela*
Autores: Herrera, Leidi
Detalhes: N/A (2014)
DOI: 10.3389/fpubh.2014.00259

138. **Artigo:** *DIAGNOSIS OF CYSTIC HYDATID DISEASE: ROLE OF ASPIRATION CYTOLOGY*
Autores: Hira, P. R.; Lindberg, L. G.; Francis, I.; Shweiki, H.; Shaheen, Y.; Leven, H.; Behbehani, K.
Detalhes: N/A (1988)
DOI: 10.1016/S0140-6736(88)90470-9

139. **Artigo:** *Human tuberculosis due to Mycobacterium bovis in the United States, 1995-2005*
Autores: Hlavsa, Michele C.; Moonan, Patrick K.; Cowan, Lauren S.; Navin, Thomas R.; Kammerer, J. Steve; Morlock, Glenn P.; Crawford, Jack T.; LoBue, Philip A.
Detalhes: N/A (2008)
DOI: 10.1086/589240

140. **Artigo:** *Evaluation and validation of a real-time polymerase chain reaction assay for rapid identification of Bacillus anthracis [1]*
Autores: Hoffmaster, Alex R.; Meyer, Richard F.; Bowen, Michael P.; Marston, Chung K.; Weyant, Robbin S.; Barnett, Gwen A.; Sejvar, James J.; Jernigan, John A.; Perkins, Bradley A.; Popovic, Tanja

Detalhes: N/A (2002)
DOI: 10.3201/eid0810.020393

141. **Artigo:** *Demonstration of Mycobacterium Tuberculosis in sputum and saliva smears of tuberculosis patients using Ziehl Neelsen and flurochrome staining - A comparative study*
Autores: Holani, Anuja G.; Ganvir, Sindhu M.; Shah, Nishat N.; Bansode, Shriram C.; Shende, Vaishali; Jawade, Rashmi; Bijjargi, Shobha C.
Detalhes: N/A (2014)
DOI: 10.7860/JCDR/2014/9764.4587

142. **Artigo:** *A comparative evaluation of parasitological tests and a PCR for Trypanosoma evansi diagnosis in experimentally infected water buffaloes*
Autores: Holland, W. G.; Claes, F.; My, L. N.; Thanh, N. G.; Tam, P. T.; Verloo, D.; Büscher, P.; Goddeeris, B.; Vercruysse, J.
Detalhes: N/A (2001)
DOI: 10.1016/S0304-4017(01)00381-8

143. **Artigo:** *Rapid detection methods for Bacillus anthracis in environmental samples: A review*
Autores: Irenge, Léonid M.; Gala, Jean Luc
Detalhes: N/A (2012)
DOI: 10.1007/s00253-011-3845-7

144. **Artigo:** *Enzyme-linked immunosorbent assay to detect urinary antibody against recombinant rKRP42 antigen made from Leishmania donovani for the diagnosis of visceral leishmaniasis*
Autores: Islam, Mohammad Zahidul; Itoh, Makoto; Takagi, Hidekazu; Islam, Anwar Ul; Saifuddin Ekram, A. R.M.; Rahman, Ajijur; Takesue, Atsuhide; Hashiguchi, Yoshihisa; Kimura, Eisaku
Detalhes: N/A (2008)
DOI: N/A

145. **Artigo:** *Detection and characterization of Leishmania in tissues of patients with post kala-azar dermal leishmaniasis using a specific monoclonal antibody*
Autores: Ismail, A.; Kharazmi, A.; Permin, H.; El Hassan, A. M.
Detalhes: N/A (1997)
DOI: 10.1016/S0035-9203(97)90075-4

146. **Artigo:** *Differential serodiagnosis for cystic and alveolar echinococcosis using fractions of Echinococcus granulosus cyst fluid (antigen B) and E. multilocularis protoscolex (Em18)*
Autores: Ito, Akira; Ma, Liang; Schantz, Peter M.; Gottstein, Bruno; Liu, Yue Han; Chai, Jun Jie; Abdel-Hafez, Sami K.; Altintas, Nazmiye; Joshi, Durga D.; Lightowlers, Marshall W.; Pawlowski, Zbigniew S.
Detalhes: N/A (1999)
DOI: 10.4269/ajtmh.1999.60.188

147. **Artigo:** *Development of Em18-immunoblot and Em18-ELISA for specific diagnosis of alveolar echinococcosis*
Autores: Ito, Akira; Sako, Yasuhito; Yamasaki, Hiroshi; Mamuti, Wulamu; Nakaya, Kazuhiro; Nakao, Minoru; Ishikawa, Yuji
Detalhes: N/A (2003)
DOI: 10.1016/S0001-706X(02)00221-8

148. **Artigo:** *EM18, a new serodiagnostic marker for differentiation of active and inactive cases of alveolar hydatid disease*
Autores: Ito, A.; Schantz, P. M.; Wilson, J. F.
Detalhes: N/A (1995)
DOI: N/A

149. **Artigo:** *Differential serodiagnosis of alveolar and cystic hydatid disease in the People's Republic of China*
Autores: Ito, A.; Wang, X. G.; Liu, Y. H.
Detalhes: N/A (1993)
DOI: 10.4269/ajtmh.1993.49.208

150. **Artigo:** *Evaluation of an enzyme-linked immunosorbent assay (ELISA) with affinity-purified Em18 and an ELISA with recombinant Em18 for differential diagnosis of alveolar echinococcosis: Results of a blind test*
Autores: Ito, Akira; Xiao, Ning; Liance, Martine; Sato, Marcello O.; Sako, Yasuhito; Mamuti, Wulamu; Ishikawa, Yuji; Nakao, Minoru; Yamasaki, Hiroshi; Nakaya, Kazuhiro; Bardonnet, Karine; Bresson-Hadni, Solange; Vuitton, Dominique A.
Detalhes: N/A (2002)
DOI: 10.1128/JCM.40.11.4161-4165.2002

151. **Artigo:** *Human rabies and bat bites [12]*
Autores: Jackson, Alan C.; Fenton, M. Brock
Detalhes: N/A (2001)
DOI: 10.1016/S0140-6736(00)04852-2

152. **Artigo:** *Quantitative study of the infection in brain neurons in human rabies*
Autores: Jackson, Alan C.; Ye, Hongtao; Ridaura-Sanz, Cecilia; Lopez-Corella, Eduardo
Detalhes: N/A (2001)
DOI: 10.1002/jmv.2080

153. **Artigo:** *Complement C3 is required for the progression of cutaneous lesions and neutrophil attraction in Leishmania major infection*
Autores: Jacobs, Thomas; Andrä, Jörg; Gaworski, Iris; Graefe, Sebastian; Mellenthin, Katja; Krömer, Manfred; Halter, Roman; Borlak, Jürgen; Clos, Joachim
Detalhes: N/A (2005)
DOI: 10.1007/s00430-004-0229-y

154. **Artigo:** *The characterisation of Brucella strains isolated from marine mammals*
Autores: Jahans, K. L.; Foster, G.; Broughton, E. S.
Detalhes: N/A (1997)
DOI: 10.1016/S0378-1135(97)00118-1

155. **Artigo:** *Leishmania donovani is the only cause of visceral leishmaniasis in East Africa; previous descriptions of L. infantum and "L. archibaldi" from this region are a consequence of convergent evolution in the isoenzyme data*
Autores: Jamjoom, M. B.; Ashford, R. W.; Bates, P. A.; Chance, M. L.; Kemp, S. J.; Watts, P. C.; Noyes, H. A.
Detalhes: N/A (2004)
DOI: 10.1017/S0031182004005955

156. **Artigo:** *Revisiting the immune trypanolysis test to optimise epidemiological surveillance and control of sleeping sickness in West Africa*
Autores: Jamonneau, Vincent; Bucheton, Bruno; Kaboré, Jacques; Ilboudo, Hamidou; Camara, Oumou; Courtin, Fabrice; Solano, Philippe; Kaba, Dramane; Kambire, Roger; Lingue, Kouakou; Camara, Mamadou; Baelmans, Rudy; Lejon, Veerle; Buscher, Philippe
Detalhes: N/A (2010)
DOI: 10.1371/journal.pntd.0000917

157. **Artigo:** *Emergence/re-emergence of Echinococcus spp. - A global update*
Autores: Jenkins, D. J.; Romig, T.; Thompson, R. C.A.
Detalhes: N/A (2005)
DOI: 10.1016/j.ijpara.2005.07.014

158. **Artigo:** *Liver alveolar echinococcosis in China: Clinical aspect with relative basic research*
Autores: Jiang, Ci Peng; Don, McManus; Jones, Malcolm
Detalhes: N/A (2005)
DOI: 10.3748/wjg.v11.i30.4611

159. **Artigo:** *Immunodiagnostic differentiation of alveolar and cystic echinococcosis using ELISA test with 18-kDa antigen extracted from Echinococcus protoscoleces*
Autores: Jiang, Li; Wen, Hao; Ito, Akira
Detalhes: N/A (2001)
DOI: 10.1016/S0035-9203(01)90235-4

160. **Artigo:** *Differentiating Taenia eggs found in human stools: Does Ziehl-Neelsen staining help?*
Autores: Jimenez, Juan A.; Rodriguez, Silvia; Moyano, Luz M.; Castillo, Yesenia; García, Héctor H.
Detalhes: N/A (2010)
DOI: 10.1111/j.1365-3156.2010.02579.x

161. **Artigo:** *Rhodococcus gordoniae sp. nov., an actinomycete isolated from clinical material and phenol-contaminated soil*

Autores: Jones, Amanda L.; Brown, June M.; Mishra, Vachaspati; Perry, John D.; Steigerwalt, Arnold G.; Goodfellow, Michael
Detalhes: N/A (2004)
DOI: 10.1099/ijs.0.02756-0

162. **Artigo:** *Clinical management of cystic echinococcosis: State of the art, problems, and perspectives*
Autores: Junghanss, Thomas; Da Silva, Antonio Menezes; Horton, John; Chiodini, Peter L.; Brunetti, Enrico
Detalhes: N/A (2008)
DOI: N/A

163. **Artigo:** *Simultaneous detection and strain differentiation of Mycobacterium tuberculosis for diagnosis and epidemiology*
Autores: Kamerbeek, Judith; Schouls, Leo; Kolk, Arend; Van Agterveld, Miranda; Van Soolingen, Dick; Kuijper, Sjoukje; Bunschoten, Annelies; Molhuizen, Henri; Shaw, Rory; Goyal, Madhu; Van Embden, Jan
Detalhes: N/A (1997)
DOI: N/A

164. **Artigo:** *Ecology of zoonoses: Natural and unnatural histories*
Autores: Karesh, William B.; Dobson, Andy; Lloyd-Smith, James O.; Lubroth, Juan; Dixon, Matthew A.; Bennett, Malcolm; Aldrich, Stephen; Harrington, Todd; Formenty, Pierre; Loh, Elizabeth H.; MacHalaba, Catherine C.; Thomas, Mathew Jason; Heymann, David L.
Detalhes: N/A (2012)
DOI: 10.1016/S0140-6736(12)61678-X

165. **Artigo:** *Interlaboratory comparison of intact-cell matrix-assisted laser desorption ionization-time of flight mass spectrometry results for identification and differentiation of Brucella spp*
Autores: Karger, Axel; Melzer, Falk; Timke, Markus; Bettin, Barbara; Kostrzewa, Markus; Nöckler, Karsten; Hohmann, Angelika; Tomaso, Herbert; Neubauer, Heinrich; Al Dahouk, Sascha
Detalhes: N/A (2013)
DOI: 10.1128/JCM.01720-13

166. **Artigo:** *Prevalence of antibody to Brucella species in butchers, slaughterers and others*
Autores: Karimi, A.; Alborzi, A.; Rasooli, M.; Kadivar, M. R.; Nateghian, A. R.
Detalhes: N/A (2003)
DOI: N/A

167. **Artigo:** *Differentiation of phylogenetically related slowly growing mycobacteria by their gyrB sequences*
Autores: Kasai, Hiroaki; Ezaki, Takayuki; Harayama, Shigeaki
Detalhes: N/A (2000)
DOI: N/A

168. **Artigo:** *ELISA and western blotting for the detection of Hsp70 and Hsp83 antigens of Leishmania donovani*
Autores: Kaur, Jaspreet; Kaur, Sukhbir
Detalhes: N/A (2013)
DOI: 10.1007/s12639-012-0133-0

169. **Artigo:** *Novel identification of differences in the kinetoplast DNA of Leishmania isolates by recombinant DNA techniques and in situ hybridisation*
Autores: Peter, W.; Kennedy, K.
Detalhes: N/A (1984)
DOI: 10.1016/0166-6851(84)90088-4

170. **Artigo:** *Risk factors for alveolar echinococcosis in humans*
Autores: Kern, Petra; Ammon, Andrea; Kron, Martina; Sinn, Gabriele; Sander, Silvia; Petersen, Lyle R.; Gaus, Wilhelm; Kern, Peter
Detalhes: N/A (2004)
DOI: N/A

171. **Artigo:** *Diagnosis of Echinococcus multilocularis infection by reverse-transcription polymerase chain reaction*
Autores: Kern, Peter; Frosch, Petra; Helbig, Matthias; Wechsler, Johannes G.; Usadel, Susanne; Beckh, Karlheinz; Kunz, Reiner; Lucius, Richard; Frosch, Matthias
Detalhes: N/A (1995)
DOI: 10.1016/0016-5085(95)90350-X

172. **Artigo:** *Hydatid disease: Current status and recent advances*
Autores: Khuroo, Mohammad Sultan
Detalhes: N/A (2002)
DOI: 10.5144/0256-4947.2002.56

173. **Artigo:** *Genotypic identification of mycobacteria by nucleic acid sequence determination: Report of a 2-year experience in a clinical laboratory*
Autores: Kirschner, P.; Springer, B.; Vogel, U.; Meier, A.; Wrede, A.; Kiekenbeck, M.; Bange, F. C.; Bottger, E. C.
Detalhes: N/A (1993)
DOI: 10.1128/jcm.31.11.2882-2889.1993

174. **Artigo:** *The analysis of the intramacrophagic virulome of Brucella suis deciphers the environment encountered by the pathogen inside the macrophage host cell*
Autores: Köhler, Stephan; Foulongne, Vincent; Ouahrani-Bettache, Safia; Bourg, Gisèle; Teyssier, Jacques; Ramuz, Michel; Liautard, Jean Pierre
Detalhes: N/A (2002)
DOI: 10.1073/pnas.232454299

175. **Artigo:** *What is the nature of the replicative niche of a stealthy bug named Brucella?*
Autores: Köhler, Stephan; Michaux-Charachon, Sylvie; Porte, Françoise; Ramuz, Michel; Liautard, Jean Pierre
Detalhes: N/A (2003)
DOI: 10.1016/S0966-842X(03)00078-7

176. **Artigo:** *Comparison of the Bactec and lysis concentration methods for recovery of Brucella species from clinical specimens*
Autores: Kolman, S.; Maayan, M. C.; Gotesman, G.; Rozenszajn, L. A.; Wolach, B.; Lang, R.
Detalhes: N/A (1991)
DOI: 10.1007/BF01975817

177. **Artigo:** *Molecular epidemiology of terrestrial rabies in the former Soviet Union*
Autores: Kuzmin, Ivan V.; Botvinkin, Alexandr D.; McElhinney, Lorraine M.; Smith, Jean S.; Orciari, Lillian A.; Hughes, Gareth J.; Fooks, Anthony R.; Rupprecht, Charles E.
Detalhes: N/A (2004)
DOI: 10.7589/0090-3558-40.4.617

178. **Artigo:** *Phylogenetic relationships of Irkut and West Caucasian bat viruses within the Lyssavirus genus and suggested quantitative criteria based on the N gene sequence for lyssavirus genotype definition*
Autores: Kuzmin, Ivan V.; Hughes, Gareth J.; Botvinkin, Alexandr D.; Orciari, Lillian A.; Rupprecht, Charles E.
Detalhes: N/A (2005)
DOI: 10.1016/j.virusres.2005.03.008

179. **Artigo:** *Bat lyssaviruses (Aravan and Khujand) from Central Asia: Phylogenetic relationships according to N, P and G gene sequences*
Autores: Kuzmin, Ivan V.; Orciari, Lillian A.; Arai, Yohko T.; Smith, Jean S.; Hanlon, Cathleen A.; Kameoka, Yosuke; Rupprecht, Charles E.
Detalhes: N/A (2003)
DOI: 10.1016/S0168-1702(03)00217-X

180. **Artigo:** *Sensitivity, specificity, and vaccine efficacy*
Autores: Lachenbruch, Peter A.
Detalhes: N/A (1998)
DOI: 10.1016/S0197-2456(98)00042-7

181. **Artigo:** *Functional characterization of negri bodies (NBs) in rabies virus-infected cells: Evidence that NBs are sites of viral transcription and replication*
Autores: Lahaye, Xavier; Vidy, Aurore; Pomier, Carole; Obiang, Linda; Harper, Francis; Gaudin, Yves; Blondel, Danielle
Detalhes: N/A (2009)
DOI: 10.1128/JVI.00554-09

182. **Artigo:** *Identification of Bacillus anthracis by using matrix-assisted laser desorption ionization-time of flight mass spectrometry and artificial neural networks*
Autores: Lasch, Peter; Beyer, Wolfgang; Nattermann, Herbert; Stämmler, Maren; Siegbrecht, Enrico; Grunow, Roland; Naumann, Dieter
Detalhes: N/A (2009)
DOI: 10.1128/AEM.00857-09

183. **Artigo:** *Evaluation and selection of tandem repeat loci for a Brucella MLVA typing assay*
Autores: Le Flèche, Philippe; Jacques, Isabelle; Grayon, Maggy; Al Dahouk, Sascha; Bouchon, Patrick; Denoeud, France; Nöckler, Karsten; Neubauer, Heinrich; Guilloteau, Laurence A.; Vergnaud, Gilles
Detalhes: N/A (2006)
DOI: 10.1186/1471-2180-6-9

184. **Artigo:** *Evaluation of a direct, rapid immunohistochemical test for rabies diagnosis*
Autores: Lembo, Tiziana; Niezgoda, Michael; Velasco-Villa, Andrés; Cleaveland, Sarah; Ernest, Eblate; Rupprecht, Charles E.
Detalhes: N/A (2006)
DOI: N/A

185. **Artigo:** *Chagas disease: Changes in knowledge and management*
Autores: Lescure, François Xavier; Le Loup, Guillaume; Freilij, Hector; Develoux, Michel; Paris, Luc; Brutus, Laurent; Pialoux, Gilles
Detalhes: N/A (2010)
DOI: 10.1016/S1473-3099(10)70098-0

186. **Artigo:** *Characterization, cloning, and expression of two diagnostic antigens for Taenia solium tapeworm infection.*
Autores: Levine, Min Z.; Calderón, J. C.; Wilkins, Patricia P.; Lane, William S.; Asara, John M.; Hancock, Kathy; Gonzalez, Armando E.; Garcia, Hector H.; Gilman, Robert H.; Tsang, Victor C.W.
Detalhes: N/A (2004)
DOI: 10.1645/GE-189R

187. **Artigo:** *Immunodiagnosis of Echinococcus infections: Confirmatory testing and species differentiation by a new commercial Western Blot*
Autores: Liance, M.; Janin, V.; Bresson-Hadni, S.; Vuitton, D. A.; Houin, R.; Piarroux, R.
Detalhes: N/A (2000)
DOI: N/A

188. **Artigo:** *Commercial nucleic-acid amplification tests for diagnosis of pulmonary tuberculosis in respiratory specimens: Meta-analysils and meta-regression*
Autores: Ling, Daphne I.; Flores, Laura L.; Riley, Lee W.; Pai, Madhukar
Detalhes: N/A (2008)
DOI: 10.1371/journal.pone.0001536

189. **Artigo:** *Genotyping of Bacillus anthracis strains based on automated capillary 25-loci Multiple Locus Variable-Number Tandem Repeats Analysis*
Autores: Lista, Florigio; Faggioni, Giovanni; Valjevac, Samina; Ciammaruconi, Andrea; Vaissaire, Josée; Le Doujet, Claudine; Gorgé, Olivier; De Santis, Riccardo; Carattoli, Alessandra; Ciervo, Alessandra; Fasanella, Antonio; Orsini, Francesco; D'Amelio, Raffaele; Pourcel, Christine; Cassone, Antonio; Vergnaud, Gilles
Detalhes: N/A (2006)
DOI: 10.1186/1471-2180-6-33

190. **Artigo:** *Immunization studies on human volunteers with ether-killer Brucella abortus: preliminary report.*
Autores: LIVE, I.
Detalhes: N/A (1958)
DOI: N/A

191. **Artigo:** *Comparative analysis of the diagnostic performance of six major Echinococcus granulosus antigens assessed in a double-blind, randomized multicenter study*
Autores: Lorenzo, Carmen; Ferreira, Henrique B.; Monteiro, Karina M.; Rosenzvit, Mara; Kamenetzky, Laura; García, Hector H.; Vasquez, Yessika; Naquira, Cesar; Sánchez, Elizabeth; Lorca, Myriam; Contreras, María; Last, Jerry A.; González-Sapienza, Gualberto G.
Detalhes: N/A (2005)
DOI: 10.1128/JCM.43.6.2764-2770.2005

192. **Artigo:** *Buffered plate antigen test as a screening test for diagnosis of human brucellosis*
Autores: Lucero, N. E.; Bolpe, J. E.
Detalhes: N/A (1998)
DOI: N/A

193. **Artigo:** *LTBI: Latent tuberculosis infection or lasting immune responses to M. tuberculosis? A TBNET consensus statement*
Autores: Mack, U.; Migliori, G. B.; Sester, M.; Rieder, H. L.; Ehlers, S.; Goletti, D.; Bossink, A.; Magdorf, K.; Holscher, C.; Kampmann, B.; Arend, S. M.; Detjen, A.; Bothamley, G.; Zellweger, J. P.; Milburn, H.; Diel, R.; Ravn, P.; Cobelens, F.; Cardona, P. J.; Kan, B.; Solovic, I.; Duarte, R.; Cirillo, D. M.; Lange, C.
Detalhes: N/A (2009)
DOI: 10.1183/09031936.00120908

194. **Artigo:** *A specific diagnostic antigen of Echinococcus granulosus with an apparent molecular weight of 8 kDa*
Autores: Maddison, S. E.; Slemenda, S. B.; Schantz, P. M.; Fried, J. A.; Wilson, M.; Tsang, V. C.W.
Detalhes: N/A (1989)
DOI: 10.4269/ajtmh.1989.40.377

195. **Artigo:** *Cutaneous leishmaniasis in the returning traveler*
Autores: Magill, Alan J.
Detalhes: N/A (2005)
DOI: 10.1016/j.idc.2004.11.005

196. **Artigo:** *Sudanese mucosal leishmaniasis: Isolation of a parasite within the Leishmania donovani complex that differs genotypically from L. donovani causing classical visceral leishmaniasis*
Autores: Mahdi, Muzamil; Elamin, Elwaleed M.; Melville, Sara E.; Musa, Ahmed M.; Blackwell, Jenefer M.; Mukhtar, Moawia M.; Elhassan, Ahmed M.; Ibrahim, Muntaser E.
Detalhes: N/A (2005)
DOI: 10.1016/j.meegid.2004.05.008

197. **Artigo:** *Laboratory diagnosis of human rabies: Recent advances*
Autores: Mani, Reeta Subramaniam; Madhusudana, Shampur Narayan
Detalhes: N/A (2013)
DOI: 10.1155/2013/569712

198. **Artigo:** *Molecular approaches to identify and differentiate Bacillus anthracis from phenotypically similar Bacillus species isolates*
Autores: Marston, Chung K.; Gee, Jay E.; Popovic, Tanja; Hoffmaster, Alex R.
Detalhes: N/A (2006)
DOI: 10.1186/1471-2180-6-22

199. **Artigo:** *Towards point-of-care diagnostic and staging tools for human African trypanosomiaisis*
Autores: Matovu, Enock; Kazibwe, Anne Juliet; Mugasa, Claire Mac K.; Ndungu, Joseph Mathu; Njiru, Zablon Kithingi
Detalhes: N/A (2012)
DOI: 10.1155/2012/340538

200. **Artigo:** *Nested PCR for specific diagnosis of Taenia solium taeniasis*
Autores: Mayta, Holger; Gilman, Robert H.; Prendergast, Emily; Castillo, Janeth P.; Tinoco, Yeny O.; Garcia, Hector H.; Gonzalez, Armando E.; Sterling, Charles R.
Detalhes: N/A (2008)
DOI: 10.1128/JCM.01172-07

201. **Artigo:** *Nested PCR for specific diagnosis of Taenia solium taeniasis*
Autores: Mayta, Holger; Gilman, Robert H.; Prendergast, Emily; Castillo, Janeth P.; Tinoco, Yeny O.; Garcia, Hector H.; Gonzalez, Armando E.; Sterling, Charles R.
Detalhes: N/A (2008)
DOI: 10.1128/JCM.01172-07

202. **Artigo:** *Echinococcosis*
Autores: McManus, Donald P.; Zhang, Wenbao; Li, Jun; Bartley, Paul B.

Detalhes: N/A (2003)
DOI: 10.1016/S0140-6736(03)14573-4

203. **Artigo:** *The so-called African mycobacteria strains from the tropical West Africa*
Autores: Meissner, G.; Schröder, K.
Detalhes: N/A (1969)
DOI: N/A

204. **Artigo:** *Persistence of Leishmania parasites in scars after clinical cure of american cutaneous leishmaniasis: Is there a sterile cure?*
Autores: Mendonça, Mitzi G.; De Brito, Aria E.F.; Rodrigues, Eduardo H.G.; Bandeira, Valdir; Jardim, Márcio L.; Abath, Frederico G.C.
Detalhes: N/A (2004)
DOI: 10.1086/382135

205. **Artigo:** *Interpretation of repeated tuberculin tests: Boosting, conversion, and reversion*
Autores: Menzies, Dick
Detalhes: N/A (1999)
DOI: 10.1164/ajrccm.159.1.9801120

206. **Artigo:** *A comparison of the morphologic, cultural and biochemical characteristics of b. abortus and b. melitensis*
Autores: Meyer, K. F.; Shaw, E. B.
Detalhes: N/A (1920)
DOI: 10.1093/infdis/27.3.173

207. **Artigo:** *Comparison of cytologic giemsa and real-time polymerase chain reaction technique for the diagnosis of cutaneous leishmaniasis on scraping smears*
Autores: Meymandi, Simin Shamsi; Bahmanyar, Mohammad; Dabiri, Shahriar; Aflatonian, Mohammad Reza; Bahmanyar, Shahram; Meymandi, Manzumeh Shamsi
Detalhes: N/A (2010)
DOI: 10.1159/000325174

208. **Artigo:** *Identification of species of Brucella using Fourier transform infrared spectroscopy*
Autores: Miguel Gómez, M. A.; Bratos Pérez, M. A.; Martín Gil, F. J.; Dueñas Díez, A.; Martín Rodríguez, J. F.; Gutiérrez Rodríguez, P.; Orduña Domingo, A.; Rodríguez Torres, A.
Detalhes: N/A (2003)
DOI: 10.1016/S0167-7012(03)00120-9

209. **Artigo:** *Human African Trypanosomiasis Diagnosis in First-Line Health Services of Endemic Countries, a Systematic Review*
Autores: Mitashi, Patrick; Hasker, Epco; Lejon, Veerle; Kande, Victor; Muyembe, Jean Jacques; Lutumba, Pascal; Boelaert, Marleen
Detalhes: N/A (2012)
DOI: 10.1371/journal.pntd.0001919

210. **Artigo:** *Current diagnosis and treatment of visceral leishmaniasis*
Autores: Mondal, Smriti; Bhattacharya, Pradyot; Ali, Nahid
Detalhes: N/A (2010)
DOI: 10.1586/eri.10.78

211. **Artigo:** *Three new sensitive and specific heat-shock protein 70 PCRs for global Leishmania species identification*
Autores: Montalvo, A. M.; Fraga, J.; Maes, I.; Dujardin, J. C.; Van Der Auwera, G.
Detalhes: N/A (2012)
DOI: 10.1007/s10096-011-1463-z

212. **Artigo:** *Rabies-specific antibodies: Measuring surrogates of protection against a fatal disease*
Autores: Moore, Susan M.; Hanlon, Cathleen A.
Detalhes: N/A (2010)
DOI: 10.1371/journal.pntd.0000595

213. **Artigo:** *Brucella abortus 16S rRNA and lipid A reveal a phylogenetic relationship with members of the alpha-2 subdivision of the class Proteobacteria*
Autores: Moreno, E.; Stackebrandt, E.; Dorsch, M.; Wolters, J.; Busch, M.; Mayer, H.
Detalhes: N/A (1990)
DOI: 10.1128/jb.172.7.3569-3576.1990

214. **Artigo:** *Echinococcosis: a review*
Autores: Moro, Pedro; Schantz, Peter M.
Detalhes: N/A (2009)
DOI: 10.1016/j.ijid.2008.03.037

215. **Artigo:** *Screening for cystic echinococcosis in an endemic region of Peru using portable ultrasonography and the enzyme-linked immunoelectrotransfer blot (EITB) assay*
Autores: Moro, Pedro L.; Garcia, Hector H.; Gonzales, Armando E.; Bonilla, Juan J.; Verastegui, Manuela; GilmanMD, Robert H.
Detalhes: N/A (2005)
DOI: 10.1007/s00436-005-1350-6

216. **Artigo:** *Comparative study of smear microscopy, rapid slide culture, and lowenstein - jensen culture in cases of pulmonary tuberculosis in a tertiary care hospital*
Autores: Kumar, Muddaiah Ravish; Malini, James Pratibha; Kumar, Kadahalli Lingegowda Ravi
Detalhes: N/A (2013)
DOI: N/A

217. **Artigo:** *Zoonotic mycobacterium bovis-induced tuberculosis in humans*
Autores: Müller, Borna; Dürr, Salome; Alonso, Silvia; Hattendorf, Jan; Laisse, Cláudio J.M.; Parsons, Sven D.C.; van Helden, Paul D.; Zinsstag, Jakob

Detalhes: N/A (2013)
DOI: 10.3201/eid1906.120543

218. **Artigo:** *Performance of Parasitological and Molecular Techniques for the Diagnosis and Surveillance of Gambiense Sleeping Sickness*
Autores: Mumba Ngoyi, Dieudonné; Ali Ekangu, Rosine; Mumvemba Kodi, Marie France; Pyana, Patient Pati; Balharbi, Fatima; Decq, Mélanie; Kande Betu, Victor; Van der Veken, Wim; Sese, Claude; Menten, Joris; Büscher, Philippe; Lejon, Veerle
Detalhes: N/A (2014)
DOI: 10.1371/journal.pntd.0002954

219. **Artigo:** *Stage determination in sleeping sickness: Comparison of two cell counting and two parasite detection techniques*
Autores: Mumba Ngoyi, Dieudonné; Menten, Joris; Pyana, Pati Patient; Büscher, Philippe; Lejon, Veerle
Detalhes: N/A (2013)
DOI: 10.1111/tmi.12102

220. **Artigo:** *Polymerase chain reaction protocols for rabies virus discrimination*
Autores: Nadin-Davis, Susan A.
Detalhes: N/A (1998)
DOI: 10.1016/S0166-0934(98)00106-2

221. **Artigo:** *A molecular epidemiological study of rabies virus in central Ontario and western Quebec*
Autores: Nadin-Davis, S. A.; Allen Casey, G.; Wandeler, A. I.
Detalhes: N/A (1994)
DOI: 10.1099/0022-1317-75-10-2575

222. **Artigo:** *A molecular epidemiological analysis of the incursion of the raccoon strain of rabies virus into Canada*
Autores: Nadin-Davis, S. A.; Muldoon, F.; Wandeler, A. I.
Detalhes: N/A (2006)
DOI: 10.1017/S0950268805005108

223. **Artigo:** *A rare case of seronegative culture-proven infection with brucella suis*
Autores: Naha, Kushal; Dasari, Sowjanya; Pandit, Vinay; Seshadri, Shubha
Detalhes: N/A (2012)
DOI: org/10.4066/AMJ.2012.1177

224. **Artigo:** *Diagnosis of human brucellosis using PCR*
Autores: Navarro, Elena; Casao, María Angeles; Solera, Javier
Detalhes: N/A (2004)
DOI: 10.1586/14737159.4.1.115

225. **Artigo:** *Identification of novel diagnostic serum biomarkers for chagas' disease in asymptomatic subjects by mass spectrometric profiling*
Autores: Ndao, Momar; Spithill, Terry W.; Caffrey, Rebecca; Li, Hongshan; Podust, Vladimir N.; Perichon, Regis; Santamaria, Cynthia; Ache, Alberto; Duncan, Mark; Powell, Malcolm R.; Ward, Brian J.
Detalhes: N/A (2010)
DOI: 10.1128/JCM.02207-09

226. **Artigo:** *Differentiation of clinical Mycobacterium tuberculosis complex isolates by gyrB DNA sequence polymorphism analysis*
Autores: Niemann, S.; Harmsen, D.; Rusch-Gerdes, S.; Richter, E.
Detalhes: N/A (2000)
DOI: 10.1128/jcm.38.9.3231-3234.2000

227. **Artigo:** *African trypanosomiasis: Sensitive and rapid detection of the sub-genus Trypanozoon by loop-mediated isothermal amplification (LAMP) of parasite DNA*
Autores: Njiru, Z. K.; Mikosza, A. S.J.; Matovu, E.; Enyaru, J. C.K.; Ouma, J. O.; Kibona, S. N.; Thompson, R. C.A.; Ndung'u, J. M.
Detalhes: N/A (2008)
DOI: 10.1016/j.ijpara.2007.09.006

228. **Artigo:** *Chagas disease: An overview of clinical and epidemiological aspects*
Autores: Nunes, Maria Carmo Pereira; Dones, Wistremundo; Morillo, Carlos A.; Encina, Juan Justiniano; Ribeiro, Antônio Luiz
Detalhes: N/A (2013)
DOI: 10.1016/j.jacc.2013.05.046

229. **Artigo:** *Polymerase chain reaction (PCR) is highly sensitive for diagnosis of mucosal leishmaniasis*
Autores: Oliveira, Jene Greyce S.; Novais, Fernanda O.; De Oliveira, Camila I.; Da Cruz, Antonio C.; Campos, Léon Fábio; Da Rocha, Any V.; Boaventura, Viviane; Noronha, Almério; Costa, Jackson M.L.; Barral, Aldina
Detalhes: N/A (2005)
DOI: 10.1016/j.actatropica.2004.12.003

230. **Artigo:** *The pathogenesis of Leishmania/HIV co-infection: Cellular and immunological mechanisms*
Autores: Olivier, M.; Badaró, R.; Medrano, F. J.; Moreno, J.
Detalhes: N/A (2003)
DOI: N/A

231. **Artigo:** *Native and recombinant antigens in the immunodiagnosis of human cystic echinococcosis*
Autores: Ortona, Elena; Riganò, Rachele; Margutti, Paola; Notargiacomo, Sergio; Ioppolo, Salvatore; Vaccari, Sergio; Barca, Stefano; Buttari, Brigitta; Profumo, Elisabetta; Teggi,

Antonella; Siracusano, Alessandra
Detalhes: N/A (2000)
DOI: 10.1046/j.1365-3024.2000.00336.x

232. **Artigo:** *Added value of whole-genome sequencing for management of highly drug-resistant TB*
Autores: Outhred, Alexander C.; Jelfs, Peter; Suliman, Basel; Hill-Cawthorne, Grant A.; Crawford, Archibald B.H.; Marais, Ben J.; Sintchenko, Vitali
Detalhes: N/A (2015)
DOI: 10.1093/jac/dku508

233. **Artigo:** *Systematic review: T-cell-based assays for the diagnosis of latent tuberculosis infection: An update*
Autores: Pai, Madhukar; Zwerling, Alice; Menzies, Dick
Detalhes: N/A (2008)
DOI: 10.7326/0003-4819-149-3-200808050-00241

234. **Artigo:** *Single step polymerase chain reaction (PCR) for the diagnosis of the leishmania (Viannia) subgenus*
Autores: Paiva, Byanca Regina; Passos, Luciana Neves; Falqueto, Aloisio; Malafronte, Rosely Dos S.; De Andrade, Heitor Franco
Detalhes: N/A (2004)
DOI: 10.1590/S0036-46652004000600007

235. **Artigo:** *Diagnosis of visceral leishmaniasis by polymerase chain reaction of DNA extracted from Giemsa's solution-stained slides*
Autores: Pandey, Kishor; Pandey, Basu Dev; Mallik, Arun Kumar; Kaneko, Osamu; Uemura, Haruki; Kanbara, Hiroji; Yanagi, Tetsuo; Hirayama, Kenji
Detalhes: N/A (2010)
DOI: 10.1007/s00436-010-1920-0

236. **Artigo:** *A novel and accurate diagnostic test for human African trypanosomiasis*
Autores: Papadopoulos, Marios C.; Abel, Paulo M.; Agranoff, Dan; Stich, August; Tarelli, Edward; Bell, B. Anthony; Planche, Timothy; Loosemore, Alison; Saadoun, Samira; Wilkins, Peter; Krishna, Sanjeev
Detalhes: N/A (2004)
DOI: 10.1016/S0140-6736(04)16046-7

237. **Artigo:** *The new global map of human brucellosis*
Autores: Pappas, Georgios; Papadimitriou, Photini; Akritidis, Nikolaos; Christou, Leonidas; Tsianos, Epameinondas V.
Detalhes: N/A (2006)
DOI: 10.1016/S1473-3099(06)70382-6

238. **Artigo:** *Effect of storage of sputum specimens at room temperature on smear and culture results*
Autores: Paramasivan, C. N.; Narayana, A. S.L.; Prabhakar, R.; Rajagopal, M. S.;

Somasundaram, P. R.; Tripathy, S. P.
Detalhes: N/A (1983)
DOI: 10.1016/0041-3879(83)90036-3

239. **Artigo:** *Use of a fluorescent stain for evaluating in vitro infection with Leishmania panamensis*
Autores: Pérez-Cordero, José Julián; Sánchez-Suárez, Jeysson; Delgado, Gabriela
Detalhes: N/A (2011)
DOI: 10.1016/j.exppara.2011.05.022

240. **Artigo:** *The pathology of rabies in the central nervous system*
Autores: Perl, Daniel P.; Good, Paul F.
Detalhes: N/A (2017)
DOI: 10.1201/9780203736371

241. **Artigo:** *Laboratory medicine in Africa: A barrier to effective health care*
Autores: Petti, Cathy A.; Polage, Christopher R.; Quinn, Thomas C.; Ronald, Allan R.; Sande, Merle A.
Detalhes: N/A (2006)
DOI: 10.1086/499363

242. **Artigo:** *Differentiation between spores of Bacillus anthracis and Bacillus cereus by a quantitative immunofluorescence technique*
Autores: Phillips, A. P.; Martin, K. L.; Broster, M. G.
Detalhes: N/A (1983)
DOI: N/A

243. **Artigo:** *Role of PCR in diagnosis and prognosis of visceral leishmaniasis in patients coinfected with human immunodeficiency virus type 1*
Autores: Pizzuto, M.; Piazza, M.; Senese, D.; Scalamogna, C.; Calattini, S.; Corsico, L.; Persico, T.; Adriani, B.; Magni, C.; Guaraldi, G.; Gaiera, G.; Ludovisi, A.; Gramiccia, M.; Galli, M.; Moroni, M.; Corbellino, M.; Antinori, S.
Detalhes: N/A (2001)
DOI: 10.1128/JCM.39.1.357-361.2001

244. **Artigo:** *Differential immunodiagnosis between cystic hydatid disease and other cross-reactive pathologies*
Autores: Poretti, Daniele; Felleisen, Erika; Grimm, Felix; Pfister, Marc; Teuscher, Françoise; Zuercher, Christian; Reichen, Jürg; Gottstein, Bruno
Detalhes: N/A (1999)
DOI: 10.4269/ajtmh.1999.60.193

245. **Artigo:** *Target product profile (TPP) for chagas disease point-of-care diagnosis and assessment of response to treatment*
Autores: Porrás, Analía I.; Yadon, Zaida E.; Altcheh, Jaime; Britto, Constança; Chaves, Gabriela C.; Flevaud, Laurence; Martins-Filho, Olindo Assis; Ribeiro, Isabela; Schijman, Alejandro G.;

Shikanai-Yasuda, Maria Aparecida; Sosa-Estani, Sergio; Stobbaerts, Eric; Zicker, Fabio
Detalhes: N/A (2015)
DOI: 10.1371/journal.pntd.0003697

246. **Artigo:** *Bayesian modelling to estimate the test characteristics of coprology, coproantigen ELISA and a novel real-time PCR for the diagnosis of taeniasis*
Autores: Praet, Nicolas; Verweij, Jaco J.; Mwape, Kabemba E.; Phiri, Isaac K.; Muma, John B.; Zulu, Gideon; van Lieshout, Lisette; Rodriguez-Hidalgo, Richar; Benitez-Ortiz, Washington; Dorny, Pierre; Gabriël, Sarah
Detalhes: N/A (2013)
DOI: 10.1111/tmi.12089

247. **Artigo:** *Real-Time Multiplex PCR Assay for Detection of Brucella spp., B. abortus, and B. melitensis*
Autores: Probert, William S.; Schrader, Kimmi N.; Khuong, Nhi Y.; Bystrom, Susan L.; Graves, Margot H.
Detalhes: N/A (2004)
DOI: 10.1128/JCM.42.3.1290-1293.2004

248. **Artigo:** *Utilization of the rpoB Gene as a Specific Chromosomal Marker for Real-Time PCR Detection of Bacillus anthracis*
Autores: Qi, Yuan; Patra, Guy; Liang, Xudong; Williams, Leanne E.; Rose, Sharon; Redkar, Rajendra J.; DelVecchio, Vito G.
Detalhes: N/A (2001)
DOI: 10.1128/AEM.67.8.3720-3727.2001

249. **Artigo:** *Comparison between LightCycler real-time Polymerase Chain Reaction (PCR) assay with serum and PCR-enzyme-linked immunosorbent assay with whole blood samples for the diagnosis of human brucellosis*
Autores: Queipo-Ortuño, María Isabel; Colmenero, Juan D.; Baeza, Guillermo; Morata, Pilar
Detalhes: N/A (2005)
DOI: 10.1086/426818

250. **Artigo:** *Epidemiology, clinical manifestations and diagnosis of zoonotic cestode infections: An update*
Autores: Raether, W.; Hänel, H.
Detalhes: N/A (2003)
DOI: 10.1007/s00436-003-0903-9

251. **Artigo:** *Optimisation of an ELISA for the serodiagnosis of visceral leishmaniasis using in vitro derived promastigote antigens*
Autores: Rajasekariah, G. Halli R.; Ryan, Jeffrey R.; Hillier, Scott R.; Yi, Lisa P.; Stiteler, John M.; Cui, Liwang; Smithyman, Anthony M.; Martin, Samuel K.
Detalhes: N/A (2001)
DOI: 10.1016/S0022-1759(01)00341-6

252. **Artigo:** *Molecular typing of Mycobacterium bovis isolates: A review*
Autores: Ramos, Daniela Fernandes; Tavares, Lucas; da Silva, Pedro Eduardo Almeida; Dellagostin, Odir Antônio
Detalhes: N/A (2014)
DOI: 10.1590/S1517-83822014005000045

253. **Artigo:** *Detection technologies for Bacillus anthracis: Prospects and challenges*
Autores: Rao, Shilpakala Sainath; Mohan, Ketha V.K.; Atreya, Chintamani D.
Detalhes: N/A (2010)
DOI: 10.1016/j.mimet.2010.04.005

254. **Artigo:** *Chagas disease*
Autores: Rassi, Anis; Rassi, Anis; Marin-Neto, José Antonio
Detalhes: N/A (2010)
DOI: 10.1016/S0140-6736(10)60061-X

255. **Artigo:** *Spontaneous death of Echinococcus multilocularis: Cases diagnosed serologically (by Em2 ELISA) and clinical significance*
Autores: Rausch, R. L.; Wilson, J. F.; Schantz, P. M.; McMahon, B. J.
Detalhes: N/A (1987)
DOI: 10.4269/ajtmh.1987.36.576

256. **Artigo:** *Real-time detection of Brucella abortus, Brucella melitensis and Brucella suis*
Autores: Redkar, R.; Rose, S.; Bricker, B.; DelVecchio, V.
Detalhes: N/A (2001)
DOI: 10.1006/mcpr.2000.0338

257. **Artigo:** *Sequence analysis of the 3-untranslated region of HSP70 (type I) genes in the genus Leishmania: Its usefulness as a molecular marker for species identification*
Autores: Requena, Jose M.; Chicharro, Carmen; García, Lineth; Parrado, Rudy; Puerta, Concepción J.; Cãavate, Carmen
Detalhes: N/A (2012)
DOI: 10.1186/1756-3305-5-87

258. **Artigo:** *Diagnosis of parasitic infections: What's going on?*
Autores: Ricciardi, Alessandra; Ndao, Momar
Detalhes: N/A (2015)
DOI: 10.1177/1087057114548065

259. **Artigo:** *The testing of proven Trypanosoma brucei and T. rhodesiense strains by the blood incubation infectivity test.*
Autores: Rickman, L. R.; Robson, J.
Detalhes: N/A (1970)
DOI: N/A

260. **Artigo:** *Evaluation of a urinary antigen-based latex agglutination test in the diagnosis of kala-azar in eastern Nepal*
Autores: Rijal, S.; Boelaert, M.; Regmi, S.; Karki, B. M.S.; Jacquet, D.; Singh, R.; Chance, M. L.; Chappuis, F.; Hommel, M.; Desjeux, P.; Van Der Stuyft, P.; Le Ray, D.; Koirala, S.
Detalhes: N/A (2004)
DOI: 10.1111/j.1365-3156.2004.01251.x

261. **Artigo:** *Diagnosis of cutaneous Leishmaniasis and species discrimination of parasites by PCR and hybridization*
Autores: Rodriguez, N.; Guzman, B.; Rodas, A.; Takiff, H.; Bloom, B. R.; Convit, J.
Detalhes: N/A (1994)
DOI: N/A

262. **Artigo:** *Evaluation and improvement of two PCR targets in molecular typing of clinical samples of Leishmania patients*
Autores: Roelfsema, Jeroen H.; Nozari, Nahid; Herremans, Tineke; Kortbeek, Laetitia M.; Pinelli, Elena
Detalhes: N/A (2011)
DOI: 10.1016/j.exppara.2010.06.024

263. **Artigo:** *Estimating prevalence from the results of a screening test*
Autores: Rogan, Walter J.; Gladen, Beth
Detalhes: N/A (1978)
DOI: 10.1093/oxfordjournals.aje.a112510

264. **Artigo:** *Sensitivity of the polymerase chain reaction for the diagnosis of cutaneous leishmaniasis due to Leishmania (Viannia) guyanensis*
Autores: Romero, Gustavo A.S.; Guerra, Marcus V.F.; Paes, Marcilene G.; Cupolillo, Elisa; Bentin Toaldo, Cristiane; Macêdo, Vanize O.; Fernandes, Octavio
Detalhes: N/A (2001)
DOI: 10.1016/S0001-706X(01)00140-1

265. **Artigo:** *The present situation of echinococcosis in Europe*
Autores: Romig, Thomas; Dinkel, Anke; Mackenstedt, Ute
Detalhes: N/A (2006)
DOI: 10.1016/j.parint.2005.11.028

266. **Artigo:** *A need for standardized rabies-virus diagnostic procedures: Effect of cover-glass mountant on the reliability of antigen detection by the fluorescent antibody test*
Autores: Rudd, Robert J.; Smith, Jean S.; Yager, Pamela A.; Orciari, Lillian A.; Trimarchi, Charles V.
Detalhes: N/A (2005)
DOI: 10.1016/j.virusres.2005.03.014

267. **Artigo:** *Diagnosis of brucellosis by using blood cultures*
Autores: Ruiz, J.; Lorente, I.; Perez, J.; Simarro, E.; Martinez-Campos, L.
Detalhes: N/A (1997)
DOI: 10.1128/jcm.35.9.2417-2418.1997

268. **Artigo:** *Rabies re-examined*
Autores: Rupprecht, Charles E.; Hanlon, Cathleen A.; Hemachudha, Thiravat
Detalhes: N/A (2002)
DOI: 10.1016/S1473-3099(02)00287-6

269. **Artigo:** *Modern laboratory diagnostics for mycobacteria*
Autores: Rüsch-Cerdes, Sabine; Hillemann, D.
Detalhes: N/A (2008)
DOI: 10.1055/s-2008-1038242

270. **Artigo:** *Leishmania promastigote membrane antigen-based enzyme-linked immunosorbent assay and immunoblotting for differential diagnosis of Indian post-kala-azar dermal leishmaniasis*
Autores: Saha, Samiran; Mazumdar, Tuhina; Anam, Khairul; Ravindran, Rajesh; Bairagi, Bibhas; Saha, Bibhuti; Goswami, Ramapada; Pramanik, Netai; Guha, Subhashis K.; Kar, Sourjya; Banerjee, Dwijadas; Ali, Nahid
Detalhes: N/A (2005)
DOI: 10.1128/JCM.43.3.1269-1277.2005

271. **Artigo:** *Development of a species-specific PCR assay for detection of Leishmania donovani in clinical samples from patients with kala-azar and post-kala-azar dermal leishmaniasis*
Autores: Salotra, P.; Sreenivas, G.; Pogue, G. P.; Lee, N.; Nakhasi, H. L.; Ramesh, V.; Negi, N. S.
Detalhes: N/A (2001)
DOI: 10.1128/JCM.39.3.849-854.2001

272. **Artigo:** *Validation of the use of middlebrook 7H10 agar, BACTEC MGIT 960, and BACTEC 460 12B media for testing the susceptibility of Mycobacterium tuberculosis to levofloxacin*
Autores: Sanders, Cynthia A.; Nieda, Rachel R.; Desmond, Edward P.
Detalhes: N/A (2004)
DOI: 10.1128/JCM.42.11.5225-5228.2004

273. **Artigo:** *Serum biomarkers predictive of cure in Chagas disease patients after nifurtimox treatment*
Autores: Santamaria, Cynthia; Chatelain, Eric; Jackson, Yves; Miao, Qianqian; Ward, Brian J.; Chappuis, François; Ndao, Momar
Detalhes: N/A (2014)
DOI: 10.1186/1471-2334-14-302

274. **Artigo:** *Antibodies against Echinococcus multilocularis alkaline phosphatase as markers for the specific diagnosis and the serological monitoring of Alveolar echinococcosis*

Autores: Sarciron, Elisabeth M.; Bresson-Hadni, Solange; Mercier, Mariette; Lawton, Philippe; Duranton, Christelle; Lenys, Daniele; Petavy, Anne F.; Vuitton, Dominique A.
Detalhes: N/A (1997)
DOI: 10.1046/j.1365-3024.1997.d01-183.x

275. **Artigo:** *Comparison of kinyoun, auramine o, and ziehl-neelsen staining for diagnosing tuberculosis at the national tuberculosis center in burkina faso*
Autores: Sawadogo, T. L.; Savadogo, L. G.B.; Diande, S.; Ouedraogo, F.; Mourfou, A.; Gueye, A.; Sawadogo, I.; Nebié, B.; Sangare, L.; Ouattara, A. S.
Detalhes: N/A (2012)
DOI: 10.1684/mst.2012.0082

276. **Artigo:** *Brucella microti sp. nov., isolated from the common vole Microtus arvalis*
Autores: Scholz, Holger C.; Hubalek, Zdenek; Sedláček, Ivo; Vergnaud, Gilles; Tomaso, Herbert; Al Dahouk, Sascha; Melzer, Falk; Kämpfer, Peter; Heubauer, Heinrich; Cloeckaert, Axel; Maquart, Marianne; Zygmunt, Michel S.; Whatmore, Adrian M.; Falsen, Enevold; Bahn, Peter; Göllner, Cornelia; Pfeffer, Martin; Huber, Birgit; Busse, Hans Jürgen; Nöckler, Karsten
Detalhes: N/A (2008)
DOI: 10.1099/ijs.0.65356-0

277. **Artigo:** *Molecular approaches for a better understanding of the epidemiology and population genetics of Leishmania*
Autores: Schnian, G.; Kuhls, K.; Mauricio, I. L.
Detalhes: N/A (2011)
DOI: 10.1017/S0031182010001538

278. **Artigo:** *Is it time to revise the nomenclature of Leishmania?*
Autores: Schönian, Gabriele; Mauricio, Isabel; Cupolillo, Elisa
Detalhes: N/A (2010)
DOI: 10.1016/j.pt.2010.06.013

279. **Artigo:** *Detection and identification of Leishmania parasites by in situ hybridization with total and recombinant DNA probes*
Autores: Schoone, G. J.; van Eys, G. J.J.M.; Llgthart, G. S.; Taub, F. E.; Zaal, J.; Mebrahtu, Y.; Laywer, P.
Detalhes: N/A (1991)
DOI: 10.1016/0014-4894(91)90106-7

280. **Artigo:** *A bacteriolytic agent that detects and kills Bacillus anthracis*
Autores: Schuch, Raymond; Nelson, Daniel; Fischetti, Vincent A.
Detalhes: N/A (2002)
DOI: 10.1038/nature01026

281. **Artigo:** *Multicenter feasibility study to assess external quality assessment panels for Xpert MTB/RIF assay in South Africa*

Autores: Scott, Lesley; Albert, Heidi; Gilpin, Chris; Alexander, Heather; DeGruy, Kyle; Stevens, Wendy
Detalhes: N/A (2014)
DOI: 10.1128/JCM.03533-13

282. **Artigo:** *Interferon-γ release assays for the diagnosis of active tuberculosis: A systematic review and meta-analysis*
Autores: Sester, M.; Sotgiu, G.; Lange, C.; Giehl, C.; Girardi, E.; Migliori, G. B.; Bossink, A.; Dheda, K.; Diel, R.; Dominguez, J.; Lipman, M.; Nemeth, J.; Ravn, P.; Winkler, S.; Huitric, E.; Sandgren, A.; Manissero, D.
Detalhes: N/A (2011)
DOI: 10.1183/09031936.00114810

283. **Artigo:** *Specific and cross-reactive antigens of Echinococcus granulosus hydatid cyst fluid*
Autores: Shepherd, James C.; McManus, Donald P.
Detalhes: N/A (1987)
DOI: 10.1016/0166-6851(87)90003-X

284. **Artigo:** *Review: Molecular tools for the diagnosis of cystic and alveolar echinococcosis*
Autores: Siles-Lucas, M. M.; Gottstein, B. B.
Detalhes: N/A (2001)
DOI: 10.1046/j.1365-3156.2001.00732.x

285. **Artigo:** *Clinical and immunopathological spectrum of american cutaneous leishmaniasis with special reference to the disease in Amazonian Brazil - A review*
Autores: Silveira, Fernando T.; Lainson, Ralph; Corbett, Carlos E.P.
Detalhes: N/A (2004)
DOI: 10.1590/S0074-02762004000300001

286. **Artigo:** *Detection of antibodies against echinococcus granulosus major antigens and their subunits by immunoblotting*
Autores: Siracusano, A.; Ioppolo, S.; Notargiacomo, S.; Ortona, E.; Riganó, R.; Teggi, A.; De Rosa, F.; Vicari, G.
Detalhes: N/A (1991)
DOI: 10.1016/0035-9203(91)90039-2

287. **Artigo:** *Molecular epidemiology of rabies in the united states*
Autores: Smith, Jean S.; Orciari, Lillian A.; Yager, Pamela A.
Detalhes: N/A (1995)
DOI: 10.1016/S1044-5773(05)80016-2

288. **Artigo:** *A rapid reproducible test for determining rabies neutralizing antibody*
Autores: Smith, J. S.; Yager, P. A.; Baer, G. M.
Detalhes: N/A (1973)
DOI: N/A

289. **Artigo:** *Development and evaluation of a rapid dipstick assay for serodiagnosis of acute human brucellosis*
Autores: Smits, Henk L.; Basahi, M. A.; Díaz, Ramon; Marrodan, T.; Douglas, James T.; Rocha, Alice; Veerman, Jaques; Zheludkov, M. M.; Witte, Olav W.M.; De Jong, Joop; Gussenhoven, George C.; Goris, Marga G.A.; Van Der Hoorn, Menno A.W.G.
Detalhes: N/A (1999)
DOI: N/A

290. **Artigo:** *Hydrocephalus secondary to cysticercotic arachnoiditis. A long-term follow-up review of 92 cases*
Autores: Sotelo, J.; Marin, C.
Detalhes: N/A (1987)
DOI: 10.3171/jns.1987.66.5.0686

291. **Artigo:** *Two-laboratory collaborative study on identification of mycobacteria: Molecular versus phenotypic methods*
Autores: Springer, Burkhard; Stockman, Leslie; Teschner, Kerstin; Roberts, Glenn D.; Bottger, Erik C.
Detalhes: N/A (1996)
DOI: N/A

292. **Artigo:** *PCR test for detecting Taenia solium cysticercosis in pig carcasses*
Autores: Sreedevi, Chennuru; Hafeez, Mohammad; Kumar, Putcha Anand; Rayulu, Vukka Chengalva; Subramanyam, Kothapalli Venkata; Sudhakar, Krovvidi
Detalhes: N/A (2012)
DOI: 10.1007/s11250-011-9893-2

293. **Artigo:** *Commercial Serological tests for the diagnosis of active pulmonary and extrapulmonary tuberculosis: An updated systematic review and Meta-Analysis*
Autores: Steingart, Karen R.; Flores, Laura L.; Dendukuri, Nandini; Schiller, Ian; Laal, Suman; Ramsay, Andrew; Hopewell, Philip C.; Pai, Madhukar
Detalhes: N/A (2011)
DOI: 10.1371/journal.pmed.1001062

294. **Artigo:** *A systematic review of commercial serological antibody detection tests for the diagnosis of extrapulmonary tuberculosis*
Autores: Steingart, Karen R.; Henry, Megan; Laal, Suman; Hopewell, Philip C.; Ramsay, Andrew; Menzies, Dick; Cunningham, Jane; Weldingh, Karin; Pai, Madhukar
Detalhes: N/A (2007)
DOI: 10.1136/thx.2006.075754

295. **Artigo:** *Evaluation of the Diagnostic Accuracy of Prototype Rapid Tests for Human African Trypanosomiasis*
Autores: Sternberg, Jeremy M.; Gierliński, Marek; Biéler, Sylvain; Ferguson, Michael A.J.; Ndung'u, Joseph M.

Detalhes: N/A (2014)
DOI: 10.1371/journal.pntd.0003373

296. **Artigo:** *Single-nucleotide repeat analysis for subtyping Bacillus anthracis isolates*
Autores: Stratilo, Chad W.; Lewis, Christopher T.; Bryden, Louis; Mulvey, Michael R.; Bader, Doug
Detalhes: N/A (2006)
DOI: 10.1128/JCM.44.3.777-782.2006

297. **Artigo:** *Identification of sVSG117 as an Immunodiagnostic Antigen and Evaluation of a Dual-Antigen Lateral Flow Test for the Diagnosis of Human African Trypanosomiasis*
Autores: Sullivan, Lauren; Fleming, Jennifer; Sastry, Lalitha; Mehlert, Angela; Wall, Steven J.; Ferguson, Michael A.J.
Detalhes: N/A (2014)
DOI: 10.1371/journal.pntd.0002976

298. **Artigo:** *Proteomic Selection of Immunodiagnostic Antigens for Human African Trypanosomiasis and Generation of a Prototype Lateral Flow Immunodiagnostic Device*
Autores: Sullivan, Lauren; Wall, Steven J.; Carrington, Mark; Ferguson, Michael A.J.
Detalhes: N/A (2013)
DOI: 10.1371/journal.pntd.0002087

299. **Artigo:** *Resistance to treatment in kala-azar: Speciation of isolates from northeast India*
Autores: Sundar, S.; Pai, K.; Kumar, R.; Pathak-Tripathi, K.; Gam, A. A.; Ray, M.; Kenney, R. T.
Detalhes: N/A (2001)
DOI: 10.4269/ajtmh.2001.65.193

300. **Artigo:** *Laboratory diagnosis of visceral leishmaniasis*
Autores: Sundar, Shyam; Rai, M.
Detalhes: N/A (2002)
DOI: 10.1128/CDLI.9.5.951-958.2002

301. **Artigo:** *Anthrax infection*
Autores: Sweeney, Daniel A.; Hicks, Caitlin W.; Cui, Xizhong; Li, Yan; Eichacker, Peter Q.
Detalhes: N/A (2011)
DOI: 10.1164/rccm.201102-0209CI

302. **Artigo:** *Detection and identification of old world leishmania by high resolution melt analysis*
Autores: Talmi-Frank, Dalit; Nasereddin, Abedelmajeed; Schnur, Lionel F.; Schönian, Gabriele; Töz, Seray Özensoy; Jaffe, Charles L.; Baneth, Gad
Detalhes: N/A (2010)
DOI: 10.1371/journal.pntd.0000581

303. **Artigo:** *Evaluation of a commercial Echinococcus western blot assay for serological follow-up of patients with alveolar echinococcosis*

Autores: Tappe, Dennis; Grüner, Beate; Kern, Peter; Frosch, Matthias
Detalhes: N/A (2008)
DOI: 10.1128/CVI.00272-08

304. **Artigo:** *Molecular diagnosis of leishmaniasis*
Autores: Tavares, Carlos Alberto P.; Fernandes, Ana Paula; Melo, Maria Norma
Detalhes: N/A (2003)
DOI: 10.1586/14737159.3.5.657

305. **Artigo:** *The value of interferon gamma release assays for diagnosis infection with Mycobacterium tuberculosis during an annual screening of health care workers*
Autores: Thijsen, Steven F.T.; Van Rossum, Saskia V.; Arend, Sandra; Koster, Ben; MacHiels, Alexander M.; Bossink, Ailko W.J.
Detalhes: N/A (2008)
DOI: 10.1097/JOM.0b013e31818def3d

306. **Artigo:** *Variation in Echinococcus: Towards a Taxonomic Revision of the Genus*
Autores: Thompson, R. C.A.; Lymbery, A. J.; Constantine, C. C.
Detalhes: N/A (1995)
DOI: 10.1016/S0065-308X(08)60071-8

307. **Artigo:** *The neural cell adhesion molecule is a receptor for rabies virus*
Autores: Thoulouze, Maria Isabel; Lafage, Mireille; Schachner, Melitta; Hartmann, Ursula; Cremer, Harold; Lafon, Monique
Detalhes: N/A (1998)
DOI: 10.1128/jvi.72.9.7181-7190.1998

308. **Artigo:** *Growth characteristics of Bacillus anthracis compared to other Bacillus spp. on the selective nutrient media Anthrax Blood Agar® and Cereus Ident Agar®*
Autores: Tomaso, Herbert; Bartling, Carsten; Al Dahouk, Sascha; Hagen, Ralf M.; Scholz, Holger C.; Beyer, Wolfgang; Neubauer, Heinrich
Detalhes: N/A (2006)
DOI: 10.1016/j.syapm.2005.05.008

309. **Artigo:** *Impact of genotypic studies on mycobacterial taxonomy: The new mycobacteria of the 1990s*
Autores: Tortoli, Enrico
Detalhes: N/A (2003)
DOI: 10.1128/CMR.16.2.319-354.2003

310. **Artigo:** *Successfully treated spondylodiscitis due to a previously unreported mycobacterium*
Autores: Tortoli, Enrico; Mantella, Antonia; Mariottini, Alessandro; Mazzarelli, Gianna; Pecile, Patrizia; Rogasi, Pier G.; Sterrantino, Gaetana; Fantoni, Elisa; Leoncini, Francesco
Detalhes: N/A (2006)
DOI: 10.1099/jmm.0.46256-0

311. **Artigo:** *Mycobacterium lentiflavum, an emerging pathogen?*
Autores: Tortoli, Enrico; Mattei, Romano; Russo, Cristina; Scarparo, Claudio
Detalhes: N/A (2006)
DOI: 10.1016/j.jinf.2005.08.020

312. **Artigo:** *Diagnostic value of RK39 dipstick in zoonotic visceral leishmaniasis in Turkey*
Autores: Toz, Seray Ozensoy; Chang, Kwang Poo; Ozbel, Yusuf; Alkan, M. Ziya
Detalhes: N/A (2004)
DOI: 10.1645/GE-339R

313. **Artigo:** *An Enzyme-Linked Immunoelectrotransfer Blot Assay and Glycoprotein Antigens for Diagnosing Human Cysticercosis (Taenia Solium)*
Autores: Tsang, Victor C.W.; Brand, Joy A.; Boyer, Anne E.
Detalhes: N/A (1989)
DOI: 10.1093/infdis/159.1.50

314. **Artigo:** *Bacillus anthracis but not always anthrax*
Autores: Turnbull, P. C.B.; Hutson, R. A.; Ward, Mandy J.; Jones, Marie N.; Quinn, C. P.; Finnie, N. J.; Duggleby, C. J.; Kramer, J. M.; Melling, J.
Detalhes: N/A (1992)
DOI: 10.1111/j.1365-2672.1992.tb04876.x

315. **Artigo:** *Chagas' disease: An emergent urban zoonosis. The Caracas Valley (Venezuela) as an epidemiological model*
Autores: Urdaneta-Morales, Servio
Detalhes: N/A (2014)
DOI: 10.3389/fpubh.2014.00265

316. **Artigo:** *Comparison between quantitative nucleic acid sequence-based amplification, real-time reverse transcriptase PCR, and real-time PCR for quantification of Leishmania parasites*
Autores: Van Der Meide, Wendy; Guerra, Jorge; Schoone, Gerard; Farenhorst, Marit; Coelho, Leíla; Faber, William; Peekel, Inge; Schallig, Henk
Detalhes: N/A (2008)
DOI: 10.1128/JCM.01416-07

317. **Artigo:** *Global genetic population structure of Bacillus anthracis*
Autores: Van Ert, Matthew N.; Easterday, W. Ryan; Huynh, Lynn Y.; Okinaka, Richard T.; Hugh-Jones, Martin E.; Ravel, Jacques; Zanecki, Shaylan R.; Pearson, Talima; Simonson, Tatum S.; U'Ren, Jana M.; Kachur, Sergey M.; Leadem-Dougherty, Rebecca R.; Rhoton, Shane D.; Zinser, Guenevier; Farlow, Jason; Coker, Pamala R.; Smith, Kimothy L.; Wang, Bingxiang; Kenefic, Leo J.; Fraser-Liggett, Claire M.; Wagner, David M.; Keim, Paul
Detalhes: N/A (2007)
DOI: 10.1371/journal.pone.0000461

318. **Artigo:** *Detection of Leishmania parasites by DNA in situ hybridization with non-radioactive probes*
Autores: van Eys, G. J.J.M.; Schoone, G. J.; Ligthart, G. S.; Laarman, J. J.; Terpstra, W. J.
Detalhes: N/A (1987)
DOI: 10.1007/BF00578504

319. **Artigo:** *Brucella, a monospecific genus as shown by deoxyribonucleic acid hybridization*
Autores: Verger, J. M.; Grimont, F.; Grimont, P. A.D.; Grayon, M.
Detalhes: N/A (1985)
DOI: 10.1099/00207713-35-3-292

320. **Artigo:** *The use of live vaccine for vaccination of human beings against brucellosis in the USSR.*
Autores: VERSHILOVA, P. A.
Detalhes: N/A (1961)
DOI: N/A

321. **Artigo:** *DNA polymorphism in the genus Brucella*
Autores: Vizcaíno, Nieves; Cloeckaert, Axel; Verger, Jean Michel; Grayon, Maggy; Fernández-Lago, Luis
Detalhes: N/A (2000)
DOI: 10.1016/S1286-4579(00)01263-6

322. **Artigo:** *Leishmania identification by PCR of Giemsa-stained lesion imprint slides stored for up to 36 years*
Autores: Volpini, Â C.; Marques, M. J.; Lopes dos Santos, S.; Machado-Coelho, G. L.; Mayrink, W.; Romanha, A. J.
Detalhes: N/A (2006)
DOI: 10.1111/j.1469-0691.2006.01422.x

323. **Artigo:** *Socioeconomic and behavior risk factors of human alveolar echinococcosis in Tibetan communities in Sichuan, People's Republic of China*
Autores: Wang, Qian; Qiu, Jiamin; Yang, Wen; Schantz, Peter M.; Raoul, Francis; Craig, Philip S.; Giraudoux, Patrick; Vuitton, Dominique A.
Detalhes: N/A (2006)
DOI: N/A

324. **Artigo:** *Rabies and other lyssavirus diseases*
Autores: Warrell, M. J.; Warrell, D. A.
Detalhes: N/A (2004)
DOI: 10.1016/S0140-6736(04)15792-9

325. **Artigo:** *Efficacy of Selected Hand Hygiene Agents Used to Remove Bacillus atrophaeus (a Surrogate of Bacillus anthracis) from Contaminated Hands*
Autores: Weber, David J.; Sickbert-Bennett, Emily; Gergen, Maria F.; Rutala, William A.

Detalhes: N/A (2003)
DOI: 10.1001/jama.289.10.1274

326. **Artigo:** *Chest x-ray vs. xpert® mtb/rif assay for the diagnosis of sputum smear-negative tuberculosis in uganda*
Autores: Wekesa, Clara; Kirenga, B. J.; Joloba, M. L.; Bwanga, F.; Katamba, A.; Kamya, M. R.
Detalhes: N/A (2014)
DOI: 10.5588/ijtld.13.0464

327. **Artigo:** *An evaluation of two commercially available ELISAs and one in-house reference laboratory ELISA for the determination of human anti-rabies virus antibodies*
Autores: Welch, Ryan J.; Anderson, Brian L.; Litwin, Christine M.
Detalhes: N/A (2009)
DOI: 10.1099/jmm.0.006064-0

328. **Artigo:** *Rapid detection of Brucella spp. in blood cultures by fluorescence in situ hybridization*
Autores: Wellinghausen, Nele; Nöckler, Karsten; Sigge, Anja; Bartel, Melanie; Essig, Andreas; Poppert, Sven
Detalhes: N/A (2006)
DOI: 10.1128/JCM.44.5.1828-1830.2006

329. **Artigo:** *Immunoglobulin G subclass responses in human cystic and alveolar echinococcosis*
Autores: Wen, H.; Craig, P. S.
Detalhes: N/A (1994)
DOI: N/A

330. **Artigo:** *Rabies virus in the decomposed brain of an Ethiopian wolf detected by nested reverse transcription-polymerase chain reaction.*
Autores: Whitby, J. E.; Johnstone, P.; Sillero-Zubiri, C.
Detalhes: N/A (1997)
DOI: 10.7589/0090-3558-33.4.912

331. **Artigo:** *A comparative study of the fluorescent antibody test for rabies diagnosis in fresh and formalin-fixed brain tissue specimens*
Autores: Whitfield, Sylvia G.; Fekadu, Makonnen; Shaddock, John H.; Niezgoda, Michael; Warner, Cynthia K.; Messenger, Sharon L.
Detalhes: N/A (2001)
DOI: 10.1016/S0166-0934(01)00304-4

332. **Artigo:** *Is IP-10 a better biomarker for active and latent tuberculosis in children than IFNγ?*
Autores: Whittaker, Elizabeth; Gordon, Andrea; Kampmann, Beate
Detalhes: N/A (2008)
DOI: 10.1371/journal.pone.0003901

333. **Artigo:** *Evaluation of diagnostic tests for infectious diseases: General principles*
Autores: Banoo, Shabir; Bell, David; Bossuyt, Patrick; Herring, Alan; Mabey, David; Poole,

Freddie; Smith, Peter G.; Sriram, N.; Wongsrichanalai, Chansuda; Linke, Ralf; O'Brien, Rick; Perkins, Mark; Cunningham, Jane; Matsoso, Precious; Nathanson, Carl Michael; Olliaro, Piero; Peeling, Rosanna W.; Ramsay, Andy
Detalhes: N/A (2010)
DOI: 10.1038/nrmicro1523

334. **Artigo:** *Development of a serologic assay to detect Taenia solium taeniasis*
Autores: Wilkins, Patricia P.; Allan, James C.; Verastegui, Manuela; Acosta, Mariela; Eason, Adam G.; Hugo Garcia, H.; Gonzalez, Armando E.; Gilman, Robert H.; Tsang, Victor C.W.
Detalhes: N/A (1999)
DOI: 10.4269/ajtmh.1999.60.199

335. **Artigo:** *Airborne Rabies Transmission in a Laboratory Worker*
Autores: Winkler, William G.; Fashinell, Thomas R.; Leffingwell, Lois; Howard, Paxton; Conomy, John P.
Detalhes: N/A (1973)
DOI: 10.1001/jama.1973.03230100043011

336. **Artigo:** *A robust lentiviral pseudotype neutralisation assay for in-field serosurveillance of rabies and lyssaviruses in Africa*
Autores: Wright, Edward; McNabb, Suzanne; Goddard, Trudy; Horton, Daniel L.; Lembo, Tiziana; Nel, Louis H.; Weiss, Robin A.; Cleaveland, Sarah; Fooks, Anthony R.
Detalhes: N/A (2009)
DOI: 10.1016/j.vaccine.2009.09.024

337. **Artigo:** *Rabies in the 21st century*
Autores: Wunner, William H.; Briggs, Deborah J.
Detalhes: N/A (2010)
DOI: 10.1371/journal.pntd.0000591

338. **Artigo:** *Detection of Brucella melitensis by BACTEC NR660 blood culture system*
Autores: Yagupsky, P.
Detalhes: N/A (1994)
DOI: 10.1128/jcm.32.8.1899-1901.1994

339. **Artigo:** *Laboratory exposures to brucellae and implications for bioterrorism*
Autores: Yagupsky, Pablo; Baron, Ellen Jo
Detalhes: N/A (2005)
DOI: 10.3201/eid1108.041197

340. **Artigo:** *DNA Differential Diagnosis of Taeniasis and Cysticercosis by Multiplex PCR*
Autores: Yamasaki, Hiroshi; Allan, James C.; Sato, Marcello Otake; Nakao, Minoru; Sako, Yasuhito; Nakaya, Kazuhiro; Qiu, Dongchuan; Mamuti, Wulamu; Craig, Philip S.; Ito, Akira
Detalhes: N/A (2004)
DOI: 10.1128/JCM.42.2.548-553.2004

341. **Artigo:** *DNA Differential Diagnosis of Taeniasis and Cysticercosis by Multiplex PCR*
Autores: Yamasaki, Hiroshi; Allan, James C.; Sato, Marcello Otake; Nakao, Minoru; Sako, Yasuhito; Nakaya, Kazuhiro; Qiu, Dongchuan; Mamuti, Wulamu; Craig, Philip S.; Ito, Akira
Detalhes: N/A (2004)
DOI: 10.1128/JCM.42.2.548-553.2004

342. **Artigo:** *Cysticercosis: Recent advances in diagnosis and management of neurocysticercosis*
Autores: Yancey, Linda S.; Diaz-Marchan, Pedro J.; White, Arthur Clinton
Detalhes: N/A (2005)
DOI: 10.1007/s11908-005-0022-0

343. **Artigo:** *Brucellosis: current epidemiology, diagnosis, and management.*
Autores: Young, E. J.
Detalhes: N/A (1995)
DOI: N/A

344. **Artigo:** *An overview of human brucellosis*
Autores: Young, Edward J.
Detalhes: N/A (1995)
DOI: 10.1093/clinids/21.2.283

345. **Artigo:** *Evaluation of 7SL RNA gene sequences for the identification of Leishmania spp.*
Autores: Zelazny, Adrian M.; Fedorko, Daniel P.; Li, Li; Neva, Franklin A.; Fischer, Steven H.
Detalhes: N/A (2005)
DOI: N/A

346. **Artigo:** *Concepts in immunology and diagnosis of hydatid disease*
Autores: Zhang, Wenbao; Li, Jun; McManus, Donald P.
Detalhes: N/A (2003)
DOI: 10.1128/CMR.16.1.18-36.2003

347. **Artigo:** *Recent advances in the immunology and diagnosis of echinococcosis*
Autores: Zhang, Wenbao; McManus, Donald P.
Detalhes: N/A (2006)
DOI: 10.1111/j.1574-695X.2006.00060.x