Istituto Superiore di Sanità

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Biomonitoring data as a tool for assessing Aflatoxin B1 exposure of workers (BIODAF)

Among xenobiotics, mycotoxins, secondary metabolites of fungal origin, are one of the most harmful hazards with high toxic potency and recognized impacts on human and animal health.

Toxicological implications of mycotoxin exposure deserve an accurate evaluation since a considerable number of uncertainties is present as a result of the peculiar characteristics of toxicokinetics and toxicodynamics associated to the intake of the parent mycotoxins and the formation in vivo of the corresponding metabolites.

From the above, a research activity is proposed with the aim to produce data on the quali/quantitative assessment of metabolites deriving from aflatoxin B1 intake in workers operating in risky workplaces (feed manufacturing, spices warehouses) due to the presence of contaminated environmental dusts. The main objective of the research project is to produce a more accurate assessment of the exposure and risk of this sensitive population groups, by considering the total intake of the toxin, i.e. the fraction derived from the ingestion of contaminated diet and the fraction derived from the environmental work conditions by inhalation of dusts and dermal contact.

The specific objectives will be the following:

1. To determine the estimated exposure of aflatoxin B1 by characterising the metabolic profile of the toxin in human biological fluids
2. To validate specific biomarkers of exposure of aflatoxin B1
3. To characterise the risk derived from aflatoxin B1 (Evaluation of Margin of Exposure (MoE)
4. To collect evidences for orienting appropriate management activities by competent Authorities and stakeholders on mycotoxin risks, with the aim to mitigate the exposure of workers
5. To disseminate the produced data through their presentation at the International Conference that will be held in December 2017 and publication on international peer-reviewed journals

Methodology

The data will be acquired through the implementation of the following methodology:

Objective 1

- Enrolment of a representative number of volunteers to be found in identified high-risk

companies all over the national and trans-national territory. A control group will be sampled in parallel by enrolling operators working in the same company but not exposed to risky environmental conditions (i.e. administrative staff). The minimum number of observations to be performed will be established on statistical criteria, selecting volunteers by age, working hours, health status, presence of peculiar pathologies such as hepatitis B.

- Collection of urine and serum samples of volunteers in at least two days, to be individuated in start-end of the week (Monday and Friday)
- Collection of Food Frequency Questionnaires (FFQ) and Food Records (FR) recalling 24 and 48 hours
- Analysis of the collected samples by validated LC-MS/MS method

Objective 2

- Analytical characterisation of AFB1 metabolites through the evaluation of the relevant performance criteria indicators (ion-ratio, matrix effects, signal suppression/enhancement, etc.) for assessing and confirming the identity of the metabolites

Objective 3

- A probabilistic approach for assessing the exposure of workers to AFB1 by the Monte Carlo technique will be applied.

Objective 4

- A collection of the main intervention actions to be followed for minimising the risk will be made, starting from the main outputs of the study in terms of probability of causing a more relevant AFB1 intake

Objective 5

- An International Conference will be organised at the end of the year and successively the publication in an international journal of high impact factor will be made. A tentative scientific program could entail the following topics:

- *General aspects on Mycotoxins and their impact on the agri-food chain*
- *Risk assessment of mycotoxins: the EFSA opinion*
- *Mycotoxins and climate change: a challenge for food security and food safety*

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- *Risk management and preventive actions aimed at the minimisation of risk by mycotoxins along the agri-food chain*
- *Epidemiological evidence of the role of mycotoxins in the incidence of human pathogenesis*
- *The use of biomarkers in the exposure assessment of mycotoxins*
- *Occupational risk deriving from mycotoxin contaminated environment*

The inherent costs for the execution of the project and the International Conference account for 60.000 Euros.

A tentative subdivision of the costs is as follows:

Task	**Financial request (€)**
Materials and Methods	32.000
Organisation of the International Conference	28.000

Involved co-partners:

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