1. Biomarkers in humans

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Abbreviations

|  |  |
| --- | --- |
| 15ADON | 15 Acetyl deoxynivalenol |
| AFalb | Aflatoxin-alb |
| AFB1 | Aflatoxin B1 |
| AFB1alb | Aflatoxins B1-alb |
| AFB1lys | Aflatoxins B1-lysin |
| AFB1N7guanine | Aflatoxins B1-N7-guanine |
| AFB2 | Aflatoxin B2 |
| AFBs | Aflatoxins |
| AFG1 | Aflatoxin G1 |
| AFG2 | Aflatoxin G2 |
| AFM1 | Aflatoxin M1 |
| alloTeA | allo-Tenuazonic acid |
| BEA | Beauvericin |
| BEN | Balkan endemic nephropathy |
| CIT | Citrinin |
| DAS | Diacetoxyscirpenol |
| DAS | Diacetoxyscirpenol |
| DOM1 | De-epoxy-deoxynivalenol |
| DOM1glucur | De-epoxy-deoxynivalenol-glucuronide |
| DON | Deoxynivalenol |
| DON3G | Deoxynivalenol-3-glucoside |
| DON3glucur | Deoxynivalenol-3-glucuronide |
| DON15glucur | Deoxynivalenol-15-glucuronide |
| FB1 | Fumonisin B1 |
| FB2 | Fumonisin B2 |
| FBs | Fumonisins |
| FFQ | Food frequency questionnaire |
| FFQ | Food Frequency Questionnaire |
| NIV | Nivalenol |
| OHCIT | Dihydrocitrinone |
| OTA | Ochratoxin A |
| OTα | Ochratoxin α |
| RIA | Radio-Immune Assay |
| TD | Toxicodynamics |
| TeA | tenuazonic acid |
| TK | Toxicokinetics |
| TLC | Thin Layer Chromatography |
| VFM | Velasco FluorotoxinMeter |
| y | years |
| ZAN | Zearalanone |
| ZEN | Zearalenone |
| ZEN14Glc | Zearalenone-14-glucoside |
| ZEN14Sulf | Zearalenone -14-sulfate |
| ZEN16Glc | Zearalenone-16-glucoside |
| ZENSulf | Zearalenone sulfate |
| αZAL | α-zearalanol |
| αZEL | α-zearalenol |
| βZAL | β-zearalanol |
| βZEL | β-zearalenol |
| βZEL14Glc | β-zearalenol-14-glucoside |

Supplementing Tables

Table L1. Aflatoxins\_List of biomarker, substrate, population group, analytical method, range of values. Information on the study, association with the diet and the exposure values are also reported when available.

| Mycotoxin | Biomarker | Substrate | Population group | Analytical method (LOQ/LOD) | Range of values a) | Study description | Association with the diet | Exposure value | Reference |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AFs | AFalb | Blood | Toddlers | ELISA (LOQ -) | 12.7 ng/g albumin (geom. mean) | Country Guinea. Healthy children (N=305) at maize harvest | Correlation with groundnuts dietary staple | - | Watson, 2015 |
|  |  | Blood | Toddlers | 16.29 ng/g albumin (geom. mean) | Country Guinea. Healthy children (N=288) post maize harvest |
| AFB1 | AFM1 | Urine | Adults | ELISA (LOQ -) | 42-165 pg/ml | Country Ethiopia. Healthy lactating woman in dry season (N=101) | - | - | Gebreegziabher, 2016 |
|  |  | Urine | Adults | 77-352 pg/ml | Country Ethiopia. Healthy lactating woman in wet season (N=101) |
| AFB1 | AFB1lys | Serum | Adults | HPLC-MS/MS (LOQ 0.2 pg AFB1-lys/mg alb) | 25.28 pg/mg alb | Country Nepal. Female early pregnancy (N=141) | - | - | Groopman, 2014 |
|  |  | Serum | Adults | 28.22±4.95 pg/mg alb | Country Nepal. Female early pregnancy, December-February (N=141) |
|  |  | Serum | Adults | 0.45-2939.3 pg/mg alb | Country Nepal. Early pregnant women group (N=141) |
|  |  | Serum | Adults | 1.56-63.22 pg/mg alb | Country Bangladesh. Early (I trimester) pregnant women group (N=63) |
|  |  | Serum | Adults | 3.37-72.8 pg/mg alb | Country Bangladesh. Early (III trimester) pregnant women group (N=63) |
| AFB1 | AFB1lys | Cord blood | Adults | 4.20-76.69 pg/mg alb | Country Bangladesh. Early (III trimester) pregnant women group (N=63) |
| AFB1 | AFB1lys | Serum | Toddlers | 3.88-81.44 pg/mg alb | Country Bangladesh. Children group (N=63) |
|  |  | Serum | Adults | 18.8 pg/mg alb | Country Bangladesh. Female first trimester (N=63) |
|  |  | Serum | Adults | 23.35 pg/mg alb | Country Bangladesh. Female third trimester (N=63) |
| AFB1 | AFB1lys | Cord blood | Adults | 27.41 pg/mg alb | Country Bangladesh. Female (N=63) |
| AFB1 | AFB1lys | Serum | Toddlers | 13.79 pg/mg alb | Country Bangladesh. Toddlers (N=63) age 2 y. |
| AFs | AFs | Serum | Adults | Velasco fluorotoxin Meter LOD 20ng/g | > LOD (133/213) | Country Nigeria. Pregnant woman (N=213) |  | - | Isaiah, 2014 |
| AFs | AFs | Amniotic Fluid | Adults | > LOD (66/89) | Country Nigeria. Pregnant woman (N=89) |
| AFs | AFs | Serum | Infants | > LOD (142/211) | Country Nigeria. Infants (N=211) |
| AFB1 | AFB1lys | Plasma | Toddlers | LC-MS\_IDMS (LOD 0.4 pg/mg alb) | 3.85±15.75 pg/mg alb (geom. mean) | Country Nepal. Toddlers 2 y age (N=85) | Food and nutrient records 24-h recalls each month from 9 - 36 months (toddlers 2y). Breastmilk consumption in the prior 24-hours (toddlers 1y). | - | Mitchell, 2017 |
|  |  | Plasma | Toddlers | 3.05±4.71 pg/mg alb (geom. mean) | Country Nepal. Toddlers 1y age (N=77) |
|  |  | Plasma | Toddlers | 4.06±22.72 pg/mg alb (geom. mean) | Country Nepal. Toddlers 1y age (N=85)) |
| AFB1 | AFM1 | Urine | Adults | HPLC-FLD (LOQ 5 pg/ml) | 41.2 pg/mg creat | Country Bangladesh. Adults (N=30) sampling period Summer Rural area | FFQ (daily, weekly consumption and standard food habits). 2 days food consumption records prior urine sampling.  No correlation but trend for higher mean level of AFM1. | - | Ali, 2016 |
|  |  | Urine | Adults | 49.4 pg/mg creat | Country Bangladesh. Adults (N=32) sampling period Summer Urban area |
|  |  | Urine | Adults | 6.6 pg/mg creat | Country Bangladesh. Adults (N=30) sampling period Winter, Rural area |
|  |  | Urine | Adults | 70.4 pg/mg creat | Country Bangladesh. Pregnant woman (N=32), Rural area |
|  |  | Urine | Adults | 86.1 pg/mg creat | Country Bangladesh. Pregnant woman (N=22) Suburban area |
|  |  | Urine | Adults | 36.5 pg/mg creat | Country Bangladesh. Pregnant woman (N=54) Suburban and rural area |
| AFB1 | AFM1 | Urine | Adults | HPLC-FLD (LOD 12 pg/ml) | 8.2-31 pg/mg creat | Country Kenya. Adults with recurring aflatoxicosis treatment placebo (N=50) | Adults consuming a maize-based diet. | - | Awuor, 2017 |
|  |  | Urine | Adults | 4.2-13 pg/mg creat | Country Kenya. Adults with recurring aflatoxicosis treatment group I (N=25) |
|  |  | Urine | Adults | 4-26 pg/mg creat | Country Kenya. Adults with recurring aflatoxicosis treatment placebo group II (N=50) |
|  |  | Urine | Adults | 7.3-44 pg/mg creat | Country Kenya. Adults with recurring aflatoxicosis treatment II group II (N=25) |
| AFB1 | AFB1lys | Serum | Adults | 3.3 pg/mg alb (median) | Country Kenya. Adults with recurring aflatoxicosis day 1 (N=39) |
|  |  | Serum | Adults | 6.4 pg/mg alb (median) | Country Kenya. Adults with recurring aflatoxicosis day 21 (N=39) |
| AFB1 | AFM1 | Urine | Toddlers | ELISA (LOD 15 pg/ml) | < LOD-30.6 pg/ml | Country Tanzania. Healthy children Kikelewa village (N=22) | Correlation between AFB1 intake and AFM1 excretion. | - | Chen, 2018 |
|  |  | Urine | Toddlers | < LOD-281 pg/ml | Country Tanzania. Healthy children Niabula village (N=31) |
|  |  | Urine | Toddlers | 15.1-1950 pg/ml | Country Tanzania. Healthy children Kigwa village (N=31) |
| AFB1 | AFBalb | Blood | Toddlers | ELISA (LOD 3 pg/mg albunine) | < LOD-15 pg/mg alb | Country Tanzania. Healthy children Kikelewa village (N=22) |
|  |  | Blood | Toddlers | < LOD-130.5pg/mg alb | Country Tanzania. Healthy children Niabula village (N=31) |
|  |  | Blood | Toddlers | <LOD-853.3pg/mg alb | Country Tanzania. Healthy children Kigwa village (N=31) |
| AFB1 | AFM1 | Urine | Adults | ELISA (LOD 30 pg/ml) | 164± 98 pg/mg creat | Country Bangladesh. Healthy adult urban area (N=43) | FFQ (2 days prior turine sampling); anthropometric and occupational information. | - | Ali, 2015\_347 |
|  |  | Urine | Adults | 83±48 pg/mg creat | Country Bangladesh. Healthy adults (Rural area (N=52) |
| AFs | AFB1 | Blood | Adults | UHPLC-MS/MS (LOQ 0.14 mg/l) | 0.62-0.88 mg/l | Liver cancer volunteers (N=10) | - | - | Chen, 2016 |
| AFs | AFB2, AFB2,AFG1,AFG2 | Blood | Adults | UHPLC-MS/MS (LOQ-) | <LOQ | Liver cancer volunteers (N=10) |
| AFB1 | AFM1 | Urine | Adults | HPLC (LOQ 10 pg/ml) | 116 pg/mg creat | Country Haity. Healthy volunteers, rural area (N=191) | Dietary recall survey (the day of survey and previous 7-day) on dairy, animal-sourced foods, peanut products and maize. | - | Schwartzbord, 2016 |
|  |  | Urine | Adults | 43.7 pg/mg creat | Country Haity. Healthy volunteers, rural area (N=147) |
| AFB1 | AFalb | Serum | Toddlers | ELISA (LOD 3 pg/mg alb) | 12.7 pg/mg alb | Country Guinea. Healthy children from subsistence farming households (N=288) | - | - | Watson, 2016 |
| AFB2 | AFalb | Serum | Toddlers | 16.3 pg/mg alb | Country Guinea. Healthy children from subsistence farming households, 6 months postharvest (N=288) |
| AFB1 | AFM1 | Urine | Adults | HPLC-FD (LOD 0.5 pg/mg) | < LOD-3018.69 pg/mg creat | Country Ghana. Positive HBV/HCV group with liver disease (N=38) | Questionnaire on socio-demographic characteristics and food storage and consumption practices. | - | Afum, 2016 |
|  |  | Urine | Adults | < LOD-678.8 pg/mg creat | Country Ghana. Healty group (N=136) |
|  |  | Urine | Adults | < LOD-1173.09 pg/mg creat | Country Ghana. Positive HBV/HCV group without liver disease (N=102) |
| AFB1+AFM1 | AFB1lys | Urine | Adults | UPLC-MS (LOQ 20 pg/mg alb) | <LOQ | Country Brazil. Healthy volunteers, employees from Sao Paulo (N=113) | 24h dietary recall. | - | Jager, 2016 |
| AFB1+AFM1 | AFB1N7guanine | Urine | Adults | UPLC-MS (LOQ 10 pg/ml) | <LOQ | Country Brazil. Healthy volunteers, employees from Sao Paulo (N=113) | - |
| AFB1+AFM1 | AFM1 | Urine | Adults | UPLC-MS (LOQ 0.25 pg/ml) | 0.25-2.79 pg/mg creat | Country Brazil. Healthy volunteers, employees from Sao Paulo (N=33). June 2011 | 0.51 PDIM (ng/kg bw pwe day) AFB1+AFM1 |
|  |  | Urine | Adults | 0.26-12.68 pg/mg creat | Country Brazil. Healthy volunteers, employees from Sao Paulo (N=31). September 2011 | 1.35 PDIM (ng/kg bw pwe day) AFB1+AFM1 |
|  |  | Urine | Adults | 0.25-2.45 pg/mg creat | Country Brazil. Healthy volunteers, employees from Sao Paulo (N=27). December 2011 | 0.09 PDIM (ng/kg bw pwe day) AFB1+AFM1 |
|  |  | Urine | Adults | 0.25-0.86 pg/mg creat | Country Brazil. Healthy volunteers, employees from Sao Paulo (N=22). March 2012 | 0.86 PDIM (ng/kg bw pwe day) AFB1+AFM1 |
| AFB1 | AFB1lys | Serum | Adults/ children | HPLC-FLD LOD:0.2, LOQ: 0.4 pg/mg alb | <LOQ-4.78 pg/mg alb | Low dietary AFB1 exposure in mother and children (N=12) | - | - | Xue, 2016 |
|  |  | Serum | Adults/ children | <LOQ-24.64 pg/mg alb | Medium dietary AFB1 exposure in mother and children (N=12) |
|  |  | Serum | Adults/ children | 61.49-992.42 pg/mg alb | High dietary AFB1 exposure in mother and children (N=12) |
| AFB1 | AFM1 | Urine | Children | ELISA (LOD 0.1ng/ml) | 6.6±0.1 ng/ml | Country Kenya. Healthy children (N=7) probiotic yoghurt, day 7 | - | - | Nduti, 2016 |
|  |  | Urine | Children | 3.8±0.11 ng/ml | Country Kenya. Healthy children (N=7) probiotic yoghurt, day 0 |
|  |  | Urine | Children | 2.8±0.3 ng/ml | Country Kenya. Healthy children (N=7) probiotic yoghurt, day 21 |
|  |  | Urine | Children | 3.4±0.07 ng/ml | Country Kenya. Healthy children (N=7) probiotic yoghurt, day 14 |
|  |  | Urine | Children | 9.2±0.09 ng/ml | Country Kenya. Healthy children (N=7) control milk, day 0 |
|  |  | Urine | Children | 10.3±0.27 ng/ml | Country Kenya. Healthy children (N=7) control milk, day 7 |
|  |  | Urine | Children | 11.6±0.026 ng/ml | Country Kenya. Healthy children (N=7) control milk, day 14 |
|  |  | Urine | Children | 12.7±0.25 ng/ml | Country Kenya. Healthy children (N=7) control milk, day 21 |
| AFB1 | AFB1lys | Serum | Adults | HPLC-FLD (LOD 0.05 ng/ml) | 1·133–18·847 pg/mg alb | Country Malaysia. Healthy subjects with detectable levels of urinary AFM1 (> 0·005 ng/ml) N=66) PROBIOTIC baseline | FFQ (2-days and 4 weeks) | - | Redzwan, 2016 |
|  |  | Serum | Adults | 1·843–14·321 pg/mg alb | Country Malaysia. Healthy subjects with detectable levels of urinary AFM1 (> 0·005 ng/ml) N=66) PROBIOTIC\_4th week |
|  |  | Serum | Adults | 1·465–18·399 pg/mg alb | Country Malaysia. Healthy subjects with detectable levels of urinary AFM1 (> 0·005 ng/ml) N=66) PROBIOTIC\_4th week |
|  |  | Serum | Adults | 1·470–20·241 pg/mg alb | Country Malaysia. Healthy subjects with detectable levels of urinary AFM1 (> 0·005 ng/ml) N=66) PLACEBO baseline |
|  |  | Serum | Adults | 0·820–15·661 pg/mg alb | Country Malaysia. Healthy subjects with detectable levels of urinary AFM1 (> 0·005 ng/ml) N=66) PLACEBO\_2th week |
|  |  | Serum | Adults | 0·800–17·308 pg/mg alb | Country Malaysia. Healthy subjects with detectable levels of urinary AFM1 (> 0·005 ng/ml) N=66) PLACEBO\_4th week |
| AFB1 | AFM1 | Urine | Adults | HPLC-FLD LOD: 0.018 ng/ml | 0·002–7·678 pg/μmol creat | Country Malaysia. Healthy subjects with detectable levels of urinary AFM1 (> 0·005 ng/ml) N=66) PROBIOTIC baseline |
|  |  | Urine | Adults | 0·001–15·899 pg/μmol creat | Country Malaysia. Healthy subjects with detectable levels of urinary AFM1 (> 0·005 ng/ml) N=66) PROBIOTIC\_4th week |
|  |  | Urine | Adults | 0·001–13·754 pg/μmol creat | Country Malaysia. Healthy subjects with detectable levels of urinary AFM1 (> 0·005 ng/ml) N=66) PROBIOTIC\_4th week |
|  |  | Urine | Adults | 0·001–0·863 pg/μmol creat | Country Malaysia. Healthy subjects with detectable levels of urinary AFM1 (> 0·005 ng/ml) N=66) PLACEBO baseline |
|  |  | Urine | Adults | 0·005–7·899 pg/μmol creat | Country Malaysia. Healthy subjects with detectable levels of urinary AFM1 (> 0·005 ng/ml) N=66) PLACEBO\_2th week |
|  |  | Urine | Adults | 0·005–3·831 pg/μmol creat | Country Malaysia. Healthy subjects with detectable levels of urinary AFM1 (> 0·005 ng/ml) N=66) PLACEBO\_4th week |
| AFB1 | AFB1lys | Plasma | Adults | HPLC-FLD (LOD 0.5 pg/ml) | 14.95±15.86 ng/g alb | Country Ghana. HIV seropositive participants at baseline (N=294) | Socio economic and food consumption data. | - | Jolly, 2015 |
|  |  | Plasma | Adults | 23.27±26.63 ng/g alb | Country Ghana. HIV seropositive participants at six months (N=169) |
|  |  | Plasma | Adults | 15.32±15.43 ng/g alb | Country Ghana. HIV seropositive participants at 12 months (N=114) |
| AFB1 | AFB1lys | Serum | Adults | HPLC-FLD (LOD 0.4 pg/mg alb) | 0.4-168 pg/mg alb | Country Uganda. General population cohort (N=714). 1989-2010 period. | - | - | Kang, 2015 |
|  |  | Serum | Adults | 0.4-122.5 pg/mg alb | Country Uganda. Rakay community cohort (N=374). 1999-2003 period. |
| AFB1 | AFM1 | Blood | Adults | ELISA (LOD 0.6 pg/mg alb) | 58.75-97.89 pg/mg alb | Country Gambia. Healthy pregnant women dry season (N=115) | - | - | Hernandez-Vargas, 2015 |
|  |  | Blood | Adults | 60.85-102.46pg/mg alb | Country Gambia. Healthy pregnant women rainy season (N=115) |
| AFB1 | AFM1 | Urine | Children | HPLC-FLD | 416.58–681.42 pg/mg creat | Country Ghana. Healthy children Placebo group (N=21) | - | - | Mitchell,  2014 |
|  |  | Urine | Children | 150.46–192.20 pg/mg creat | Country Ghana. Healthy children, calcium montmorillonite low dose group (N=21) |
|  |  | Urine | Children | 103.01–140.73 pg/mg creat | Country Ghana. Healthy children, calcium montmorillonite high dose group (N=21) |
| AFB1 | AFalb | Serum | Adults | ELISA (LOD 3 pg/mg alb) | 11.5 pg/mg alb (geom. mean) | Country Uganda. Adults (N=100) | FFQ, (dayly and weekly in the preceding 30 days). Data on Aflatoxin levels correlatet to dietary factors. | - | Asiki, 2014 |
|  |  | Serum | Toddlers | 9.7 pg/mg alb (geom. mean) | Country Uganda. Children (N=96) |
|  |  | Serum | Adults | 10.5 pg/mg alb (geom. mean) | Country Uganda. Male (N=85) |
|  |  | Serum | Adults | 10.6 pg/mg alb (geom. mean) | Country Uganda. Female (N=111) |
|  |  | Serum | Adults | 10.9 pg/mg alb (geom. mean) | Country Uganda. HIV positive (N=10) |
| AFB1 | AFM1 | Serum | Adults | ELISA (LOD 3 pg/mg alb) | 11.5 pg/mg alb (geom. mean) | Country Uganda. HIV negative (N=80) |
| AFB1 | AFB1 | Serum | Adults | HPLC-FLD (LOQ -) | 0.09±0.03 pg/ml | Country Yemen. Healthy adults, control group (N=40) | - | - | Al-Ghazali, 2014 |
|  |  | Serum | Adults | 0.04-0.22 pg/ml | Country Yemen. Different cancer patients (N=42) |
| AFB1 | AFM1 | Serum | Adults | 1.08±0.63 pg/ml | Country Yemen. Healthy adults, control group (N=40) |
|  |  | Serum | Adults | 2.05-6.75 pg/ml | Country Yemen. Different cancer patients (N=42) |
| AFB1 | AFB1 | Urine | Children | AflaCheck test (QL) | < LOD | Country Mexico. Children with developmental deficiencies (N=30) | - | - | Ruvalcaba Ledezma, 2014 |
|  |  | Urine | Children | < LOD | Country Mexico. Healthy children: control (N=30) |
| AFB1 | AFB1lys | Serum | Adults | HPLC-FLD (LOD 0.05 ng/ml) | 8.03±3.41 pg/mg alb | Country Malaysia. Healthy non-academic staffs exposed to aflatoxin (detection of urinary AFM1), (N=71) | Questionnaire on socio-demographic background and medical health history. | - | Mohd Redzwana, 2014 |
|  |  | Serum | Adults | 5.64±2.46 pg/mg alb | Country Malaysia. Healthy non-academic staffs exposed to aflatoxin (detection of urinary AFM1,) male(N=36) |
|  |  | Serum | Adults | 6.85±3.2 pg/mg alb | Country Malaysia. Healthy non-academic staffs exposed to aflatoxin (detection of urinary AFM1) female, (N=35) |
| AFB1 | AFalb | Serum | Toddlers | HPLC-FLD (LOD: 0.05 ng/ml) | 43.2 pg/mg alb (geom. mean) | Country Tanzania. Healthy children during storage season (N=148) | Data on maize-based weaning food. | 81.7 ng/kg bw/d (geom. mean) data on maize-based weaning food) | Routledge, 2014 |
| AFB1 | AFalb | Plasma | Adults | ELISA (LOD 0.6 pg/mg alb) | 40.6 pg/mg alb (geom. mean) | Country Gambia. Woman early pregnancy dry season (N=47) | - | - | Castelino, 2014 |
|  |  | Plasma | Adults | 31.6 pg/mg alb (geom. mean) | Country Gambia. Woman early pregnancy rainy season (N=47) |
|  |  | Plasma | Adults | 31.6 pg/mg alb (geom. mean) | Country Gambia. Woman early pregnancy all season (N=134) |
|  |  | Plasma | Adults | 68.7 pg/mg alb (geom. mean) | Country Gambia. Woman late pregnancy dry season (N=47) |
|  |  | Plasma | Adults | 26.6 pg/mg alb (geom. mean) | Country Gambia. Woman late pregnancy rainy season (N=52) |
|  |  | Plasma | Adults | 41.8 pg/mg alb (geom. mean) | Country Gambia. Woman late pregnancy all season (N=99) |
|  |  | Plasma | Adults | 52.8 pg/mg alb (geom. mean) | Country Gambia. Woman early and late pregnancy rainy season (N=47) |
|  |  | Plasma | Adults | 29.6 pg/mg alb (geom. mean) | Country Gambia. Woman early and late pregnancy dry season (N=47) |
| AFB1 | AFM1 | Urine | Adults | ELISA (LOD 0.2 ng/ml) | 2.94-96.6 pg/ml | Country Haiti. Adults (N=52) | - | - | Schwartzbord, 2016 |
| AFB1 | AFB1alb | Plasma | Adults | RIA (LOD 0.01 pmol/mg alb) | 1.1± 0.60 pmol/mg alb | Country Ghana. HIV positive subjects (N=155) | Sociodemographic characteristics | - | Jolly, 2011 |
|  |  | Plasma | Adults | 0.9± 0.5 pmol/mg alb | Country Ghana. HIV negative subjects (N=159) |
| AFB1 | AFalb | Serum | Children | ELISA (LOD 3 pg/mg) | 72.2 pg/mg alb | Country Kenya. Children with high prevalence of both aflatoxin exposure and Schistosomisis infection Yumbuni school (N=119) | - | - | Castelino, 2015 |
|  |  | Serum | Children | 207.7 pg/mg alb | Country Kenya. Children with high prevalence of both aflatoxin exposure and Schistosomisis infection Matangini school (N=61) |
| AFB1 | AFalb | Plasma | Adults | LC-MS (LOQ -) | 7.6 pg/mg alb | Female group with gallblader cancer (N=36) | AFalb level associated to red chili peppers consumption. | - | Nogueira, 2015 |
|  |  | Plasma | Adults | 3.5 pg/mg alb | Control group: patients with gallstone (N=29) |
|  |  | Plasma | Adults | 2.4 pg/mg alb | Control group: population enrolled in the same health care. Cancer-free (N=47) |
| AFs | AFB1 | Serum | Adults | HPLC-FLD (LOD 5 pg/ml) | 53.96±11.72 pg/ml | Country Turkey. Chronic hepatitis B patients (N=38) | - | - | Aydın, 2015 |
| AFs | AFG1 | Serum | Adults | HPLC-FLD (LOD 5 pg/ml) | 22.8±18.51 pg/ml | Country Turkey. Chronic hepatitis B patients (N=38) |
| AFs | AFB2 | Serum | Adults | HPLC-FLD (LOD 2. 5 pg/ml) | 23.72±7.47 pg/ml | Country Turkey. Chronic hepatitis B patients (N=38) |
| AFs | AFG2 | Serum | Adults | HPLC-FLD (LOD 2. 5 pg/ml) | 9.33±1.69 pg/ml | Country Turkey. Chronic hepatitis B patients (N=38) |
| AFs | AFB1 | Serum | Adults | HPLC-FLD (LOD 5 pg/ml) | 41.09±6.77 pg/ml | Country Turkey. Cirrhosis patients (N=26) |
| AFs | AFG1 | Serum | Adults | HPLC-FLD (LOD 5 pg/ml) | 23±14.31 pg/ml | Country Turkey. Cirrhosis patients (N=26) |
| AFs | AFB2 | Serum | Adults | HPLC-FLD (LOD 2. 5 pg/ml) | 16.84±6.17pg/ml | Country Turkey. Cirrhosis patients (N=26) |
| AFs | AFG2 | Serum | Adults | HPLC-FLD (LOD 2. 5 pg/ml) | 10.25±2.67 pg/ml | Country Turkey. Cirrhosis patients (N=26) |
| AFs | AFB1 | Serum | Adults | HPLC-FLD (LOD 5 pg/ml) | 63.11±13.02 pg/ml | Country Turkey. Hepatocellular carcinoma patients (N=20) |
| AFs | AFG1 | Serum | Adults | HPLC-FLD (LOD 5 pg/ml) | 28.79±9.01 pg/ml | Country Turkey. Hepatocellular carcinoma patients (N=20) |
| AFs | AFB2 | Serum | Adults | HPLC-FLD (LOD 2. 5 pg/ml) | 28.17±4 pg/ml | Country Turkey. Hepatocellular carcinoma patients (N=20) |
| AFs | AFG2 | Serum | Adults | HPLC-FLD (LOD 2. 5 pg/ml) | 14.77±4.82 pg/ml | Country Turkey. Hepatocellular carcinoma patients (N=20) |
| AFs | AFB1 | Serum | Adults | HPLC-FLD (LOD 5 pg/ml) | 18.36±10.64 pg/ml | Country Turkey. Healthy control group. (N=49) |
| AFs | AFG1 | Serum | Adults | HPLC-FLD (LOD 5 pg/ml) | 11.51±3.94 pg/ml | Country Turkey. Healthy control group. (N=49) |
| AFs | AFB2 | Serum | Adults | HPLC-FLD (LOD 2. 5 pg/ml) | 9.98±4.76 pg/ml | Country Turkey. Healthy control group. (N=49) |
| AFs | AFG2 | Serum | Adults | HPLC-FLD (LOD 2. 5 pg/ml) | 5.71±2.25 pg/ml | Country Turkey. Healthy control group. (N=49) |
| AFB1 | AFM1 | Urine | Adults | ELISA (LOD 0.011 ng/ml) | 2.34±2.32 pg/g | Dairy products median intake of 67.79 g/day (N=98) | - | - | Redzwan, 2012 |
| AFB1 | AFM1 | Urine | Adults | ELISA (LOD 30 pg/ml) | 181 pg/mg creat | Country Bangladesh. Healthy female rural area (N=27) | FFQ (2 days prior urine sampling). | - | Ali, 2015 |
| AFB1 | AFM1 | Urine | Adults | 144 pg/mg creat | Country Bangladesh. Healthy male rural area (N=25) |
| AFB1 |  |  | Adults | 80 pg/mg creat | Country Bangladesh. Healthy female urban area (N=23) |
| AFB1 |  |  | Adults | 88 pg/mg creat | Country Bangladesh. Healthy male urban area (N=21) | FFQ (2 days prior urine sampling). |
| AFB1 | AFB1lys | Serum | Adults | HPLC-FLD (LOD 0.2 pg/g alb) | 4.18-7.63 pg/mg alb | Country Kenya. Female winter (N=133) | Data on socio-demographic characteristics and food items purchased and consumed in the past 7 days | - | Leroy, 2015 |
|  |  | Serum | Adults | 6.14-9.39 pg/mg alb | Country Kenya. Female spring (N=622) |
|  |  | Serum | Adults | 5.38-0.46 pg/mg alb | Country Kenya. Female autumn (N=129) |
|  |  | Serum | Adults | 6.87 pg/mg alb | Country Kenya. Pregnant (N=454) |
|  |  | Serum | Adults | 8.29 pg/mg alb | Country Kenya. No pregnant (with child under 24 months of age) (N=430) |
|  |  | Serum | Adults | 5.1 pg/mg alb | Country Kenya. Food secure or mildly food insecure access (N=305) |
|  |  | Serum | Adults | 7.97 pg/mg alb | Country Kenya. Moderate food insecure access (N=300) |
|  |  | Serum | Adults | 9.78 pg/mg alb | Country Kenya. Severely food insecure access (N=279) |
|  |  | Serum | Adults | 6.65 pg/mg alb | Country Kenya. Little hunger (N=720) |
|  |  | Serum | Adults | 10.03 pg/mg alb | Country Kenya. Moderate hunger (N=132) |
|  |  | Serum | Adults | 16.95 pg/mg alb | Country Kenya. Severe hunger (N=32) |
| AFB1 | AFM1 | Urine | Infant/toddlers | HPLC (LOD 0.5 pg/ml urine) | 2058 pg/mg creat | Country Ghana. Children Ejura town day 0 (recruitment) | Nutritional food prepared by mixing groundnuts (0.5), beans (0.5) and maize (4).  Mean Afs in nutr. food 201 ppb | - | Kumi, 2015 |
|  |  | Urine | Infant/toddlers | 3853.3 pg/mg creat | Country Ghana. Ejura town, after 21 days of consuming locally prepared nutritional food |
|  |  | Urine | Infant/toddlers | 208 pg/mg creat | Country Ghana. Hiawoanwu town, day 0 (recruitment) |
|  |  | Urine | Infant/toddlers | 1161.7 pg/mg creat | Country Ghana. Hiawoanwu town, after 21 days of consuming locally prepared nutritional food |
|  |  | Urine | Infant/toddlers | 508 pg/mg creat | Country Ghana; Dromankuman town, day 0 (recruitment) |
|  |  | Urine | Infant/toddlers | 1458 pg/mg creat | Country Ghana. Dromankuman town, after 21 days of consuming locally prepared nutritional food |
| AFB1 | AFM1 | Urine | Adolescents/adults | UPCLMS/MS (LOQ 0.25 pg/ml) | 1.6 pg/mg creat | Country Brazil. Females volunteers (N:8); June period | - | - | Jager, 2014 |
|  |  | Urine | Adolescents/adults | 1.3 pg/mg creat | Country Brazil. Males volunteers (N:8); June period |
|  |  | Urine | Adolescents/adults | 1.5 pg/mg creat | Country Brazil. Females volunteers (N:8); September period |
|  |  | Urine | Adolescents/adults | 3 pg/mg creat | Country Brazil. Males volunteers (N:8); September period |
|  |  | Urine | Adolescents/adults | 1.2 pg/mg creat | Country Brazil. Females volunteers (N:8); December period |
|  |  | Urine | Adolescents/adults | 0.3 pg/mg creat | Country Brazil. Males volunteers (N:8); Decewmber period |
|  |  | Urine | Adolescents/adults | 0.3 pg/mg creat | Country Brazil. Females volunteers (N:8); March period |
|  |  | Urine | Adolescents/adults | 0.4 pg/mg creat | Country Brazil. Males volunteers (N:8); March period |
|  |  | Urine | Adults | ELISA (LOD 0.011 ng/ml) | 2.67 pg/g creat | Country Malaysia. Male (N=74) | Semi-quantitative FFQ on milk and dairy products consumption | - | Redzwan, 2012 |
| AFB1 | AFM1 | Urine | Adults | 2.68 pg/g creat | Country Malaysia. Pregnant woman (N=86) |
| AFB1 | AFB1lys | Serum | Adults | ELISA (2 mg/ml) | < LOD | Country India. Healthy adults (N=165) |  |  | Anitha, 2011 |
|  |  | Serum | Adults | ELISA (2 mg/ml) | 2.5-75 pg/mg alb | Country India. HBV-positive subjects (N=85) |
| AFB1 | AFB1alb | Serum | Adults | RIA (LOD 0.01 pmol/mg alb) | 0.6 pmol/mg alb | Country Ghana. HIV-positive (N=155) | Socio-demographic characteristics |  | Jolly, 2011 |
|  |  | Serum | Adults | RIA (LOD 0.01 pmol/mg alb) | 0.46 pmol/mg alb | Country Ghana. HIV-negative (N=159) |
| AFB1 | AFB1lys | Serum | Adults | HPLC | 0.44–268.73 pg/mg alb | Country Ghana. Pregnant (N=755) | Socio-demographic and obstetric characteristics |  | Shuaib, 2010b |
| AFB1 | AFB1 | Urine | Children | HPLC/ELISA | 0.109-2.84 µg/l | Country Cameroon. Malnourished suffering (N=31); Kwashiorkor area | - | - | Tchana, 2010 |
|  |  | Urine | Children | 0109-0.864 µg/l | Country Cameroon. Malnourished suffering (N=11) Kwashiorkor area |
|  |  | Urine | Children | 007-0.155 µg/l | Country Cameroon. Children control group (N=36) |
| AFB1 | AFB1 | Serum | Children/adults/elderly | 0.45-1.56 µg/l | Country Cameroon. Liver cancer patients (N36) |
| AFB1 | AFB1alb | Plasma | Adults | RIA (LOD 0.01 pmol/mg alb) | 0.8 pmol/mg alb | Country Ghana. Adults volunteers (N=82) | - | - | Obuseh, 2010 |
| AFB1 | AFM1 | Urine | Adults | HPLC (LOD 10 pg/ml) | 1646.12 pg/ml creat | Country Ghana. Adults volunteers (N=147) |
| AFB1 | AFM1 | Urine | Adults | HPLC (LOD 0.6 pg/ml | < LOD-39.9 pg/ml | Country Brazil. Healthy volunteers (N=69) | Food frequency (monthly consumption) and 24h food consumption dataprior sampling |  | de Cassia Romero, 2010 |
| AFB1 | AFM1 | Urine | Adults | HPLC FD (LOQ 0.4 pg/ml) | < LOQ | Country Brazil. Male HBV negative (N=5) |  |  | Giolo, 2012 |
|  |  | Urine | Adults | HPLC FD (LOQ 0.4 pg/ml) | 1.76-4.15 pg/ml | Country Brazil. Female HBV negative (N=24) |
|  |  | Urine | Adults | HPLC FD (LOQ 0.4 pg/ml) | 0.74-6.77 pg/ml | Country Brazil. Female HBV positive (N=17) |
|  |  | Urine | Adults | HPLC FD (LOQ 0.4 pg/ml) | 0.67-7.87 pg/ml | Country Brazil. Male HBV positive (N=26) |
| AFB1 | AFB1Lys | Serum | Adults/elderly/very elderly | HPCL FD (LOD 0.4 pg/mg alb | 6.14 pg/mg alb | Country Malaysia. Ethnics Malay (N=93) |  | 0.2 g AFB1 per day | Leong, 2012 |
|  |  | Serum | Adults/elderly/very elderly | 8.80 pg/mg alb | Country Malaysia. Ethnics Chinese (N=58) |
|  |  | Serum | Adults/elderly/very elderly | 9.71 pg/mg alb | Country Malaysia. Ethnics Indian (N=19) |
|  |  | Serum | Adults/elderly/very elderly | 7.67 pg/mg alb | Country Malaysia. Total ethnics (N=170) |
| AFB1 | AFM1 | Serum | Adults | HPLC-FD (LOD -) | 467 pg/ml | Country Egypt. Female HCV high titre (N=10) |  |  | El-Shahat, 2012 |
|  |  | Serum | Adults | 246 pg/ml | Country Egypt. Male HCV high titre (N=10) |
|  |  | Serum | Adults | 27 pg/ml | Country Egypt. Female HCV moderate titre (N=20) |
|  |  | Serum | Adults | 21 pg/ml | Country Egypt. Male HCV moderate titre (N=20) |
|  |  | Serum | Adults | 114 pg/ml | Country Egypt. Control female (N=5) |
|  |  | Serum | Adults | 22 pg.ml | Country Egypt. Control female (N=5) |
| AFB1 | AFB1lys | Serum | Adolescents/adults | HPLC-FD (LOD 0.5 pg/ml) | 10.9 pg/mg alb | Country Ghana. Pregnant woman (N=755) | Socio-demographic characteristics |  | Shuab, 2012 |
| AFB1 | AFM1 | Serum | Adults | TLC (LOQ -) | 35.59-84.93 ppm | Country Egypt. Mothers (N=46) |  | Shouman, 2011 |
| AFB1 | AFB1 | Serum | Infants/toddlers | 30.565-62.795 ppm | Country Egypt. Relative son and daughter male/female (N=46) |
| AFB1 | AFB1 | Urine | Adults | ELISA (LOD 0.0429 ng/ml) | 0.0481 ng/ml | Country Malaysia. Healthy volunteers’ male (N=8) | - | - | Sabran, 2012 |
| AFB1 | AFM1 | Urine | Adults | 0.0382 ng/ml | Country Malaysia. Healthy volunteers’ female (N=14) |
| AFB1 | AFB1alb | Plasma | Adults | RIA (LOD 0.01 pmol/mg alb | 0.9 pmol/mg alb | Country Ghana. Cross-sectional study adults’ HIV negative (N=147) | - | - | Obuseh, 2011 |
|  |  | Plasma | Adults | 1.1 pmol/mg alb | Country Ghana. Cross-sectional study adults HIV positive (N=158) |
| AFB1 | AFB1lys | Serum | Adults | HPLC FLD (LOD 10 pg/ml) | 3.84 pg/mg alb | Country United States. Population with high incidence of hepatocellular carcinoma (N=170) | - | - | Johnson, 2010 |
| AFB1 | AFM1 | Urine | Adults | HPLC FLD (LOD 0.5 pg/ml) | 223.85 ng/g creat | Country United States. Population with high incidence of hepatocellular carcinoma (N=179) |
| AFB1 | AFB1lys | Serum | Adolescents/adults | LC-MS/MS (LOD 0.02 ng/ml) | 186 pg/mg alb | Country Kenya. AIDS Indicator cross sectional study; female, (N=313) | - | - | Yard, 2013 |
|  |  | Serum | Adolescents/adults | 211 pg/mg alb | Country Kenya. AIDS Indicator cross sectional study. Male, (N=282) |
| AFB1 | AFM1 | Urine | Adults | ELISA (LOQ -) | 70.5 ng/l | Country China. Pregnant women (N=512) | - | - | Lei, 2013 |
|  |  | Urine | Adults | 53 ng/l | Country China. Male (N=88) |
| AFB1 | AFB1alb | Serum | Adults | HPLC-FLD (LOD 0.5 pg/ml) | 0.44-268.73 pg/ml | Country Ghana; pregnant women (N=755) | - | - | Shuaib, 2010a |
| AFB1 | AFB1alb | Serum | Adults | LC-MS (LOD 0.5 pg/mg alb) | 19.3 pg/mg alb | Country China. Samples randomly selected from previous multiple screening program for cancer, 1989 (N=75) | - | - | Chen, 2013 |
|  |  | Serum | Adults | 3.6 pg/mg alb | Country China; samples randomly selected from previous multiple screening program for cancer, 1995 (N=100) |
|  |  | Serum | Adults | 2.3 pg/mg alb | Country China. Samples randomly selected from previous multiple screening program for cancer, 1999 (N=100) |
|  |  | Serum | Adults | 1.4 pg/mg alb | Country China. Samples randomly selected from previous multiple screening program for cancer, 12003 (N=100) |
|  |  | Serum | Adults | 0.2 pg/mg alb | Country China. Samples randomly selected from previous multiple screening program for cancer, 2009 (N=100) |
|  |  | Serum | Adults | 0.06 pg/mg alb | Country China. Samples randomly selected from previous multiple screening program for cancer, 2012 (N=100) |
| AFB1 | AFB1lys | Serum | Adults | ELISA (LOQ -) | 8/108 (mean 19.25 pg/mg alb) | Country India. Control group l (N=108) | - | - | Anitha, 2014 |
|  |  | Serum | Child | 18.1 pg/ml alb | Country India. HBV positive; initial stage liver disorder (N=18) |
|  |  | Serum | Child | 77.5 pg/ml alb | Country India. HBV negative; cirrhosis of liver (N=2) |
|  |  | Serum | Child | 575 pg/mg alb | Country India. HBV positive; cirrhosis of liver (N=1) |
| AFs | AFM1 | Breast Milk | Adults | ELISA (LOD 10 ng/ml) | 2-4.5 ng/l | Country Turkey. Lactating woman (N=44) | No cheese consumption | - | Atasever, 2014 |
|  |  | Breast Milk | Adults | 1.3-6 ng/l | Country Turkey. Lactating woman (N=29) | Cheese consumption |
| AFB1 | AFM1 | Breast Milk | Adults | ELISA (LOQ 5 ng/kg) | 0.006-0.022 µg/kg | Country Serbia. Healty pregnant women (N=10) | - | - | Kos, 2014 |
| AFB1 | AFM1 | Breast Milk | Adults | ELISA (LOD 5 ng/l) | 5.36-28.44 nl/l | Country Cyprus. Healthy female, mouldy food consumption (N=34) | Socio-economic status | - | Kunter, 2017 |
|  |  | Breast Milk | Adults | 6.01-10.55 nl/l | Country Cyprus. Healthy female, no mouldy food consumption (N=16) |
| AFB1 | AFM1 | Breast Milk | Adults | HPLC-FLD (LOD 0.0041 ng/g) | 0.013-0.025±0.005 ng/g | Country Brazil. Healthy lactating woman (N=94) | - | - | Ishikawa, 2016 |
| AFB1 | AFM1 | Breast Milk | Adults | ELISA (LOD 0.92 ng/l) | 3.01-34.24 ng/l | Country Mexico. Healthy nursing woman (N=10). January–August 2014 | FFQ (1 week prior sampling) | 2.35 ng/kg bw per day | Cantú-Cornelio, 2016 |
| AFB1 | AFM1 | Breast Milk | Adults | HPLC-FLD (LOD 0.6 pg/ml) | 0-9-18.5 pg/ml | Country Colombia. Healthy nursing mothers (N=50) | FFQ (72h prior sampling) | - | Diaz, 2015 |
| AFB1 | AFM1 | Breast Milk | Adults | HPLC-FLD (LOD 0.005 ng/ml) | 0.01-0.55 ng/ml | Country Tanzania. Lactating mother first month (N=143) | Questionnaire on food intake (24h recall) | 11.08 ng/kg bw per day | Magoha, 2014 |
|  |  | Breast Milk | Adults | 0.01-0.47 ng/ml | Country Tanzania. Lactating mother third month (N=121) | 11.94 ng/kg bw per day |
|  |  | Breast Milk | Adults | 0.01-0.34 ng/ml | Country Tanzania. Lactating mother fifth month (N=118) | 10.91 ng/kg bw per day |
| AFB1 | AFM1 | Breast Milk | Adults | ELISA (LOD 3.01 ng/l) | 14.19-23.89 ng/l | Country Iran. Lactating mothers, urban area (N=160) | Data on socio-demographic, anthropometric and medical history.  Food questionnaire (1 week prior sampling of milk). Association between food and AFM1 occurrence in breast milk samples. | - | Jafari, 2017 |
|  |  | Breast Milk | Adults | ELISA (LOD 3.01 ng/l) | 11.07-39.25 ng/l | Country Iran. Lactating mothers, rural area (N=90) |
| AFB1 | AFM1 | Breast Milk | Adults | ELISA (LOQ -) | 67.78±4.6 ng/kg | Country Jordan. Lactating woman (N=80) | - | - | Omar, 2012 |
|  |  | Breast Milk | Adults | 40.48±7.3 ng/kg | Country Jordan. Woman no cereal consumption (N=10) |
|  |  | Breast Milk | Adults | 51.56±5.3 ng/kg | Country Jordan. Woman consuming less than 28.3 g of cereal per day (N=39) |
|  |  | Breast Milk | Adults | 9.41±5 ng/kg | Country Jordan. Woman consuming more than 28,3 g of cereal per day (N=31) |
|  |  | Breast Milk | Adults | 66.42±6.2 ng/kg | Country Jordan. Woman consuming no dairy products consumption (N=15) |
|  |  | Breast Milk | Adults | 70.3±5.9 ng/kg | Country Jordan. Woman consuming more than 28,3 of dairy products per day (N=65) |
|  |  | Breast Milk | Adults | 40.02±3.1 ng/kg | Country Jordan. Woman consuming less than28,3 g of fruit and vegetables per day (N=22) |
|  |  | Breast Milk | Adults | 48.8±2.4 ng/kg | Country Jordan. Woman consuming more than 28,3 g of fruit and vegetables per day (N=58) |
|  |  | Breast Milk | Adults | 54.8±2.2 ng/kg | Country Jordan. Woman consuming no meat (N=9) |
|  |  | Breast Milk | Adults | 56.9±4.8 ng/kg | Country Jordan. Woman consuming more than 28,3 g of meat per day (N=71) |
| AFB1 | AFM1 | Breast Milk | Adults | ELISA | 0.13-4.91 pg/ml | Country Iran. Healthy mothers (N=87;) summer period | - | - | Rafiei, 2015 |
| AFB1 | AFM1 | Breast Milk | Adults | ELISA (LOQ 5 ng/kg) | 0.006-0.022 mg/kg | Country Serbia. Pregnant healthy (N=109 | - | - | Kos, 2014 |
| AFB1 | AFM1 | Breast Milk | Adults | HPLC/ELISA (LOQ -) | 0.005-0.625 µg/l | Country Cameroon. Lactating women (N=62) | - | - | Tchana, 2010 |
| AFB1 | AFB1lys | Breast Milk | adults | HPLC-FD (LOD 0.013 ng/ml) | 0.007-2.561 ng/g | Country Sudan. Lactating mother (N=94) | Questionnaire on dietary preferences |  | Elzupir, 2012 |
| AFB1 | AFM1 | Breast Milk | Adolescents/adults | ELISA (LOD 5 ng/l | 7.1-10.8 ng/l | Country Iran. Healthy lactating (N=132) | - | - | Ghiasian, 2012 |
| AFB1 | AFM1 | Breast Milk | Adults | HPLC-FLD (LOD 0.005 µg/ml) | 4.65-92.14 ng/l | Country Nigeria. Lactating mothers (N=50) | - | - | Adejumo, 2013 |
| AFB1 | AFM1 | Breast Milk | Adults | ELISA (LOQ 0.5 ng/l 7.3-328.6 ng/l |  | Country Egypt. Lactating mother (N=125) 6 months after parturition | - | - | El-Tras, 2011 |
| AFB1 | AFM1 | Breast Milk | Adults | ELISA (LOD 0.005 µg/l) | 7.1±5.0 µg/l | Country Egypt. Lactating mother (N=150) |  |  | Tomerak, 2011 |
| AF | AFB1 | Blood | Adults | ELISA (LOD 1 ng/ml) | 9.9±5.4 ng/ml | Country Portugal. Adults waste industry workers (N=41) | - | - | Viegas, 2015 |
|  |  | Blood | Adults | <LOQ | Country Portugal. Adults control group (N=30) |
| AFB1 | AFB1 | Serum | Adults | ELISA  ELISA  ELISA  ELISA | 0.03±0.02 ng/g alb | Country Egypt. Adults normal control (N=64) | - | - | Saad-Hussein, 2014 |
|  |  | Serum | Adults | 0.06±0.03 ng/g alb | Country Egypt. Adults milling workers (N=100) |
|  |  | Serum | Adults | 0.11±0.05 ng/g alb | Country Egypt. Adults Bakers (N=90) |
|  |  | Serum | Adults | 0.65±0.47 ng/g alb | Country Egypt. Adults HCC cases (N=32) |
| AFs | AFM1 | Urine | Adults | HPLC-FLD (LOD: 0.002) | 0.042 ng/ml | Country Italy. Mill workers (N=59) | Food consumption questionnaire (1 week prior biological fluid sampliong).  The only food associated with both exposure and AFM1 urine level was chili powder. | - | Ferri, 2017 |
|  |  | Urine | Adults | 0.035 ng/ml | Country Italy. Mill workers exposed to dusts (N=29) |
|  |  | Urine | Adults | 0.027 ng/ml | Country Italy. Workers non exposed to dusts in two mills (N=29) |
| AFs | AFG2 | Urine | Adults | HPLC-FLD (LOD 0.004 ng/ml) | 0.057 ng/ml | Country Italy. Mill workers (N=59) |
| AFs | AFG1 | Urine | Adults | HPLC-FLD (LOD 0.006 ng/ml) | 0.058 ng/ml | Country Italy. Mill workers (N=59) |
| AFs | AFB2 | Urine | Adults | HPLC-FLD (LOD 0.006 ng/ml) | 0.007 ng/ml | Country Italy. Mill workers (N=59) |
| AFs | AFB1 | Urine | Adults | HPLC-FLD (LOD 0.01 ng/ml) | 0.01 ng/ml | Country Italy. Mill workers (N=59) |
| AFs | AFOH | Urine | Adults | HPLC-FLD (LOD 0.025 ng/ml) | <LOD ng/ml | Country Italy. Mill workers (N=59) |
| AFB1 | AFB1alb | Serum | Adults | ELISA (LOQ -) | 0.04±0.002 ng/g alb | Country Egypt. Workers exposed, control group (N=73) | - | - | Saad-Hussein, 2016b |
|  |  | Serum | Adults | 0.07±0.004 ng/g alb | Country Egypt. Workers exposed, flour mill (N=132) |
|  |  | Serum | Adults | 0.1±0.005 ng/g alb | Country Egypt. Workers exposed, sawmill (N=132) |
| AFB1 | AFB1 | Serum | Adults | ELISA (LOD 1 ng/ml) | 0.96 ng/ml | Country Portugal. Workers at slaughterhouse (male) (N=12) |  |  | Viegas, 2016 |
|  |  | Serum | Adults | 1.11 ng/ml | Country Portugal. Workers at slaughterhouse (female) (N=18) |
|  |  | Serum | Adults | <LOD | Country Portugal. Control administrative workers (male) (N=14) |
|  |  | Serum | Adults | <LOD | Country Portugal. Control administrative workers (female) (N=16) |
| AFB1 | AFB1alb | Serum | Adults | ELISA (LOQ -) | 0.04±0.008 ng/g alb | Country Egypt. Group of workers not occupationally exposed (N=100) | Questionnaire on dietary habits. | - | Saad-Hussein, 2016a |
|  |  | Serum | Adults | 0.06±0.003ng/g alb | Country Egypt. Group of flour mill workers (N=100) |
|  |  | Serum | Adults | 0.1±0.01ng/g alb | Country Egypt. Group of bakery workers (N=90) |
|  |  | Serum | Adults | 0.06±0.01 ng/g alb | Country Egypt. Group of flour mill workers, storage (N=19) |
|  |  | Serum | Adults | 0.06±0.01ng/g alb | Country Egypt. Group of flour mill workers, garbling (N=438) |
|  |  | Serum | Adults | 0.08±0.01 ng/g alb | Country Egypt. Group of flour mill workers, grinding (N=15) |
|  |  | Serum | Adults | 0.06±0.01 ng/g alb | Country Egypt. Group of flour mill workers, packaging (N=19) |
| AFB1 | AFalb | Serum | Adults | ELISA (LOD 10 pg/ml) | 6.4-212±4.62 pg/mg alb | Country China. Healthy workers in sugarcane factory (N=121) | AFB1 determination in samples of consumed rice: negative for exluding diet exposure. | - | Mo, 2014 |
|  |  | Serum | Adults | 9-59±13.72 pg/mg alb | Country China. Healthy employers control (N=80) |
| AFB1 | AFB1 | Serum | Adults | ELISA (LOD 1 ng/ml) | <LOQ-8.9 ng/ml | Country Portugal. Workers from seven swine farms (N=28) | - | - | Viegas, 2013 |
|  |  | Serum | Adults | <LOQ | Country Portugal. Workers administrative control group (N=30) |
| AFB1 | AFB1 | Serum | Adults | ELISA (LOQ -) | 38.51 pg/mg alb | Country China. Sugar and papermaking factory workers (N=181); autumn period | - | - | Lai, 2014 |
|  |  | Serum | Adults | 15.58 pg/mg alb | Country China. Administrative worker (N=203); autumn period |
| AFB1 | AFB1 | Serum | Adults | ELISA (LOD 1 ng/ml) | 2.1±1.0 ng/ml | Country Portugal. Male poultry workers (N=20) | - | - | Viegas, 2012a |
|  |  | Serum | Adults | 1.9±1.0 ng/ml | Country Portugal. Poultry workers female (N=11) |  |  |
|  |  | Serum | Adults | < LOD | Country Portugal. Adults control group (N=11) | - | - |
| AFB1 | AFM1 | Urine | Adults | HPLC-FLD (LOQ -) | 0.077 ng/mg creat | Country Egypt. Storage workers in mill (N=19) | - | - | Saad-Hussein, 2013b |
|  |  | Urine | Adults | 0.98 ng/mg creat | Country Egypt. Garbling workers in mill (N=41) |
|  |  | Urine | Adults | 0.313 ng/mg creat | Country Egypt. Grinding workers in mill (N=13) |
|  |  | Urine | Adults | 0.064 ng/mg creat | Country Egypt. Packaging workers in mill (N=22) |
|  |  | Urine | Adults | 0.12 ng/mg creat | Country Egypt. Workers in mill (N=95) |
|  |  | Urine | Adults | 554.2±364.2 pg/ml | Country Egypt. Pre-spinning workers in textile factory (N=14) |
|  |  | Urine | Adults | 459.1±781.6 pg/ml | Country Egypt. Spinning workers in textile factory (N=24) |
|  |  | Urine | Adults | 293.5±336.5 pg/ml | Country Egypt. Weaving in textile factory (N=20) |
|  |  | Urine | Adults | 68.5±136.8 pg/ml | Country Egypt. Controls (64) |

1. Unless specified, range of values or mean±standard deviation is reported. FFQ: Food Frequency Questionnaire.

Table L2. Ochratoxin A\_List of biomarker, substrate, population group, analytical method, range of values. Information on the study, association with the diet and the exposure values are also reported when available.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Mycotoxin | Biomarker | Substrate | Population group | Analytical method (LOQ/LOD) | Range of values a) | Study description | Association with the diet | Exposure value | Reference |
| OTA | OTA+phase-II metabolites | Urine | Infant/toddlers | LC-MS/MS (LOQ 50 ng/l) | 30-220 ng/l | Country Germany. Healthy children German origin (N=10), age range 8d-2y | - | - | Muñoz, 2017 |
|  |  | Urine | Infant/toddlers | LC-MS/MS (LOQ 50 ng/l) | 30-1360 ng/l | Country Germany. Healthy children turkish origin (N=28), age range 8d-2y |
|  |  | Urine | Adults | LC-MS/MS (LOQ 50 ng/l) | 205 ng/l | Country Germany. Healthy population (N=11) |
| OTA | OTA | Urine | Adults | HPLC-FLD (LOQ 0.008 µg/l) | 0.019-0.022 µg/l | Country Portugal. Healthy volunteers (N=142). Winter 2007-2008, summer 2008 | Survay of regional bread and pork OTA content and dietary intake for calculation of exposure. | 1.31 ng/kg bw/day | Duarte, 2015 |
|  |  | Urine | Adults | HPLC-FLD (LOQ 0.008 µg/l) | 0.016-0.019 µg/l | Country Portugal. Healthy volunteers (N=120). Winter 2008-2009, summer 2009 |  |
|  |  | Urine | Adults | HPLC-FLD (LOQ 0.008 µg/l) | 0.017±0.01 µg/l | Country Portugal, Porto town. Healthy volunteers (N=111). 2007-2011 |  |
|  |  | Urine | Adults | HPLC-FLD (LOQ 0.008 µg/l) | 0.016±0.011 µg/l | Country Portugal, Coimbra town. Healthy volunteers (N=94). 2007-2012 |  |
| OTA | OTA | Urine | Adults | HPLC-FLD (LOQ 0.008 µg/l) | 0.019±0.014 µg/l | Country Portugal, Lisboa town. Healthy volunteers (N=150). 2007-2013 |  |
| OTA | OTA | Urine | Adults | HPLC-FLD (LOQ 0.008 µg/l) | 0.023±0.016 µg/l | Country Portugal, Alentejo town. Healthy volunteers (N=117). 2007-2014 |  |
| OTA | OTA | Urine | Adults | HPLC-FLD (LOD 0.02 µg/l) | 0.2-2.6 µg/l | Country Lybia (Al-Jafara region). Nephopatic clinical group (N=65). | - | - | Sassi, 2010 |
|  |  | Urine | Adults | HPLC-FLD (LOD 0.02 µg/l) | < LOD | Country Lybia (Al-Jafara region). Patiens in dialysis group (N=5). |
|  |  | Urine | Adults | HPLC-FLD (LOD 0.02 µg/l) | < LOD | Country Lybia (Al-Jafara region). Healthy control group (N=15). |
| OTA | OTA | Urine | Adults | ELISA (LOQ-) | 51.88-85.15 ng/ml | Case study on dyalyzed patient group (N=3) | - |  | Simion, 2012 |
| OTA | OTA | Urine | Adults/Elderly | HPLC-FLD (LOQ 0.008 µg/l) | 0.008-0.062 µg/l | Healthy group, women (N=50). Winter 2007 | - | - | Duarte, 2012 |
|  |  | Urine | Adults | HPLC-FLD (LOQ 0.008 µg/l) | 0.008-0.071 µg/l | Healthy group, male (N=45). Winter 2007 |
|  |  | Urine | Adults/Elderly | HPLC-FLD (LOQ 0.008 µg/l) | 0.008-0.040 µg/l | Healthy group, women (N=50). Summer 2008 |
|  |  | Urine | Adults | HPLC-FLD (LOQ 0.008 µg/l) | 0.008-0.039 µg/l | Healthy group, male (N=45). Summer 2008 |
| OTA | OTA | Urine | Adults | LC-MS/MS (LOQ 0.05 ng/ml) | 0.02-0.14 ng/ml | Country Germany. Healthy volunteers (N=13). Age Range 20-57 y | - | - | Muñoz, 2010a |
| OTA | OTαAglycone | Urine | Adults | LC-MS/MS (LOQ -) | 0.05-4.70 ng/ml | Country Germany. Healthy volunteers (N=13). Age Range 20-57 y |
| OTA | OTα Total | Urine | Adults | LC-MS/MS (LOQ -) | 0.49-7.12 ng/ml | Country Germany. Healthy volunteers (N=13). Age Range 20-57 y |
| OTA | OTA | Plasma | Adults | LC-MS/MS (LOQ 0.1 ng/ml) | 0.19-0.29 ng/ml | Country Germany. Healthy volunteers (N=13). Age Range 20-57 y |
| OTA | OTαAglycone | Plasma | Adults | LC-MS/MS (LOQ -) | 0.03-0.17 ng/ml | Country Germany. Healthy volunteers (N=13). Age Range 20-57 y |
| OTA | OTα Total | Plasma | Adults | LC-MS/MS (LOQ -) | 0.07-1.64 ng/ml | Country Germany. Healthy volunteers (N=13). Age Range 20-57 y |
| OTA | Otα | Urine | Adults | HPLC-FLD (LOQ 0.076 µg/l) | 0.056-2.894 µg/l | Country Spain. General population, healthy volunteers (N=72). | Daily intake from literature data. FFQ (3 day food consumption record). |  | Coronel, 2011a |
| OTA | OTA | Urine | Adults | HPLC-FLD (LOQ 0.112 ng/ml) | 0.057-0.562 µg/l | Country Spain. General population, healthy volunteers (N=72). |
| OTA | OTA | Urine | Adults |  | 9.68 ng/g creat | Country Turkey (different cities). Group oh healthy subjects (N=180) | - |  | Ates, 2011 |
| OTA | OTA | Urine | Adults | HPLC-FLD (LOQ 0.053 ng/ml) | Before nd–1718.94 ng/g creat;  After nd–1771.83 ng/g creat | Country Croatia. Pregnant women group (N=40) with and without enzymatic hydrolysis | FFQ (30 days prior sampling) | - | Klapec, 2012 |
| OTA | Otα | Urine | Adults | HPLC-FLD (LOQ 0.065 ng/ml) | Before nd–2904.33 ng/g creat; After 165.08–7797.14 ng/g creat | Country Croatia. Pregnant women group (N=40) with and without enzymatic hydrolysis |
| OTA | OTA | Breast Milk | Adults | HPLC-MS (LOD 10 ng/l) | LOD-186 ng/l | Country Chile. Group of mothers (N=21). Longitudinal study mother–child pairs over a period of 6 M (days 1-6; days 15-30; month 2; month 4; month 6) | - | - | Muñoz, 2014 |
| OTA | OTA | Plasma | Adults | HPLC-MS (LOD 70 ng/l) | LOD-639 ng/l | Country Chile. Group of mothers (N=21). Longitudinal study mother–child pairs over a period of 6 M (days 1-6; days 15-30; month 2; month 4; month 6) | - | - |
| OTA | OTA | Urine | Toddlers | HPLC-MS (LOD 30 ng/l) | LOD-433 ng/l | Country Chile. Group of offspring (N=21). Longitudinal study mother–child pairs over a period of 6 M (days 1-6; days 15-30; month 2; month 4; month 6) | Infants’ daily intake calculated from data of OTA levels in breast milk. | 5-12.7 ng/kg bw per day |
| OTA | OTA | Breast Milk | Adults | ELISA (LOD 1.6 ng/l) | 1.6-60 ng/ml | Country Iran. Breastfeeding mothers group (N=87) | - |  | Dehghan, 2014 |
| OTA | OTA | Breast Milk | Adults | HPLC-FLD (LOD 10 ng/l) | 620.87-13111.30 ng/l | Country Turkey. Breastfeeding mothers (N=75) | - |  | Gurbay, 2009 |
| OTA | OTA | Breast Milk | Adults | HPLC-FLD (LOQ 30 ng/l) | 44-184 ng/l | Country Chile. Breastfeeding mothers (N=9) | - |  | Muñoz, 2010b |
| OTA | Otα | Breast Milk | Adults | HPLC-FLD (LOQ 40 ng/l) | LOQ-100 ng/l | - |  |
| OTA | OTA | Serum Cord Blood | Adults | HPLC-FLD (LOQ 50 ng/l ) | 84-4835 ng/l | Goup of breastfeeding mothers italian and non italian (N=130) | Correlations with mothers’ dietary Dietary questionnaire on eating habits. | - | Biasucci, 2010 |
| OTA | OTA | Breast Milk | Adults | HPLC-FLD (LOQ 50 ng/l ) | 1.1-75.1 ng/l | Goup of breastfeeding mothers italian and non italian (N=57) | - |
| OTA | OTA | Plasma | Adults | ELISA (LOQ 371 pg/ml) | 371-1585 ng/ll | Country Brazil, Paraná. Group of general population, women (N=149) | OTA average daily intake estimated from renal clearance of OTA | - | Rigobello, 2016 |
| OTA | OTA | Serum | Adults | HPLC-FLD (LOD 0.2 ng/ml) | 0.20-1.53 ng/mL | Country Egypt. Group of pregnant women (N=98) and their fetuses | - | - | Woo, 2016 |
| OTA | OTA | Serum | Adults | HPLC-FLD (LOD 0.1 ng/ml) | 0.4-3.9 ng/ml | Group of Balkan endemic nephropathy patients (N=18). Age range 61-79 y | - | - | Yordanova, 2010 |
|  |  | Serum | 38 Offspring of BEN patients | HPLC-FLD (LOD 0.1 ng/ml) | 0.30-1.80 ng/ml | Group of offspring of Balkan endemic nephropathy patients (N=38). Age range 38-63 y |
|  |  | Serum | 22 Offspring of controls patients | HPLC-FLD (LOD 0.1 ng/ml) | 0.39-0.93 ng/ml | Group of offspring of control patience (N=22). Age range 35-61 y |
| OTA | OTA | Blood | Adults | HPLC-FLD (LOQ 0.025ng/ml) | 0.03-0.41 ng/ml | Country Pakistan. Group of BEN patients (N=56) | - | - | Aslam, 2012 |
|  |  | Blood | Adults | HPLC-FLD (LOQ 0.025ng/ml) | 0.04-1.24 ng/ml | Country Pakistan. Group of healthy control (N=31) |
| OTA | OTA | Blood | Adults | HPLC-MS/MS (LOQ 0.013 ng/ml) | 0.071-0.383 ng/ml | Country Germany. General population group of coffee drinker (N=34). | FFQ (30 days and 24 h recall) | - | Cramer, 2016 |
| OTA | 2'R-OTA | Blood | Adults | HPLC-MS/MS (LOQ 0.013 ng/ml) | 0.021-0.414 ng/ml | Country Germany. General population group of coffee drinker (N=34). |
| OTA | OTA | Blood | Adults | HPLC-MS/MS (LOQ 0.013 ng/ml) | 0.113-0.325 ng/ml | Country Germany. General population group of non coffee drinker (N=16). |
| OTA | 2'R-OTA | Blood | Adults | HPLC-MS/MS (LOQ 0.013 ng/ml) | < LOQ | Country Germany. General population group of non coffee drinker (N=16). |
| OTA | OTA | Serum | Adults | HPLC-FLD (LOD 01 ng/ml) | 0.129-10.93 ng/ml | Group of HCC patients (N=39) | - | - | Ibrahim, 2013 |
|  |  | Serum | Adults | HPLC-FLD (LOD 0.005 ng/ml) | 0.005-0.50 ng/ml | Group of healthy population (N=22) |
| OTA | OTA | Serum | Adults | HPLC-FLD (LOD 0.025ng/ml) | 0.12–1.5 ng/mL | Country Tunisia Healthy popilaton group (N=44) | OTA content in food daily consumed by nephropathy patients and healthy subjects | - | Khlifa, 2012 |
|  |  | Serum | Adults | HPLC-FLD (LOD 0.025ng/ml) | 0.12–3.8 ng/ml | Country Tunisia Group of nephropathy patients (N=24-) |
| OTA | OTA | Serum | Adults | ELISA (LOD 25 ng/l) | 0.109-0.151 ng/ml | Country Turkey (different regions). Group oh healthy subjects (N=87). Season winter. | OTA daily intake from the serum levels using Breitholtz eq. | 0.182 ng/kg bw/day | Erkekoglu, 2010 |
|  |  | Serum | Adults | ELISA (LOD 25 ng/l) | 0.233-0.338 ng/ml | Country Turkey (different regions). Group oh healthy subjects (N=79). Season summer. | 0.408 ng/kg bw/day |
|  |  | Serum | Elderly | ELISA (LOD 25 ng/l) | 0.130-0.135 ng/ml | Country Turkey (different regions). Group oh healthy subjects (N=16). Season summer. | 0.182 ng/kg bw/day |
|  |  | Serum | Elderly | ELISA (LOD 25 ng/l) | 0.098-0.475 ng/ml | Country Turkey (different regions). Group oh healthy subjects (N=18). Season summer. | 0.408 ng/kg bw/d |
|  |  | Serum | Children | ELISA (LOD 25 ng/l) | 0.094-0.285 ng/ml | Country Turkey (different regions). Group oh healthy subjects (N=17). Season winter. | 0.182 ng/kg bw/d |
|  |  | Serum | Children | ELISA (LOD 25 ng/l) | 0.161-0.877 ng/ml | Country Turkey (different regions). Group oh healthy subjects (N=22). Season summer. | 0.408 ng/kg bw/d |
| OTA | OTA | Serum | Adults | HPLC-FLD (LOQ 0.15 ng/ml) | 1.8-65 ng/ml | Group of patients with chronic interstitial nephropaty, unknown aetiology (N=83) | OTA daily intake from the serum levels using Breitholtz eq. | 26 ng/kg bw/d | Zaied, 2011 |
|  |  | Serum | Adults | HPLC-FLD (LOQ 0.15 ng/ml) | 1.0-21.6 ng/ml | Group of patients with chronic interstitial nephropaty, known aetiology (N=77) | 7.73 ng/kg bw/d |
|  |  | Serum | Adults | HPLC-FLD (LOQ 0.15 ng/ml) | 1.1-16.3 ng/ml | Group of patients with glomerular nephropaty (N=61) | 8.12 ng/kg bw/d |
|  |  | Serum | Adults | HPLC-FLD (LOQ 0.15 ng/ml) | 1.5-16 ng/ml | Group of patients with chronic vascular nephropaty (N=49) | 7.74 ng/kg bw/d |
|  |  | Serum | Adults | HPLC-FLD (LOQ 0.15 ng/ml) | 1.7-8.5 ng/ml | Group of healthy volunteers (N=138) | 4.42 ng/kg bw/d |
| OTA | OTA | Serum | Adults | ELISA (LOQ-) | 49.94-128 ng/l | Group of patients undergoing dialysis (N=10) | Data on frequency of consumption (cereals, nuts and seeds, spices, coffe, tea, beer and wine). | - | Simion, 2011 |
| OTA | OTA | Serum | Adults (man) | HPLC-FLD (LOQ 0.07 ng/ml) | 0.15-5.57 ng/ml | Group of man blood donors (N=120) | Questionnaire on consumption and origin of food/beverages. OTA daily intake from the serum levels using Breitholtz eq and correlation with food consumption. | - | Medina, 2010 |
|  |  | Serum | Adults (women) | HPLC-FLD (LOQ 0.07 ng/ml) | 0.26-5.62 ng/ml | Group of women blood donors (N=48) |
| OTA | OTA | Serum | Adults | HPLC (LOQ 0.060 µg/l) | 0.06-10.92 µg/l | Country Spain. General population (N=325). 2008-2009 | Daily intake from literature data on food contamination, FFQ and 3-day food consumption record. | - | Coronel, 2011b |

1. Unless specified, range of values or mean±standard deviation is reported. FFQ: Food Frequency Questionnaire.

Table L3. Deoxynivalenol\_List of biomarker, substrate, population group, analytical method, range of values. Information on the study, association with the diet and the exposure values are also reported when available.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Mycotoxin | Biomarker | Substrate | Population Group | Analytical Method (LOQ/LOD) | Range of Valuesa) | Study Description | Association With The Diet | Value Exp | Ref |
| DON | DON3S | Urine | Adults | LC-MS/MS (LOD 0.45 µg/l) | 0.45-58 µg/l | Country Croatia. Pregnant women (N=40), range 26-33 y. 2011. | - | - | Warth, 2016 |
| DON | DON15S | Urine | Adults | LC-MS/MS (LOD 0.035 µg/l) | < LOD | Country Croatia. Pregnant women (N=40), range 26-33 y. 2011. | - | - |
|  |  | Urine | Adults | LC-MS/MS (LOD 0.035 µg/l) | 2.1 µg/l | 1 volumteer, male. Re-investigation of urine samples from an toxicokinetics study | 8 days duplicate diet survey | DON intake 135 µg/day |
| DON | DON | Urine | Adults | HPLC-MS/MS (LOD 0.12 ng/ml) | LOD-769 ng/mg creat | Country United Kingdom. Pregnant woman day1 (N=42) | FFQ comprising of 61 cereal-based food items, split into seven different food categories. | - | Wells, 2016 |
|  |  | Urine | Adults | HPLC-MS/MS (LOD 0.12 ng/ml) | LOD-269 ng/mg creat | Country United Kingdom. Pregnant woman day2 (N=42) |
| DON | DONglucur | Urine | Adults | HPLC-MS/MS (LOD 0.265 ng/ml) | 40.1 ng/mg creat | Country United Kingdom. Pregnant woman day1 (N=42) |
|  |  | Urine | Adults | HPLC-MS/MS (LOD 0.265 ng/ml) | 38.4 ng/mg creat | Country United Kingdom. Pregnant woman day2 (N=42) |
| DON | DON | Urine | Adults | LC-MS/MS (LOD 0.16 ng/ml) | 0.64±0.68 ng/mg creat | Country Bangladesh, urban/rural summer. Healthy population (N=62). 2013 | FFQ (2 days and standard food habits).  Demographic characteristics. | 6.3±9.1 ng/kg bw | Ali, 2016c |
|  |  | Urine | Adults | LC-MS/MS (LOD 0.16 ng/ml) | 0.27±0.27 ng/mg creat | Country Bangladesh, urban/rural winter. Healthy population (N=62). 2013 | 6.0±6.1 ng/kg bw |
| DON | DOM1 | Urine | Adults | LC-MS/MS (LOD 0.1 ng/ml) | < LOD | Country Bangladesh, urban/rural winter/summer. Healthy population (N=62). 2013 | - |
| DON | DON | Urine | Adults | LC-MS/MS (LOD 0.16 ng/ml) | 0.69±0.73 ng/mg creat | Country Bangladesh, rural summer. Healthy volunteers (N=30), 2013 | 6.9±6.4 ng/kg bw |
|  |  | Urine | Adults | LC-MS/MS (LOD 0.16 ng/ml) | 0.26±0.26 ng/mg creat | Country Bangladesh, rural winter. Healthy volunteers (N=30), 2013 | 6.0±7.4 ng/kg bw |
|  |  | Urine | Adults | LC-MS/MS (LOD 0.16 ng/ml) | 0.59±0.64 ng/mg creat | Country Bangladesh, urban summer. Healthy volunteers (N=32), 2013 | 5.7±11.1 ng/kg bw |
|  |  | Urine | Adults | LC-MS/MS (LOD 0.16 ng/ml) | 0.26±0.26 ng/mg creat | Country Bangladesh, urban winter. Healthy volunteers (N=32), 2013 | 6.0±4.8 ng/kg bw |
|  |  | Urine | Adults | LC-MS/MS (LOD 0.16 ng/ml) | 10.50±16.46 ng/mg creat | Country Germany. Healthy volunteers (N=50), 2013 | 268±199 ng/kg bw |
| DON | DOM1 | Urine | Adults | LC-MS/MS (LOD 0.1 ng/ml) | 0.20±0.23 ng/mg creat | Country Germany. Healthy volunteers (N=50), 2013 | - |
| DON | DON Total | Urine | Adults | HPLC-MS/MS (LOQ 0.5 ng/ml) | 5.3 ng/ml (mean value) | Country Sweden. Healthy volunteers (N=299). 2010. Single mycotoxin measurement. Data comparison study on data from single-mycotoxin and a multi-mycotoxin methods | Survey on dietary habits | - | Turner, 2017 |
|  |  | Urine | Adults | UHPLC-MS/MS (LOQ 1.5 ng/ml) | 4.3 ng/ml (mean value) | Country Sweden. Healthy population (N=299), 2010. Multymycotoxin measurement. Comparison study on data from single-mycotoxin and a multimycotoxin methods |
| DON | DON | Urine | Adults | LC-MS/MS (LOD 0.16 ng/ml) | 1.14±2.47 ng/mg creat | Country Bangladesh, rural. Pregnant woman (N=32), 2014 | FFQ (2 days and standard food habits).  Demographic characteristics. | 3.1-154.0 ng/kg bw | Ali, 2015b |
|  |  | Urine | Adults | LC-MS/MS (LOD 0.16 ng/ml) | 3.60±6.63 ng/mg creat | Country Bangladesh, suburban. Pregnant woman (N=22), 2014 | 4.7-460.8 ng/kg bw |
|  |  | Urine | Adults | LC-MS/MS (LOD 0.16 ng/ml) | 2.14±4.74 ng/mg creat | Country Bangladesh. Pregnant woman (N=54), 2014 | 3.1-460.8 ng/kg bw |
| DON | DOM1 | Urine | Adults | LC-MS/MS (LOD 0.1 ng/ml) | < LOD | Country Bangladesh. Pregnant woman (N=54), 2014 | - |
| DON | DON Total | Urine | Children | LC-MS (LOD 0.12 ng/ml) | 3.53-4.34 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=120), day 1-2 | FFQ, food consumption diary | - | Brera, 2015 |
|  |  | Urine | Adolescences | LC-MS (LOD 0.12 ng/ml) | 14.2-17.2 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=120), day 1-2 |
|  |  | Urine | Adults | LC-MS (LOD 0.12 ng/ml) | 7.4-17.1 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=335), day 1-2 |
|  |  | Urine | Elderly | LC-MS (LOD 0.12 ng/ml) | 5.97-13 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=60), day 1-2 |
| DON | free DON | Urine | Children | LC-MS (LOD 0.12 ng/ml) | 16.3-20.2 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=120), day 1-2 |
|  |  | Urine | Adolescences | LC-MS (LOD 0.12 ng/ml) | 2.43-4.2 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=120), day 1-2 |
|  |  | Urine | Adults | LC-MS (LOD 0.12 ng/ml) | 1.52-4.28 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=335), day 1-2 |
|  |  | Urine | Elderly | LC-MS (LOD 0.12 ng/ml) | 1.14-3.07 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=60), day 1-2 |
| DON | DONglucur | Urine | Children | LC-MS (LOD -) | 12.3-15.5 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=120), day 1-2 |
|  |  | Urine | Adolescences | LC-MS (LOD -) | 11-13.5 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=120), day 1-2 |
|  |  | Urine | Adults | LC-MS (LOD -) | 5.88-12.8 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=335), day 1-2 |
|  |  | Urine | Elderly | LC-MS (LOD -) | 4.84-9.36 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=60), day 1-2 |
| DON | DOM1 Total | Urine | Children | LC-MS (LOD 0.25 ng/ml) | < LOD-0.005 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=120), day 1-2 |
|  |  | Urine | Adolescences | LC-MS (LOD 0.25 ng/ml) | 0.01-0.07 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=120), day 1-2 |
|  |  | Urine | Adults | LC-MS (LOD 0.25 ng/ml) | 0.01-0.08 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=335), day 1-2 |
|  |  | Urine | Elderly | LC-MS (LOD 0.25 ng/ml) | < LOD-0.12 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=60), day 1-2 |
| DON | DOM1glucur | Urine | Children | LC-MS (LOD -) | < LOD-0.03 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=120), day 1-2 |
|  |  | Urine | Adolescences | LC-MS (LOD -) | 0.01-0.16 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=120), day 1-2 |
|  |  | Urine | Adults | LC-MS (LOD -) | 0.01-0.05 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=335), day 1-2 |
|  |  | Urine | Elderly | LC-MS (LOD -) | < LOD-0.12 ng/mg creat | Countries Italy, Norway and United Kingdom. Healthy volunteers (N=60), day 1-2 |
| DON | DON+DONglucur+DOM1 | Urine | Adults | LC-MS/MS (LOD 0.1 ng/ml) | 7.1 ng/mg creat | Country United Kingdom. Healthy adults volunteers (N=15). Low Fusarium prevalence (2011) | - | 24h urine: 195.9 ng/kg bw/day | Gratz, 2014 |
| DON | DON+DONglucur+DOM2 | Urine | Adults | LC-MS/MS (LOD 0.1 ng/ml) | 13.5 ng/mg creat | Country United Kingdom. Healthy adults volunteers (N=15). High Fusarium prevalence (2012) | 24h urine: 518.6 ng/kg bw/day |
| DON | DON | Urine | Toddlers | LC-MS (LOD 0.5 ng/ml) | 1.1 ng/ml (geom mean value) | Country Tanzania. Healthy children, age range 6-14 months (N=166). July 2010, first visit. 3 geographic locations | DON level in maize flour from each family to estimate the percentage of DON excreted in the urine. | 47.1–83.9 ng/kg bw/day | Srey, 2014 |
|  |  | Urine | Toddlers | LC-MS (LOD 0.5 ng/ml) | 2.3 ng/ml (geom mean value) | Country Tanzania. Healthy children, age range 6-14 months (N=166). July 2010, second visit. 3 geographic locations | 88.3-168.8 ng/kg bw/day |
|  |  | Urine | Toddlers | LC-MS (LOD 0.5 ng/ml) | 5.7 ng/ml (geom mean value) | Country Tanzania. Healthy children, age range 6-14 months (N=166). July 2011, third visit. 3 geographic locations | 191.2-375.9 ng/kg bw/day |
| DON | free DON+DONglucur | Urine | Adults | LC-MS (DON LOD 0.06 ng/ml) | 0.5-116.7 ng/mg creat | Country United Kingdom. Large multi-ethnic mother/infant birth cohort. Pregnant woman (N=85) age range 21-44 y. South Asian origin and non-South Asian. 2008-2009. | DON food intake estimated from FFQ (4 week, average intakes of 120-item. | 2.4 µg/day (South Asian); 0.2 µg/day (non South Asian) | Hepworth, 2012 |
| DON | free DON+DON15glucur | Urine | Adults | LC-MS/MS (LOQ -) | 11-24 ng/ml | Country Austria. Healthy adult volunteers (N=27), age range 20-63 | Questionnaire on the diet of the previous day. | - | Warth, 2012 |
| DON | DON total | Urine | Adults | LC-MS/MS (LOQ 13 ng/ml) | < LOQ-63 ng/ml | Country Austria. Healthy adult volunteers (N=27), age range 20-63 |
| DON | DON3glucur | Urine | Adults | LC-MS/MS (LOQ 20 ng/ml) | < LOQ-13 ng/ml | Country Austria. Healthy adult volunteers (N=27), age range 20-63 |
| DON | DON15glucur | Urine | Adults | LC-MS/MS (LOQ 10.6 ng/ml) | < LOQ-43 ng/ml | Country Austria. Healthy adult volunteers (N=27), age range 20-63 |
| DON | DON+DON3glucur+DON15glucur | Urine | Adults | LC-MS/MS (LOQ -) | < LOQ-63 ng/ml | Country Austria. Healthy adult volunteers (N=27), age range 20-63 |
| DON | free DON+DONglucur | Urine | Adults | LC-MS | 5.9 ng/mg creat | Country China. Healthy female volunteer (N=60), age range 40–70 y. 1997-1998 | Rice and wheat dietary staples. | - | Turner, 2011 |
| DON | DOM1 | Urine | Adults | LC-MS | < LOD | Country China. Healthy female volunteer (N=60), age range 40–70 y. 1997-1998 |
| DON | total DON | Urine | Adults | LC-MS/MS (LOQ 0.5 ng/ml) | 3.3 ng/mg creat | Country Sweden. Adults males volunteers (N=154) range age 18-80 y. 2010 | Cereal dietary intake from National survey on dietary habits. | Daily DON intake 176±81 ng/kg bw | Wallin, 2013 |
|  |  | Urine | Adults | LC-MS/MS (LOQ 0.5 ng/ml) | 3.8 ng/mg creat | Country Sweden. Adults female volunteers (N=172), age range 18-80 y. 2011 | Daily DON intake 156±89 ng/kg bw |
| DON | DON | Urine | Adults | LC-MS (LOD 0.5 ng/ml) | 0.8-28.8 ng/ml | Country France. Healthy farmer volunteer (N=76) age range 23-74 | Questionnaire including dietary habits. | 24h urine: 264 ng/kg bw/day | Turner, 2010 |
| DON | DOM1 | Urine | Adults | LC-MS (LOD 0.2 ng/ml) | 0.2-2.8 ng/ml | Country France. Healthy farmer volunteer (N=76) age range 23-74 | 24h urine: 264 ng/kg bw/day |

1. Unless specified, range of values or mean±standard deviation is reported. FFQ: Food Frequency Questionnaire.

Table L4. Fumonisins\_List of biomarker, substrate, population group, analytical method, range of values. Information on the study, association with the diet and the exposure values are also reported when available.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Mycotoxin | Biomarker | Substrate | Population Group | Analytical Method (LOQ/LOD) | Range of Valuesa) | Study Description | Association with the diet | Exposure Value | Reference |
| FBs | FB1 | Urine | Adults | LC-MS (LOQ 0.03 µg/l) | 2.27 µg/l | Country Guatemala. Department of Chimaltenango. Healthy Female (N=436) |  | - | Torres, 2014 |
|  |  | Urine | Adults | 0.38 µg/l | Country Guatemala. Department of Escuintla. Healthy Female (N=401) |  |
|  |  | Urine | Adults | 0.26 µg/l | Country Guatemala. Department of Jutiapa. Healthy Female (N=399) |  |
| FBs | Sa/So | Urine | Adults | HPLC-FLD (LOQ -) | 0.21±0.08 | Country South Africa, Centane region. Healthy population (N=31). Age range 32-66 | Calculated maize intake 0.39±0.19 kg/day | 3.9±7.3 µg/kg bw/day | van der Westhuizen, 2010 |
|  |  | Urine | Adults | 0.20±0.12 | Country South Africa, Bizana region. Healthy population (N=36). Age range 30-66 | Calculated maize intake 0.41±0.21 kg/day | 4.1±7.6 µg/kg bw/day |
| FBs | Sa/So | Plasma | Adults | HPLC-FLD (LOQ -) | 0.29±0.09 | Country South Africa, Centane region. Healthy population (N=31). Age range 32-66 | Calculated maize intake 0.39±0.19 kg/day | 3.9±7.3 µg/kg bw/day |
|  |  | Plasma | Adults | 0.28±0.11 | Country South Africa, Bizana region. Healthy population (N=36). Age range 30-66 | Calculated maize intake 0.41±0.21 kg/day | 4.1±7.6 µg/kg bw/day |
| FBs | FB1 | Urine | Adults | LC-MS (LOQ 0.020 µg/l) | 0.144-0.225 µg/l (0.470 μg/g creat) | Country South Africa. Healthy population, female (N=22), age range 20-70 y | Dietary recall survey. Duplicate diet | 4.84 ng/kg bw | van der Westhuizen, 2011 |
| FBs | FB1 | Urine | Adults | LC-MS (LOD 0.04 µg/l) | < LOD-4 µg/l | Country Guatemala, Chimaltenango and Escuintla region. Healthy volunteers male and female (N=177). | Consumption of maize-based foods ≥ 410 g/day.  (0.356 g FB1/g maize × 337 g maize/day)/67 kg) | 0.45 μg/kg bw day | Riley, 2012 |
| FBs | FB2+FB3 | Urine | Adults | -l | < LOD |  |
| FB1 | FB1 | Faeces | Adults | HPLC-PDA (LOQ -) | 0.38 µg/kg | Country South Africa. Healthy volunteers (N=41) | - | - | Phoku 2012 |
| FBs | FB1, FB2 | Urine | Adults | LC MS/MS (LOQ 10 µg/l) | < LOQ | Country Portugal, urban and a rural population. Healthy volunteers (N=68). | - | - | Silva, 2010 |
| FBs | Sa | Plasma | Adults | HPLC-FLD (Sa LOQ 0.14 µg/l) | 4.1±3.6 µg/l | Country Spain. General population, maize-based consumer (N=68). 2008 | FFQ (1 year, 3 days food consumption records). | Food intake 0.23 ng/kg bw day | Cano-Sancho, 2011 |
|  |  | Plasma | Adults | 6.5±9.2 µg/l | Country Spain. General population, non maize-based consumer (N=68). 2008 | FFQ (1 year, 3 days food consumption records). | Food intake 0.0 ng/kg bw day |
| FBs | So | Plasma | Adults | HPLC-FLD (So LOQ 0.15 µg/l) | 7.8±6.8 µg/l | Country Spain. General population, maize-based consumer (N=68). 2008 | FFQ (1 year, 3 days food consumption records). | Food intake 0.23 ng/kg bw day |
|  |  | Plasma | Adults | 14.3±16.5 µg/l | Country Spain. General population, non maize-based consumer (N=68). 2008 | FFQ (1 year, 3 days food consumption records). | Food intake 0.0 ng/kg bw day |
| FBs | Sa/So | Plasma | Adults |  | 0.54±0.16 µg/l | Country Spain. General population, maize-based consumer (N=68). 2008 | FFQ (1 year, 3 days food consumption records). | Food intake 0.23 ng/kg bw day |
|  |  | Plasma | Adults | 0.45±0.12 µg/l | Country Spain. General population, non maize-based consumer (N=68). 2008 | FFQ (1 year, 3 days food consumption records). | Food intake 0.0 ng/kg bw day |
| FBs | Sa | Urine | Adults | HPLC-FLD (Sa LOQ 0.14 µg/l) | 1.29±2.15 µg/l | Country Spain. General population, maize-based consumer (N=35). 2008 | Maize-based consumer. FFQ (1 year, 3 days food consumption records). | Food intake 0.14 ng/kg bw day |
|  |  | Urine | Adults | 0.95±2.15 µg/l | Country Spain. General population, low and non maize-based consumer (N=43). 2008 | Low and non maize-based consumer. FFQ (1 year, 3 days food consumption records). | Food intake 0.02 ng/kg bw day |
| FBs | So | Urine | Adults | HPLC-FLD (So LOQ 0.15 µg/l) | 2.59±0.85 µg/l | Country Spain. General population, maize-based consumer (N=35). 2008 | Maize-based consumer. FFQ (1 year, 3 days food consumption records). | Food intake 0.14 ng/kg bw day |
|  |  | Urine | Adults | 2.57±5.02 µg/l | Country Spain. General population, low and non maize-based consumer (N=43). 2008 | Low and non maize-based consumer. FFQ (1 year, 3 days food consumption records). | Food intake 0.02 ng/kg bw day |
| FBs | Sa/So | Urine | Adults |  | 0.62±0.47 µg/l | Country Spain. General population, maize-based consumer (N=35). 2008 | FFQ (1 year, 3 days food consumption records). | Food intake 0.14 ng/kg bw day |
|  |  | Urine | Adults | 0.55±0.47 µg/l | Country Spain. General population, low and non maize-based consumer (N=43). 2008 | FFQ (1 year, 3 days food consumption records). | Food intake 0.02 ng/kg bw day |

1. Unless specified, range of values or mean±standard deviation is reported. FFQ: Food Frequency Questionnaire.

Table L5. Zearalenone\_List of biomarker, substrate, population group, analytical method, range of values. Information on the study, association with the diet and the exposure values are also reported when available.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Mycotoxin | Biomarker | Substrate | Population Group | Analytical Method (LOQ/LOD) | Range of Values | Study Description | Association with The Diet | Exposure Value | Reference |
| ZEN | ZEN | Urine | Adults | UHPLC-MS/MS (LOQ -) | 0.1±0.068 µg/l | Country US. Healthy non-smoking pregnant women. Age range 18-40 y (N=30). | Subjects consuming corn-based foods: higher exposure accorcing to a. dietary survey | - | Fleck, 2016 |
| ZEN | αZEL, βZEL,αZAL, βZAL, ZAN | Urine | Adults | UHPLC-MS/MS (LOQ -) | 0.11±0.057 µg/l |
| ZEN | ZEN | Serum | Adults | UHPLC-MS/MS (LOQ -) | < LOQ |
| ZEN | Sum of ZEN and metabolites free and conjugated | Urine | Adults (women) | HPLC-MS/MS (LOQ -) | 1.327-83.301 μg/l | Country US. Women group age range 25-69 y (N=48). 24-h food diary | 10-17 (oz/day) versus lowest (0-4 oz/day) meat intake | - | Mauro, 2016 |
| ZEN | Free ZEN | Urine | Adults (women) | HPLC-MS/MS (LOQ -) | 0.582±0.880 μg/l |
| ZEN | Free αZAL | Urine | Adults (women) | HPLC-MS/MS (LOQ -) | 0.152±0 μg/l |
| ZEN | Free βZAL | Urine | Adults (women) | HPLC-MS/MS (LOQ -) | 0.095±0.049 μg/l |
| ZEN | Free αZEL | Urine | Adults (women) | HPLC-MS/MS (LOQ -) | 0.126±0.25 μg/l |
| ZEN | Free βZEL | Urine | Adults (women) | HPLC-MS/MS (LOQ -) | 0.198±0.198 μg/l |
| ZEN | Free ZAN | Urine | Adults (women) | HPLC-MS/MS (LOQ -) | 0.055±0.055 μg/l |
| ZEN | Sum of ZEN and metabolites free and conjugated | Urine | Adults (women) | HPLC-MS/MS (LOQ -) | 0.624±0.880 μg/l |
| ZEN | Free ZEN and conjugated | Urine | Adults (women) | HPLC-MS/MS (LOQ -) | 1.123-77.412 μg/l |
| ZEN | Sum of ZEN and metabolites free and conjugated | Serum | Adults | HPLC-MS/MS (LOQ -) | 1015±0.676 μg/l |
| ZEN | Free ZEN | Serum | Adults | HPLC-MS/MS (LOQ -) | 0.345±0.201 μg/l |
| ZEN | Free αZAL | Serum | Adults | HPLC-MS/MS (LOQ -) | 0.254±0.00 μg/l |
| ZEN | Free βZAL | Serum | Adults | HPLC-MS/MS (LOQ -) | 0.265±0.007 μg/l |
| ZEN | Free αZEL | Serum | Adults | HPLC-MS/MS (LOQ -) | 0.614±0.336 μg/l |
| ZEN | Free βZEL | Serum | Adults | HPLC-MS/MS (LOQ -) | 0.428±0.225 μg/l |
| ZEN | Free ZAN | Serum | Adults | HPLC-MS/MS (LOQ -) | 0.529±0.309 μg/l |
| ZEN | Sum of ZEN and metabolites free | Serum | Adults | HPLC-MS/MS (LOQ -) | 0.148-1.491 μg/l |
| ZEN | Free ZEN and conjugated | Serum | Adults | HPLC-MS/MS (LOQ -) | 0.148-1.720 μg/l |
| ZEN | ZEN | Urine | Adults | UHPLC-MS/MS (LOQ 0.1 ng/ml) | < LOQ | Country Tunisia. General population, healthy female (N=42) | - | - | Belhassen, 2014 |
| ZEN | αZEL, βZEL, | Urine | Adults | UHPLC-MS/MS (LOD 0.3 ng/ml) | < LOQ |
| ZEN | αZAL | Urine | Adults | UHPLC-MS/MS (LOQ 0.7 ng/ml) | 0.76-3.17 ng/ml |
| ZEN | ZAN, βZAL | Urine | Adults | UHPLC-MS/MS (LOQ 01 ng/ml) | < LOQ |
| ZEN | αZAL | Urine | Adults | UHPLC-MS/MS (LOQ 0.1 µg/l) | 4.6±3.1 μg/l | Breast cancer group, female. Age average 49.9 y (N=69) | - | - |
|  |  | Urine | Adults | UHPLC-MS/MS (LOQ 0.1 µg/l) | 1.7±3.1 μg/l | Healthy control group, female, average 44.6 y (N=41) |
| ZEN | α/β ZEL, ZAL | Urine | Adults | UHPLC-MS/MS (LOQ -) | < LOQ | Healthy control group and breast cancer group, female (N=110) |
| ZEN | ZEN | Urine | Adolescents | HPLC-MS/MS (LOQ 0.05 ng/m) | 1.28±3.14 ng/ml | Country US. Healthy group of adolescents female (N=163), age range 9-10 y. | Questionnaire, on puberty staging, and 3 dietary recalls (24h on different days of the week). |  | Bandera, 2011 |
| ZEN | αZAL | Urine | Adolescents | HPLC-MS/MS (LOQ 0.05 ng/m) | 0.20±0.21 ng/ml |
|  |  | Urine | Adolescents | HPLC-MS/MS (LOQ 0.05 ng/m) | 0.41±1.18 ng/ml |
| ZEN | βZAL | Urine | Adolescents | HPLC-MS/MS (LOQ 0.05 ng/m) | 0.21±0.64 ng/ml |
|  |  | Urine | Adolescents | HPLC-MS/MS (LOQ 0.05 ng/m) | 0.40±0.18 ng/ml |
| ZEN | ZAN | Urine | Adolescents | HPLC-MS/MS (LOQ 0.05 ng/m) | 0.22±0.29 ng/ml |

1. Unless specified, range of values or mean±standard deviation is reported. FFQ: Food Frequency Questionnaire.

Table L6. CIT and TeA\_List of biomarker, substrate, population group, analytical method, range of values. Information on the study, association with the diet and the exposure values are also reported when available.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Myc-otoxin | Biomarker | Substrate | Population Group | Analytical Method (LOQ or LOD) | Range of valuesa | Study Description | Association with the diet | Exposure value | Ref |
| CIT | CIT | Urine | Adults | LC–MS/MS (LOD 0.02 ng/ml) | 0.03 ng/ml (median) 20.02 ng/g creat (median) | Country Germany. Healthy population group (N=50). 2013 | - | - | Ali, 2015c |
| CIT | HOCIT | Urine | Adults | LC–MS/MS (LOD 0.05 ng/ml) | 0.06 ng/ml (median) 60.90 ng/g creat (median) |
| CIT | CIT | Urine | Adults | LC–MS/MS (LOQ 0.05 ng/ml) | < LOQ-0.07 ng/ml | Country Germany. Healthy volunteers (N=4). 2010 | - | - | Blaszkewicz, 2013 |
| CIT | HOCIT | Urine | Adults | LC–MS/MS (LOD 0.10 ng/ml) | < LOQ-0.34 ng/ml |
| CIT | CIT | Urine | Infants | LC–MS/MS (LOQ 0.05 ng/ml) | < LOQ-1.12 ng/ml | Country Germany. Healthy children Turkish origin (N=6). 2010 |
| CIT | HOCIT | Urine | Infants | LC–MS/MS (LOD 0.10 ng/ml) | < LOQ-0.26 ng/ml | Country Germany. Healthy children Turkish origin (N=6). 2010 |
| CIT | CIT | Plasma | Adults | LC–MS/MS (LOQ 0.15 ng/ml) | < LOQ-0.21 ng/ml | Country Germany. Healthy volunteers (N=4). 2011 |
| CIT | OHCIT | Urine | Adults | LC–MS/MS (LOQ 0.05 ng/ml) | < LOD-7.47 ng/ml | Country Bangladesh, rural area. Healthy volunteers (N=32). 2013 | - | - | Ali, 2015d |
| CIT | CIT | Urine | Adults | LC–MS/MS (LOQ 0.02 ng/ml) | < LOQ-1.22 ng/ml | Country Bangladesh, rural area. Healthy volunteers (N=32). 2013 |
| CIT | OHCIT | Urine | Adults | LC–MS/MS (LOQ 0.05 ng/ml) | < LOD-0.36 ng/ml | Country Bangladesh, urban area. Healthy volunteers (N=37). 2013 |
| CIT | CIT | Urine | Adults | LC–MS/MS (LOQ 0.02 ng/ml) | < LOQ-1.22 ng/ml | Country Bangaladesh, urban area. Healthy volunteers (N=37). 2013 |
| TeA | TeA | Urine | Adults | HPLC-MS (LOQ 0.11 ng/ml) | 0.07-63.8 ng/mg creat | Country Germany. Healthy volunteer adults (N=48) | FFQ (30 days and 24 h recall) | PDI (TeA+alloTeA) 0.208 μg/kg bw | Hövelmann, 2016 |
| TeA | allo TeA | Urine | Adults | HPLC-MS (LOQ 0.11 ng/ml) | 0.08-10.1 ng/mg creat | - |
| TeA | TeA | Urine | Adults | LC MS/MS (LOQ 0.6 µg/l) | 1.3-17.3 ng/mg creat | Country Germany. Healthy volunteers (N=6), age range 24-32 | - | - | Asam, 2013 |
|  |  | Urine | Adults | LC MS/MS (LOQ 0.6 µg/l) | 2.3-10.3 ng/mg creat | Country Germany. Healthy volunteers (N=2). | Urinary excretion rate after consumption of contaminated food (30 μg) | 24h urinary excretion was 89±4% |

1. Unless specified, range of values or mean±standard deviation is reported. FFQ: Food Frequency Questionnaire.

Table L7. Multi-mycotoxin\_List of biomarkers, substrate, population group, analytical method, range of values in multi-biomarker studies.

| Multi-mycotoxin study | Mycotoxin | Biomarker | Substrate | Population Group | Analytical Method (LOQ/LOD) | Range of Values | Study Description | Association with The Diet | Exposure Value | Reference |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DON,FBs,ZEN | DON | DON | Urine | Adults | UHPLC-MS/MS (LOD 0.32 µg/l) | LOD-8.94 µg/l | Country Italy. Control group (N=50). 24-h urine collected during the last day of the dietary monitored week. | Total food and beverage consumption assessed by means of the food daily consumption diary (7d). Records of food and drink weigh and description of each food. Food preparations and recipes provided | - | Cirlini, 2016 |
|  |  | Urine | Adults | UHPLC-MS/MS (LOD 0.32 µg/l) | LOD-2.41 µg/l | Country Italy. Celiac Disease group (N=55). 24-h urine collected during the last day of the dietary monitored week. |
| DON | DONglucur | Urine | Adults | UHPLC-MS/MS (LOD 0.003 µg/l) | LOD-5.84 µg/l | Country Italy. Control group (N=50). 24-h urine collected during the last day of the dietary monitored week. |
|  |  | Urine | Adults | UHPLC-MS/MS (LOD 0.003 µg/l) | LOD-5.59 µg/l | Country Italy. Celiac Disease group (N=55). 24-h urine collected during the last day of the dietary monitored week. |
| FB1 | FB1 | Urine | Adults | UHPLC-MS/MS (LOD 0.05 µg/l) | < LOD-2.24 µg/l | Country Italy. Control group (N=50). 24-h urine collected during the last day of the dietary monitored week. |
|  |  | Urine | Adults | UHPLC-MS/MS (LOD 0.05 µg/l) | < LOD | Country Italy. Celiac Disease group (N=55). 24-h urine collected during the last day of the dietary monitored week. |
| ZEN | ZEN | Urine | Adults | UHPLC-MS/MS (LOD 0.3 µg/l) | LOQ-0.05 µg/l | Country Italy. Control group (N=50). 24-h urine collected during the last day of the dietary monitored week. |
|  |  | Urine | Adults | UHPLC-MS/MS (LOQ 0.3 µg/l) | LOQ-0.10 µg/l | Country Italy. Celiac Disease group (N=55). 24-h urine collected during the last day of the dietary monitored week. |
| ZEN | αZEL, βZEL | Urine | Adults | UHPLC-MS/MS (LOD 0.09 µg/l) | LOQ-0.25 µg/l | Country Italy. Control group (N=50). 24-h urine collected during the last day of the dietary monitored week. |
|  |  | Urine | Adults | UHPLC-MS/MS (LOQ 0.09 µg/l) | LOQ-2.19 µg/l | Country Italy. Celiac Desease group (N=55). 24-h urine collected during the last day of the dietary monitored week. |
| ZEN | ZEN14Oglucuronide | Urine | Adults | UHPLC-MS/MS (LOD 0.3 µg/l) | LOQ-0.83 µg/l | Country Italy. Control group (N=50). 24-h urine collected during the last day of the dietary monitored week. |
|  |  | Urine | Adults | UHPLC-MS/MS (LOQ 0.3 µg/l) | < LOQ | Country Italy. Celiac Disease group (N=55). 24-h urine collected during the last day of the dietary monitored week. |
| ALT,DON,ZEN | DON | 3AcDON | Urine | Children | LC-MS/MS (LOQ 50 µg/l) | < LOD | Country United States. Autistic children group (N=25), range age 12.4-3.9 y | - | - | Duringer, 2016 |
|  |  | Urine | Children | LC-MS/MS (LOQ 50 µg/l) | 3.1 µg/l | Country United States. Children control group (N=29), range age 12.4-3.9 y |
| ZEN | ZEN | Urine | Children | LC-MS/MS (LOQ 50 µg/l) | < LOQ | Country United States. Autistic children group (N=25), range age 12.4-3.9 y |
|  |  | Urine | Children | LC-MS/MS (LOQ 50 µg/l) | < LOQ | Country United States. Children control group (N=29), range age 12.4-3.9 y |
| ZEN | ZEN4Glucoside | Urine | Children | LC-MS/MS (LOQ 50 µg/l) | < LOQ | Country United States. Autistic children group (N=25), range age 12.4-3.9 y |
| ZEN | ZEN4Glucoside | Urine | Children | LC-MS/MS (LOQ 50 µg/l) | < LOQ | Country United States. Children control group (N=29), range age 12.4-3.9 y |
| ALT | ALT | Urine | Children | LC-MS/MS (LOQ 50 µg/l) | < LOQ | Country United States. Autistic children group (N=25), range age 12.4-3.9 y |
|  |  | Urine | Children | LC-MS/MS (LOQ 50 µg/l) | < LOQ | Country United States. Children control group (N=29), range age 12.4-3.9 y |
| CIT,DON,ENNs,T2,ZEN | DON | DON | Urine | Adults | LC-MS/MSI (LOQ 0.2 ng/ml) | 5.3 ng/mg creat | Country Germany. Healthy volunteers group (N=101). Age range 20-30 y | FFQ (30 days and 24 h recall | PDI 0.52 g/kg bw (mean value) | Gerding, 2015 |
| DON | DON3glucur | Urine | Adults | LC-MS/MSI (LOQ 0.4 ng/ml) | 15.51 ng/mg creat |
| T2 | T2, HT2 | Urine | Adults | LC-MS/MSI (LOQ 0.05 ng/ml) | < LOQ |
| ZEN | ZEN14Oglucuronide | Urine | Adults | LC–MS/MS (LOD 0.15 µg/l) | < LOQ |
| ENs | ENB | Urine | Adults | LC-MS/MSI (LOQ 0.00125 ng/ml) | < LOQ |
| CIT | OHCIT | Urine | Adults | LC-MS/MSI (LOQ 0.05 ng/ml) | < LOQ |
| DAS,DON,FUSX,NEO,NIV,T2,ZEN | DON | DOM1 | Urine | Children | GC–MS/MS (LOD 0.25 µg/l) | 1.3 µg/g creat | Country Spain. General population (N=10), age range 8-11 y. 2013 | - |  | Rodríguez-Carrasco, 2014a |
| DON | DON | Urine | Children | GC–MS/MS (LOD 0.12 µg/l) | 7.4 µg/g creat | 1.39 mg/kg bw |
| DON | 3AcDON | Urine | Children | GC–MS/MS (LOD 0.25 µg/l) | < LOD |  |
| FUSX | FUSX | Urine | Children | GC–MS/MS (LOD 2 µg/l) | < LOD |  |
| DAS | DAS | Urine | Children | GC–MS/MS (LOD 1 µg/l) | < LOD |  |
| NIV | NIV | Urine | Children | GC–MS/MS (LOD 0.5 µg/l) | < LOD |  |
| NEO | NEO | Urine | Children | GC–MS/MS (LOD 0.25 µg/l) | < LOD |  |
| T2 | T2, HT2 | Urine | Children | GC–MS/MS (LOD 0.5 µg/l, 1 µg/l) | < LOD |  |
| ZEN | αZA, βZAL | Urine | Children | GC–MS/MS (LOD 4 µg/l) | < LOD |  |
| ZEN | ZEN, ZAN | Urine | Children | GC–MS/MS (LOD 3 µg/l) | < LOD |  |
| ZEN | αZEL, βZEL | Urine | Children | GC–MS/MS (LOD 1 µg/l, 2 µg/l) | < LOD |  |
| DAS,DON,FUSX,NEO,NIV,T2,ZEN | DON | DOM1 | Urine | Children | GC–MS/MS (LOD 0.25 µg/l) | 1.3 µg/g creat | Country Spain. General population children (N=16), range of age 8-14 y. 2013 | - | - | Rodriguez-Carrasco, 2014b |
| DON | DON | Urine | Children | GC–MS/MS (LOD 0.12 µg/l) | 27.8 µg/g creat |
| DON | 3AcDON | Urine | Children | GC–MS/MS (LOD 0.25 µg/l) | < LOD |
| FUSX | FUSX | Urine | Children | GC–MS/MS (LOD 2 µg/l) | < LOD |
| DAS | DAS | Urine | Children | GC–MS/MS (LOD 1 µg/l) | < LOD |
| NIV | NIV | Urine | Children | GC–MS/MS (LOD 0.5 µg/l) | < LOD |
| NEO | NEO | Urine | Children | GC–MS/MS (LOD 0.25 µg/l) | < LOD |
| T2 | HT2 | Urine | Children | GC–MS/MS (LOD 15 µg/l) | 12.6 µg/g creat |
| T2 | T2 | Urine | Children | GC–MS/MS (LOD 0.5 µg/l) | < LOD |
| ZEN | ZAN, αZAL, βZAL | Urine | Children | GC–MS/MS (LOD 4 µg/l) | < LOD |
| ZAN | ZEN, αZEL, βZEL | Urine | Children | GC–MS/MS (LOD 3 µg/l, 1 µg/l, 2 µg/l) | < LOD |
| DON | DOM1 | Urine | Adults | GC–MS/MS (LOD 0.25 µg/l) | < LOD-4.2 µg/g creat | Country Spain. General population adults (N=38), range of age 18-64 y. 2013 | - | - |
| DON | DON | Urine | Adults | GC–MS/MS (LOD 0.12 µg/l) | 13.7-32.9 µg/g creat |
| DON | 3AcDON | Urine | Adults | GC–MS/MS (LOD 0.25 µg/l) | < LOD |
| FUSX | FUSX | Urine | Adults | GC–MS/MS (LOD 2 µg/l) | < LOD |
| DAS | DAS | Urine | Adults | GC–MS/MS (LOD 1 µg/l) | < LOD |
| NIV | NIV | Urine | Adults | GC–MS/MS (LOD 0.5 µg/l) | 12.7-16.9 µg/g creat |
| NEO | NEO | Urine | Adults | GC–MS/MS (LOD 0.25 µg/l) | < LOD |
| T2 | HT2 | Urine | Adults | GC–MS/MS (LOD 15µg/l) | < LOD-14.5 µg/g creat |
| T2 | T2 | Urine | Adults | GC–MS/MS (LOD 0.5 µg/l) | < LOD |
| ZEN | ZAN, αZAL, βZAL | Urine | Adults | GC–MS/MS (LOD 4 µg/l) | < LOD |
| ZAN | ZEN, αZEL, βZEL | Urine | Adults | GC–MS/MS (LOD 3 µg/l, 1 µg/l, 2 µg/l) | < LOD |
| DON,FBs,NIV,OTA,ZEN | ZEN | αZEL | Urine | Adults | LC-MS/MS (LOQ-) | 0.03±0.13 μg/l (0.04 pg/mg creat) | Country El Salvador. Age average 47 y (N=252). Urine samples collected on average 19-34 days after the first day of dietary recording. | Swedish dietary survay (4-day diet record) | - | Wallin, 2015 |
| AFs,DON,FBs,OTA,ZEN | DON | DON | Urine | Adults | LC–MS (LOQ 1.5 ng/ml) | 11.89±10.05 ng/ml | Country Italy, Apulia. Healthy volunteers (N=52). 2011 | - | - | Solfrizzo, 2014 |
| FBs,DON(DOM1) | DON | DON, DONglucur | Urine | Adults | LC-MS (LOD 0.5 ng/ml) | < LOD-6.5 ng/mg creata | Country Iran, rural and urban area. Healthy population, non-smoking female (N=110), age range 39-72 y | Cereal consumption, based on maximum values | 0.12 μg/kg bw | Turner, 2012 |
| FBs,DON(DOM1) | DON | DOM1 | Urine | Adults | LC-MS (LOD 0.1 ng/ml) | < LOD | Country Iran, rural and urban area. Healthy population, non-smoking female (N=110), age range 39-72 y |
| OTA,CIT | OTA | OTA | Urine | Adults | HPLC-FLD (LOD 0.01 ng/ml) | LOD-1.75 ng/ml | Country Bangladesh. Adults’ volunteers (N=164). 2013: summer (N=69). 2014 winter (N=95) | Questionnaire on food habits | - | Ali, 2016a |
| OTA | OTα | Urine | Adults | HPLC-FLD (LOD 0.01 ng/ml) | LOD-6.10 ng/ml | - |
| CIT | CIT | Urine | Adults | LC–MS/MS (LOQ 0.02 ng/ml) | LOD-5.03 ng/ml | 0.02-4.663 μg/kg bw |
| CIT | OHCIT | Urine | Adults | LC–MS/MS (LOQ 0.05 ng/ml) | LOD-46.44 ng/ml | - |
| OTA | OTA | Urine | Adults | HPLC-FLD (LOD 0.01 ng/ml) | 0.01-0.84 ng/ml | Country Bangladesh. Healthy pregnant woman (N=54) | Questionnaire on food habits | - | Ali, 2016d |
| CIT | CIT | Urine | Adults | LC–MS/MS (LOQ 0.02 ng/ml) | 0.02-6.93 ng/ml |
| CIT,DON,OTA,ZEN | OTA | OTA | Urine | Adults | HPLC-FLD (LOD 10 ng/l) | LOD-215 ng/g creat | Country Germany. Healthy control group male (N=13) | - | - | Follmann, 2016 |
|  |  | Urine | Adults | HPLC-FLD (LOD 10 ng/l) | 17-340 ng/g creat | Country Germany. Healthy mill worker group (N=17) |
| OTA | OTα | Urine | Adults | HPLC-FLD (LOD 10 ng/l) | LOD-281 ng/g creat | Country Germany. Healthy control group male (N=13) |
|  |  | Urine | Adults | HPLC-FLD (LOD 10 ng/l) | LOD-1550 ng/g creat | Country Germany. Healthy mill worker group (N=17) |
| CIT | CIT | Urine | Adults | LC-MS/MS (LOD 20 ng/l) | 6-196 ng/g creat | Country Germany. Healthy control group male (N=13) |
|  |  | Urine | Adults | LC-MS/MS (LOD 20 ng/l) | 6-62 ng/g creat | Country Germany. Healthy mill worker group (N=17) |
| CIT | OHCIT | Urine | Adults | LC-MS/MS (LOD 50 ng/l) | 6-568 ng/g creat | Country Germany. Healthy control group male (N=13) |
|  |  | Urine | Adults | LC-MS/MS (LOD 50 ng/l) | 22-720 ng/g creat | Country Germany. Healthy mill worker group (N=17) |
| DON | DON | Urine | Adults | LC-MS/MS (LOD 150 ng/l) | 1100-13400 ng/g creat | Country Germany. Healthy control group male (N=13) |
|  |  | Urine | Adults | LC-MS/MS (LOD 150 ng/l) | 1500-12000 ng/g creat | Country Germany. Healthy mill worker group (N=17) |
| DON | DOM1 | Urine | Adults | LC-MS/MS (LOD 100 ng/l) | LOD-173 ng/g creat | Country Germany. Healthy control group male (N=13) |
|  |  | Urine | Adults | LC-MS/MS (LOD 100 ng/l) | LOD-300 ng/g creat | Country Germany. Healthy mill worker group (N=17) |
| ZEN | ZEN | Urine | Adults | LC-MS/MS (LOD 2 ng/l) | 8-61 ng/g creat | Country Germany. Healthy control group male (N=13) |
|  |  | Urine | Adults | LC-MS/MS (LOD 2 ng/l) | 1–71 ng/g creat | Country Germany. Healthy mill worker group (N=17) |
| ZEN | αZEL | Urine | Adults | LC-MS/MS (LOD 10 ng/l) | LOD-38 ng/g creat | Country Germany. Healthy control group male (N=13) |
|  |  | Urine | Adults | LC-MS/MS (LOD 10 ng/l) | LOD-40 ng/g creat | Country Germany. Healthy mill worker group (N=17) |
| ZEN | βZEL | Urine | Adults | LC-MS/MS (LOD 10 ng/l) | LOD-26 ng/g creat | Country Germany. Healthy control group male (N=13) |
|  |  | Urine | Adults | LC-MS/MS (LOD 10 ng/l) | LOD-37 ng/g creat | Country Germany. Healthy mill worker group (N=17) |
| DON,FBs,NIV,OTA,ZEN | OTA | OTA | Urine | Adults | LC-MS/MS (LOQ 0.006 ng/ml) | 0.46±0.57 μg/l (0.73 ng/mg creat) | Country Sweden. Healthy adult population (N=252). 2010 | Swedish dietary survay (4-day diet record) | - | Wallin, 2015 |
| DON | DON | Urine | Adults | LC-MS/MS (LOQ 0.2 ng/ml) | 3.37±10.1 ng/ml (4.4 ng/mg creat) | Country Sweden. Healthy adult population (N=252). 2011 |
| DON | DOM1 | Urine | Adults | LC-MS/MS (LOQ 0.89 ng/ml) | 0.18±0.97 ng/ml (0.12 ng/mg creat) | Country Sweden. Healthy adult population (N=252). 2011 |
| ZEN | ZEN | Urine | Adults | LC-MS/MS (LOQ 0.01 ng/ml) | 0.03±0.06 μg/l (0.05 pg/mg creat) | Country Sweden. Healthy adult population (N=252). 2011 |
| ZEN | αZEL | Urine | Adults | LC-MS/MS (LOQ 0.04 ng/ml) | 0.03±0.13 ng/ml (0.04 pg/mg creat) | Country Sweden. Healthy adult population (N=252). 2011 |
| ZEN | βZEL | Urine | Adults | LC-MS/MS (LOQ 0.04 ng/ml) | 0.02±0.09 μg/l (0.02 pg/mg creat) | Country Sweden. Healthy adult population (N=252). 2011 |
| FBs | FB1 | Urine | Adults | LC-MS/MS (LOQ 0.01 ng/ml) | 0.004±0.022 µg/l (0.01 pg/mg creat) | Country Sweden. Healthy adult population (N=252). 2011 |
| FBs | FB2 | Urine | Adults | LC-MS/MS (LOQ -) | 0.01±0.06 µg/l (0.04 pg/mg creat) | Country Sweden. Healthy adult population (N=252). 2011 |
| NIV | NIV | Urine | Adults | LC-MS/MS (LOQ -) | 0.02±0.74 ng/ml (0.02 pg/mg creat) | Country Sweden. Healthy adult population (N=252). 2011 |
| AFM1,OTA | AFM1 | AFM1 | Breast Milk | Adults | ELISA (LOQ -) | 5.73±0.74 ng/l | Country Turkey. Healthy woman group in lactation (N=70) | - | - | Banugul Barut, 2014 |
| OTA | OTA | Breast Milk | Adults | ELISA (LOQ -) | 0.14±0.03 ng/ml |
| OTA,OTα,CIT,OHCIT | OTA | OTA | Urine | Adults | HPLC (LOQ 0.02 ng/ml) | 0.16-0.21 μg/g creat | Country Bangladesh, urban area. Healthy volunteers, female (N=16). 2013, 2014 | - | - | Ali, 2016a |
|  |  | Urine | Adults | HPLC (LOQ 0.02 ng/ml) | 0.11-0.14 μg/g creat | Country Bangladesh, urban area. Healthy volunteers, male (N=16). 2013, 2014 |  |
|  |  | Urine | Adults | HPLC (LOQ 0.02 ng/ml) | 0.11-0.21 μg/g creat | Country Bangladesh, rural area. Healthy volunteers, female (N=15). 2013, 2014 |  |
|  |  | Urine | Adults | HPLC (LOQ 0.02 ng/ml) | 0.21-0.53 μg/g creat | Country Bangladesh, rural area. Healthy volunteers, male (N=15). 2013, 2014 |  |
| OTA | OTα | Urine | Adults | HPLC (LOQ 0.02 ng/ml) | 0.07-0.61 μg/g creat | Country Bangladesh, urban area. Healthy volunteers, female (N=16). 2013, 2014 |  |
|  |  | Urine | Adults | HPLC (LOQ 0.02 ng/ml) | 0.10-0.27 μg/g creat | Country Bangladesh, urban area. Healthy volunteers, male (N=16). 2013, 2014 |  |
|  |  | Urine | Adults | HPLC (LOQ 0.02 ng/ml) | 0.20-0.33 μg/g creat | Country Bangladesh, rural area. Healthy volunteers, female (N=15). 2013, 2014 |  |
|  |  | Urine | Adults | HPLC (LOQ 0.02 ng/ml) | 0.20-0.77 μg/g creat | Country Bangladesh, rural area. Healthy volunteers, male (N=15). 2013, 2014 |  |
| OTA | CIT | Urine | Adults | HPLC (LOQ 0.05 ng/ml) | 0.18-0.34 μg/g creat | Country Bangaladesh, urban area. Healthy volunteers, female (N=16). 2013, 2014 | 0.009 mg/kg bw/day |
|  |  | Urine | Adults | HPLC (LOQ 0.05 ng/ml) | 0.23-1.36 μg/g creat | Country Bangaladesh, urban area. Healthy volunteers, male (N=16). 2013, 2014 | 0.073 mg/kg bw/day |
|  |  | Urine | Adults | HPLC (LOQ 0.05 ng/ml) | 0.34-1.33 μg/g creat | Country Bangaladesh, rural area. Healthy volunteers, female (N=15). 2013, 2014 |  |
|  |  | Urine | Adults | HPLC (LOQ 0.05 ng/ml) | 0.20-0.77 μg/g creat | Country Bangaladesh, rural area. Healthy volunteers, male (N=15). 2013, 2014 |  |
| OTA | OHCIT | Urine | Adults | HPLC (LOQ 0.1 ng/ml) | 0.25-0.984 μg/g creat | Country Bangaladesh, urban area. Healthy volunteers, female (N=16). 2013, 2014 |  |
|  |  | Urine | Adults | HPLC (LOQ 0.1 ng/ml) | 0.37-0.74 μg/g creat | Country Bangaladesh, urban area. Healthy volunteers, male (N=16). 2013, 2014 |  |
|  |  | Urine | Adults | HPLC (LOQ 0.1 ng/ml) | 4.17-4.36 μg/g creat | Country Bangaladesh, rural area. Healthy volunteers, female (N=15). 2013, 2014 |  |
|  |  | Urine | Adults | HPLC (LOQ 0.1 ng/ml) | 1.46-10.09 μg/g creat | Country Bangaladesh, rural area. Healthy volunteers, male (N=15). 2013, 2014 |  |
| AFs,DON,FBs,OTA,ZEN | OTA | OTA | Urine | Adults | LC–MS (LOQ 0.006 ng/ml) | 0.144±0.312 ng/ml | Country Italy, Apulia. Healthy volunteers (N=52). 2011 | - | - | Solfrizzo, 2014 |
| ZEN | βZEL | Urine | Adults | LC–MS (LOQ 0.054 ng/ml) | 0.09±0.014 ng/ml |
| FB1 | FB1 | Urine | Adults | LC–MS (LOQ 0.01 ng/ml) | 0.055±0.073 ng/ml |
| ZEN | ZEN | Urine | Adults | LC–MS (LOQ 0.007 ng/ml) | 0.057±0.023 ng/ml |
| ZEN | αZEL | Urine | Adults | LC–MS (LOQ 0.03 ng/ml) | 0.077±0.027 ng/ml |
| FBs,DON(DOM1) | FB1 | FB1 | Urine | Adults | LC-MS (LOD 0.03 µg/l) | < LOD | Country Iran, rural and urban area. Healthy population, non-smoking female (N=110), age range 39-72 y | - | - | Turner, 2012 |
|  | DON | DOM1 | Urine | Adults | LC-MS (LOD 0.1 ng/ml) | < LOD |  |  |
|  | DON | DON3glucur | Urine | Adults | LC-MS (LOD 0.5 ng/ml) | < LOD– 6.5 ng/ml |  |  |  |
| AFs,DON,FBs,NIV,OTA,ZEN | ZEN | ZEN | Urine | Adults | LC–MS/MS (LOQ 1.3 µg/l) | < LOQ-1.42 µg/l (0,21 µg/g creat) | HIV positive patients (N=145) | Frequency of consumption of maize, groundnut and their processed food-based products | - | Abia, 2013 |
| ZEN | ZEN14GlcA | Urine | Adults | LC–MS/MS (LOQ 3.3 µg/l) | 0.81 µg/l 3.38-31 µg/l (0.765 µg/g creat) |
| ZEN | αZEL | Urine | Adults | LC–MS/MS (LOQ 1.7 µg/l) | < LOD |
| ZEN | ZEN, ZEN14Oglucuronide, αZEL | Urine | Adults | LC–MS/MS (LOQ -) | 0.74 µg/l (0.7 µg/g creat) |
| ZEN | ZEN | Urine | Adults | LC–MS/MS (LOQ 1.3 µg/l) | < LOD | HIV seronegative group (N=30) |
| ZEN | ZEN14GlcA | Urine | Adults | LC–MS/MS (LOQ 3.3 µg/l) | < LOQ |
| ZEN | αZEL | Urine | Adults | LC–MS/MS (LOQ 1.7 µg/l) | < LOQ |
| FBs | FB1 | Urine | Adults | LC–MS/MS (LOQ 1.7 µg/l) | 0.63 µg/l (0.33 µg/g creat) | HIV positive patients (N=145) | 5.25-123.3 μg/kg bw day |
| FBs | FB2 | Urine | Adults | LC–MS/MS (LOQ 1.7 µg/l) | < LOD |  |
| FBs | FB1 | Urine | Adults | LC–MS/MS (LOQ 1.7 µg/l) | < LOD | HIV sero-negative group (N=30) |  |
| FBs | FB2 | Urine | Adults | LC–MS/MS (LOQ 1.7 µg/l) | < LOD |  |
| AFs | AFM1 | Urine | Adults | LC–MS/MS (LOQ 0.17 µg/l) | 0.04 µg/l (0.7 µg/g creat) | HIV positive patients (N=145) | 0.05-1.15 μg/kg bw day |
|  |  | Urine | Adults | LC–MS/MS (LOQ 0.17 µg/l) | < LOQ | HIV sero-negative group (N=30) |  |
| DON | DON | Urine | Adults | LC–MS/MS (LOQ 13 µg/l) | < LOQ | HIV positive patients (N=145) |  |
| DON | DON15glucur | Urine | Adults | LC–MS/MS (LOQ 11 µg/l) | 5.7 µg/l (0.7 µg/g creat) |  |
| DON | DON3glucur | Urine | Adults | LC–MS/MS (LOQ 20 µg/l) | 3.88 µg/l (0.7 µg/g creat) |  |
| DON | DON, DON3glucur, DON15glucur | Urine | Adults | - | 6.4 µg/l (0.7 µg/g creat) | 0.21-2.59 μg/kg bw day |
| DON | DON | Urine | Adults | LC–MS/MS (LOQ 13 µg/l) | < LOQ | HIV sero-negative group (N=30) |  |
| DON | DON15glucur | Urine | Adults | LC–MS/MS (LOQ 11 µg/l) | 8.52 µg/l (0.7 µg/g creat) | HIV sero-negative (N=30) |  |
| DON | DON3glucur | Urine | Adults | LC–MS/MS (LOQ 20 µg/l) | 7.59 µg/l (0.7 µg/g creat) | HIV sero-negative (N=30) |  |
| DON | DON, DON3glucur, DON15glucur | Urine | Adults | - | 10.14 µg/l (0.7 µg/g creat) | HIV sero-negative (N=30) |  |
| NIV | NIV | Urine | Adults | LC–MS/MS (LOQ 10 µg/l) | 2.87 µg/l (0.7 µg/g creat) | HIV positive (N=145) | 0.65-5.50 μg/kg bw day |
|  |  | Urine | Adults | LC–MS/MS (LOQ 10 µg/l) | 2.35µg/l (0.7 µg/g creat) | HIV sero-negative (N=30) |  |
| OTA | OTA | Urine | Adults | LC–MS/MS (LOQ 0.17 µg/l) | 0.07 µg/l (0.7 µg/g creat) | HIV positive (N=145) | 0.004-0.094 μg/kg bw day |
|  |  | Urine | Adults | LC–MS/MS (LOQ 0.17 µg/l) | 0.04 µg/l (0.7 µg/g creat) | HIV sero-negative (N=30) |  |
| AFs(AFM1),FBs,OTA | FBs | FB1, FB2 | Urine | Adults | LC–MS/MS (LOQ 0.004 ng/ml) | < LOQ | Country South Corea. Healthy volunteers (N=12) | - | - | Ahn, 2010 |
| AFS | AFM1 | Urine | Adults | LC–MS/MS (LOQ 0.010 ng/ml) | 0.002 ng /ml only 1 sample |
| OTA | OTA | Urine | Adults | LC–MS/MS (LOQ 0.010 µg/l, 0.022 µg/l) | 0.013-0.093 |
| urine | ZEN | ZEN | Urine | Children/Adolescents/Adults | LC–MS/MS (LOQ 0.6 μg/l) | 0.3 µg/l | Country Nigeria. General population: children (N=20), adolescents (N=20), adults (N=81). | 25 g random portion of the meal consumed the day prior urine collection.  Diet information (maize, groundnut, sorghum and rice about 39% 29% 12% and 9% respectively). | 11.8 μg/kg bw/day | Ezekiel, 2014 |
| ZEN | ZEN14Oglucuronide | Urine | Children/Adolescents/Adults | LC–MS/MS (LOQ 1 μg/l) | 9.5±14.4 µg/l |  |
| OTA | OTA | Urine | Children/Adolescents/Adults | LC–MS/MS (LOQ 0.15 µg/l) | 0.2±0.1 µg/l |  |
| FBs | FB1 | Urine | Children/Adolescents/Adults | LC–MS/MS (LOQ 2 µg/l) | 4.6±2.8 µg/ |  |
| FBs | FB2 | Urine | Children/Adolescents/Adults | LC–MS/MS (LOQ 0.7 µg/l) | 1.0±0 µg/l |  |
| AFS | AFM1 | Urine | Children/Adolescents/Adults | LC–MS/MS (LOQ 0.15 µg/l) | 0.3±0.4 µg/l |  |
| DON | DON | Urine | Children/Adolescents/Adults | LC–MS/MS (LOQ 4 µg/l) | 2.0±0 µg/l |  |
| DON | 15ADON | Urine | Children/Adolescents/Adults | LC–MS/MS (LOQ 2 µg/l) | 3.5±2.6 µg/ |  |
| DON | DON+15ADON | Urine | Children/Adolescents/Adults | LC–MS/MS (LOQ 2 µg/l) | 3.9±3.3 µg/ |  |
| FBs | FB1 | Urine | Children | LC–MS/MS (LOQ 2 µg/l) | 1.0±0 µg/l | Country Nigeria. General population, children (N=20). |  |
| FBs | FB2 | Urine | Children | LC–MS/MS (LOQ 0.7 µg/l) | 4.6±0.7 µg/l |  |
| Afs | AFM1 | Urine | Children | LC–MS/MS (LOQ 0.15 µg/l) | 0.3±0.2 µg/l | 0.27 μg/kg bw/day |
| OTA | OTA | Urine | Children | LC–MS/MS (LOQ 0.15 µg/l) | 0.1±0.1 µg/l |  |
| DON+ZEN+FB2 | DON+ZEN+FB2 | Urine | Children |  | < LOD |  |
| DON | 15ADON | Urine | Adolescents | LC–MS/MS (LOQ 4 µg/l) | 2±2 µg/l | Country Nigeria. General population, adolescents (N=20) | 0.67 μg/kg bw/day |
| OTA | OTA | Urine | Adolescents | LC–MS/MS (LOQ 0.15 µg/l) | 0.1±0.1 µg/l |  |
| AFS | AFM1 | Urine | Adolescents | LC–MS/MS (LOQ 0.15 µg/l) | 0.3±0.4 µg/l |  |
| FBs | FB1 | Urine | Adolescents | LC–MS/MS (LOQ 2 µg/l) | 6.9±5.4 µg/ |  |
| FBs | FB2 | Urine | Adolescents | LC–MS/MS (LOQ 0.7 µg/l) | 1.0±0 µg/l |  |
| ZEN | ZEN | Urine | Adults | LC–MS/MS (LOQ 0.6 μg/l) | 0.3 µg/l | Country Nigeria. General population, adults (N=81) |  |
| ZEN | ZEN14Oglucuronide | Urine | Adults | LC–MS/MS (LOQ 1 μg/l) | 10.5±14.2 µg/l |  |
| OTA | OTA | Urine | Adults | LC–MS/MS (LOQ 0.15 µg/l) | 0.2±0.1 µg/l |  |
| FBs | FB1 | Urine | Adults | LC–MS/MS (LOQ 2 µg/l) | 4.2±2.2 µg/ |  |
| FBs | FB2 | Urine | Adults | LC–MS/MS (LOQ 0.7 µg/l) | 1.0±0 µg/l |  |
| AFS | AFM1 | Urine | Adults | LC–MS/MS (LOQ 0.15 µg/l) | 0.4±0.5 µg/l |  |
| DON | DON | Urine | Adults | LC–MS/MS (LOQ 4 µg/l) | 2.0±0 µg/l |  |
| DON | 15ADON | Urine | Adults | LC–MS/MS (LOQ 2 µg/l) | 4.6±2.6 µg/l |  |
| OTA | OTA | Urine | Adults | LC–MS/MS (LOQ 0.15 µg/l) | 0.2±0.1 µg/l |  |
| AFs,CIT,DON,ENNs,FBs,OTA,ZEN | ZEN | αZEL | Urine | Adults/Children | LC–MS/MS (LOD 0.0125 µg/l) | 1.46±1.42 μg/l | Country Haity. Healthy volunteers (N=142) | PDI: body weight (60 kg) and mean daily urine excretion.  Calculated mean PDI of selected mycotoxins | 0.03 μg/kg bw | Gerding, 2015 |
|  |  | Urine | Adults | LC–MS/MS (LOD 0.0125 µg/l) | < LOD | Country Germany. Healthy volunteers (N=50) | - |
|  |  | Urine | Adults | LC–MS/MS (LOD 0.0125 µg/l) | < LOD | Country Bangaladesh. Healthy volunteers (N=95). Urban and rural areas. 2013-2014 | - |
| FBs | FB1 | Urine | Adults/children | LC MS/MS (LOD 0.00125 µg/l) | 0.44±0.21 µg/l | Country Haity. Healthy volunteers (N=142) | 0.05 μg/kg bw |
|  |  | Urine | Adults | LC MS/MS (LOD 0.00125 µg/l) | < LOD | Country Germany. Healthy volunteers (N=50) | - |
|  |  | Urine | Adults | LC MS/MS (LOD 0.00125 µg/l) | < LOD | Country Bangaladesh. Healthy volunteers (N=95). Urban and rural areas. 2013-2014. | 0.05 μg/kg bw day |
| AFs | AFM1 | Urine | Adults/children | LC MS/MS (LOD 0.0025 µg/l) | 0.06±0.03 µg/l | Country Haity. Healthy volunteers (N=142). | 0.03 mg/kg bw day |
|  |  | Urine | Adults | LC MS/MS (LOD 0.0025 µg/l) | < LOD | Country Germany. Healthy volunteers (N=50) | - |
|  |  | Urine | Adults | LC MS/MS (LOD 0.0025 µg/l) | 0.06±0.02 µg/l | Country Bangaladesh. Healthy volunteers (N=95). Urban and rural areas. 2013-2014. | 0.3 mg/kg bw day |
| CIT | OHCIT | Urine | Adults/children | LC MS/MS (LOD 0.01 µg/l) | 0.49±0.95 µg/l | Country Haity. Healthy volunteers (N=142). | - |
|  |  | Urine | Adults | LC MS/MS (LOD 0.01 µg/l) | 0.12±0.02 µg/l | Country Germany. Healthy volunteers (N=50) | - |
|  |  | Urine | Adults | LC MS/MS (LOD 0.01 µg/l) | 3.2±8.43 µg/l | Country Bangaladesh. Healthy volunteers (N=95). Urban and rural areas. 2013-2014. | - |
| DON | DON | Urine | Adults/children | LC MS/MS (LOD 0.1 µg/l) | 2.75±2 µg/l | Country Haity. Healthy volunteers (N=142). | 0.27 mg/kg bw day |
|  |  | Urine | Adults | LC MS/MS (LOD 0.1 µg/l) | 2±2 µg/l | Country Germany. Healthy volunteers (N=50) | 0.3 mg/kg bw day |
|  |  | Urine | Adults | LC MS/MS (LOD 0.1 µg/l) | < LOD | Country Bangaladesh. Healthy volunteers (N=95). Urban and rural areas. 2013-2014. | - |
| DON | DON3glucur | Urine | Adults/children | LC MS/MS (LOD 0.1 µg/l) | 17±21.1 µg/l | Country Haity. Healthy volunteers (N=142). | - |
|  |  | Urine | Adults | LC MS/MS (LOD 0.1 µg/l) | 11.2±13 µg/l | Country Germany. Healthy volunteers (N=50) |  |
|  |  | Urine | Adults | LC MS/MS (LOD 0.1 µg/l) | < LOD | Country Bangaladesh. Healthy volunteers (N=95). Urban and rural areas. 2013-2014. |  |
| Ens | EnB | Urine | Adults/children | LC MS/MS (LOD 0.000125 µg/l) | 0.036±0.02 µg/l | Country Haity. Healthy volunteers (N=142). |  |
|  |  | Urine | Adults | LC MS/MS (LOD 0.000125 µg/l) | 0.012±0.02 µg/l | Country Germany. Healthy volunteers (N=50) |  |
|  |  | Urine | Adults | LC MS/MS (LOD 0.000125 µg/l) | 0.019±0 µg/l | Country Bangaladesh. Healthy volunteers (N=95). Urban and rural areas. 2013-2014. |  |
| OTA | OTA | Urine | Adults/children | LC MS/MS (LOD 0.01 µg/l) | 0.109±0.044 µg/l | Country Haity. Healthy volunteers (N=142). | - |
|  |  | Urine | Adults | LC MS/MS (LOD 0.01 µg/l) | 0.203±0.283 µg/l | Country Bangaladesh. Healthy volunteers (N=95). Urban and rural areas. 2013-2014 |  |
| AFs,FBs | FB1 | FB1 | Urine | Infants/toddlers | HPLC (LOQ 20 pg/ml) | 211.2-868.3 pg/ml (geom mean) | Country Tanzania, Nyabula village, during maize harvest season. Children group (N=166), range 6-14 m. | Questionnaire on maize intake (24 h dietary recall) during maize harvest season, 6 and 12 months after harvest.r | - | Shirima, 2015 |
|  |  | Urine | Infants/toddlers | HPLC (LOQ 20 pg/ml) | 211.7 pg/ml (geom mean) | Country Tanzania, Nyabula village, after 6 m. Children (N=166), 6-14 m. |
|  |  | Urine | Infants/toddlers | HPLC (LOQ 20 pg/ml) | 868.3 pg/ml (geom mean) | Country Tanzania, Nyabula village, after 12 m. Children (N=166), 6-14 m. |
|  |  | Urine | Infants/toddlers | HPLC (LOQ 20 pg/ml) | 327.2-686.1 pg/ml (geom mean) | Country Tanzania, Kigwa village, during maize harvest season. Children group (N=166), range 6-14 m. |
|  |  | Urine | Infants/toddlers | HPLC (LOQ 20 pg/ml) | 327.2 pg/ml (geom mean) | Country Tanzania, Kigwa village, after 6 m. Children (N=166), 6-14 m. |
|  |  | Urine | Infants/toddlers | HPLC (LOQ 20 pg/ml) | 686.1 pg/ml (geom mean) | Country Tanzania, Kigwa village, after 12 months. Children (N=166), 6-14 months. |
|  |  | Urine | Infants/toddlers | HPLC (LOQ 20 pg/ml) | 82.8-320.2 pg/ml (geom mean) | Country Tanzania, Kikelewa village, during maize harvest season. Children group (N=166), range 6-14 m. |
|  |  | Urine | Infants/toddlers | HPLC (LOQ 20 pg/ml) | 82.8 pg/ml (geom mean) | Country Tanzania, Kikelewa village after 6 m. Children (N=166), 6-14 ms. |
|  |  | Urine | Infants/toddlers | HPLC (LOQ 20 pg/ml) | 320.2 pg/ml (geom mean) | Country Tanzania, Kikelewa village after 12 ms. Children (N=166), 6-14 m. |
| AFs,DON,FBs,OTA,T2,ZEN | ZEN | ZEN | Urine | Adults | LC–MS (LOQ 10 µg/l) | < LOQ | Country Spain. General population (N=27) | - | - | Rubert, 2011 |
| FBs | FB1, FB2 | Urine | Adults | LC-MS (LOQ 15 µg/l) | < LOQ | Country Spain. General population (N=27) |
| AFs,DON,FBs,OTA,ZEN | ZEN | αZEL | Urine | Adults | LC-MS/MS (LOQ 0.029 µg/l) | 0.247±0.590 μg/g creat | Country South Africa. Farmer women (N=54) | Food questionnaires (24-h dietary recall).  Correlation with maize (porridge) | - | Shephard, 2013 |
| ZEN | βZEL | Urine | Adults | LC-MS/MS (LOQ 0.054 µg/l) | 0.244±0.820 μg/g creat |
| ZEN | ZEN | Urine | Adults | LC-MS/MS (LOQ 0.007 µg/l) | 0.204±0.456 μg/g creat |
| FBs | FB1 | Urine | Adults | LC-MS/MS (LOQ 0.12 µg/l) | 0.841±1.06 μg/g creat |
| DON | DON | Urine | Adults | LC-MS/MS (LOQ 1.51 µg/l) | 4.94±7.60 μg/g creat |
| OTA | OTA | Urine | Adults | LC-MS/MS (LOQ 0.007 µg/l) | 0.024±0.058 μg/g creat |
| AFB1 | AFM1 | Urine | Adults | LC-MS/MS (LOQ 0.502 µg/l) | < LOQ |
| AFs,DON,FBs,OTA,ZEN | AFB1 | AFM1 | Urine | Adults/Elderly/very elderly | LC–MS (LOD 0.8 µg/l, 2.2 µg/l) | < LOD | Country Italy. Age range 26-87 y (N=10) | - | - | Solfrizzo, 2011 |
| FB1 | FB1 | Urine | Adults/elderly/very elderly | LC–MS (LOD=0.05 µg/l) | < LOD |
| AFs | AFM1 | Urine | Adults/elderly/very elderly | LC–MS (LOD=0.06 µg/l) | < LOD |
| DON | DON | Urine | Adults/elderly/very elderly | LC–MS (LOD=0.8 µg/l) | 1.98±1.36 µg/l |
| DON | DOM1 | Urine | Adults/elderly/very elderly | LC–MS (LOD=0.8 µg/l) | < LOD |
| DON | DON total | Urine | Adults/elderly/very elderly | LC–MS (LOD=0.8 µg/l) | 3.67±1.60 µg/l |
| OTA | OTA | Urine | Adults/elderly/very elderly | LC–MS (LOD=0.01 µg/l) | 0.028±0.020 µg/l |
| OTA | OTA total | Urine | Adults/elderly/very elderly | LC–MS (LOD=0.01 µg/l) | 0.049±0.025 µg/l |
| ZEN,αZOL,βZOL,αZAL,βZAL,ZAN | ZEN | αZEL | Urine | Adults | UHPLC MS/MS (LOD 0.3 ng/ml) | 4.6±3.1 ng/ml | Country Tunisia. Breast cancer patients, female (N=69). Age mean 49.9 y | Interview on socio-demographic factors,a full medical and reproductive history, lifestyle habits and vegetable consumption. | - | Belhassen, 2015 |
| ZEN | αZEL | Urine | Adults | UHPLC MS/MS (LOD 0.3 ng/ml) | 1.7±1 ng/ml | Country Tunisia. Healthy control grouup, female (N=41). Age mean 44.6 y |
| ZEN | ZEN,αZOL, βZOL,βZAL,ZAN | Urine | Adults | UHPLC MS/MS (LOD -) | < LOD | Country Tunisia. Breast cancer patients, female (N=69). Age mean 49.9 y |
| ZEN | ZEN,αZOL, βZOL,βZAL,ZAN | Urine | Adults | UHPLC MS/MS (LOD -) | < LOD | Country Tunisia. Healthy control grouup, female (N=41). Age mean 44.6 y |

1. Unless specified, range of values or mean±standard deviation is reported. FFQ: Food Frequency Questionnaire.

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