POSITIONING CURRENT EFFORTS OF FOOD CONTAMINANTS MANAGEMENT

Importance of Analytical Methods

GFoRSS Webinar

Workshop on Rapid Methodologies for Mycotoxin Analysis and Control

22 June 2021

Cairo, Arab Republic of Egypt

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Outline

Reviewing Principles of Management of Chemicals in Food: with Emphasis on Chemical Contaminants

Importance of Mycotoxins

Importance of Analytical Methods in Food Regulatory Decisions

Regulator's Mandate in Managing Chemicals in Food

Ensure that Chemical hazards are not present in food at LEVELS that lead to adverse health effects to humans

Chemicals in Food are not Managed on the Basis of the Hazard …

*but the **RISK**…*

Key Concept: Hazard vs Risk?

The difference is the EXPOSURE

Exposure

Exposure to Chemicals in Food (or Intake)

=

Occurrence of the Chemical in the Food

X

Amount of the Food Consumed

Analytical Methods are KEY

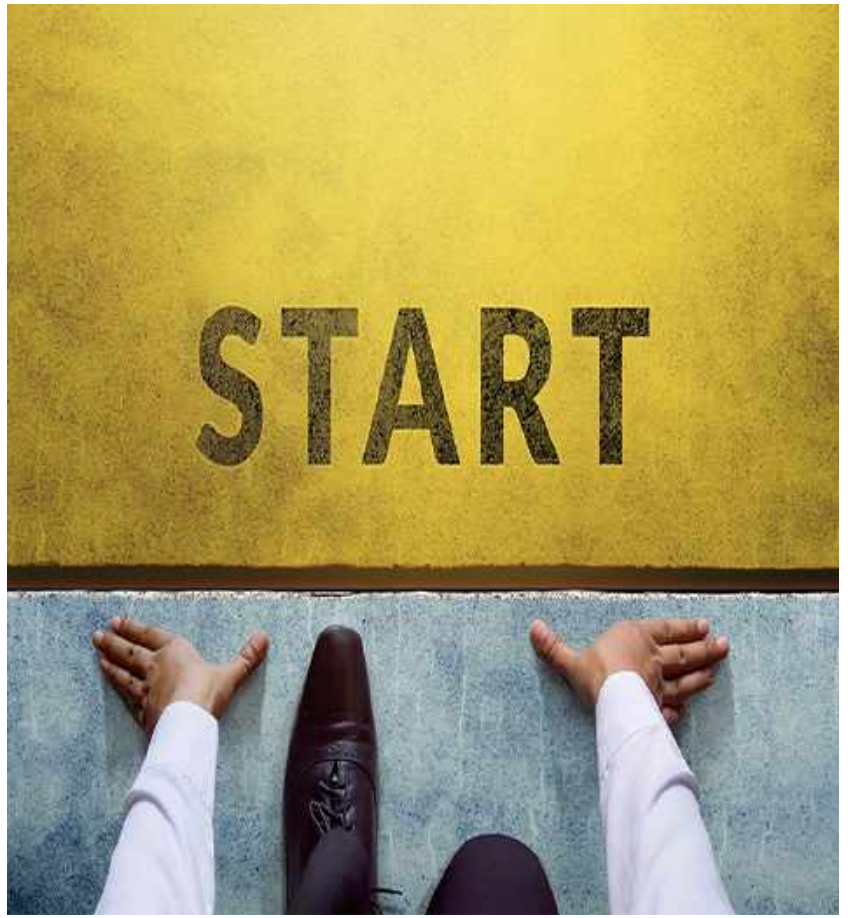
Analytical Methods are KEY in supporting risk assessment and management of contaminants in food

The Start

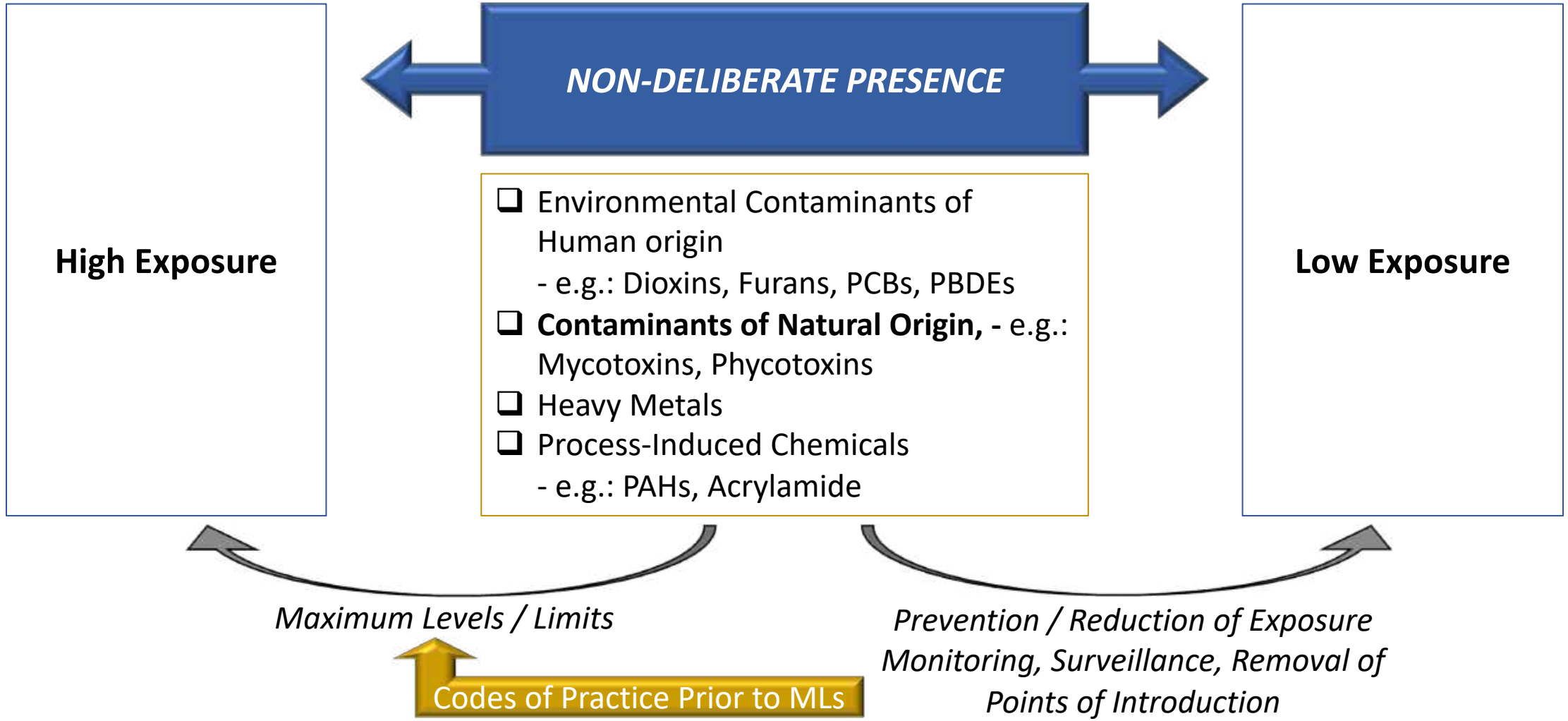
Determining the Presence of a Contaminant and its Quantification

Analytical Methods are key in Supporting Risk Assessment and Management of Contaminants

- Analytical Methods should be chosen to address the purpose ("fit for Purpose")
- Analytical Strategy encompasses screening and confirmatory approaches
- Analysis can be costly and should be part of an **overall risk management approach**



Non-Deliberate Presence of Chemicals



Management of Contaminants: Ensuring Preventive Approaches

Older Food Safety Approach

- Reactive approach
- Main responsibility with Government
- No structured risk analysis
- Reliance on end product testing and inspection

Modern Food Safety Approach

- Preventive approach
- Shared responsibility – FBO main actor in food safety prevention
- Structured risk analysis
- Priority based on risk

Early Intervention – not based on end product testing

Codex Guidance

Risk Management for Contaminants in Food

- General Standard for Contaminants and Toxins in Food (GSCTF): CXS 193-1995
- Code of Practice concerning Source Directed Measures to Reduce Contamination in Food with Chemicals: CXP 49-2001
- Guidelines for Rapid Risk Analysis following instances of Detection of Contaminants in Food where there is No Regulatory Level: CXG 92-2019

Risk Management

Tool Box of Interventions

- Industry Action:
  - Preventing food and feed contamination at the source, e.g. by reducing environmental pollution;
  - Applying appropriate technology control measure(s) in food and feed production, manufacture, processing, preparation, treatment, etc…
- Regulator's action : non-regulatory :
  - Providing advice and guidance to consumers on the risks and benefits of particular food choices;
- Regulatory Measures :
  - Establishment of Maximal Limits or Maximal Residue Limits.
  - Recalls and safety alerts, etc…
  - Surveillance and monitoring of effectiveness of measures

Key Message

Contaminants are

NOT

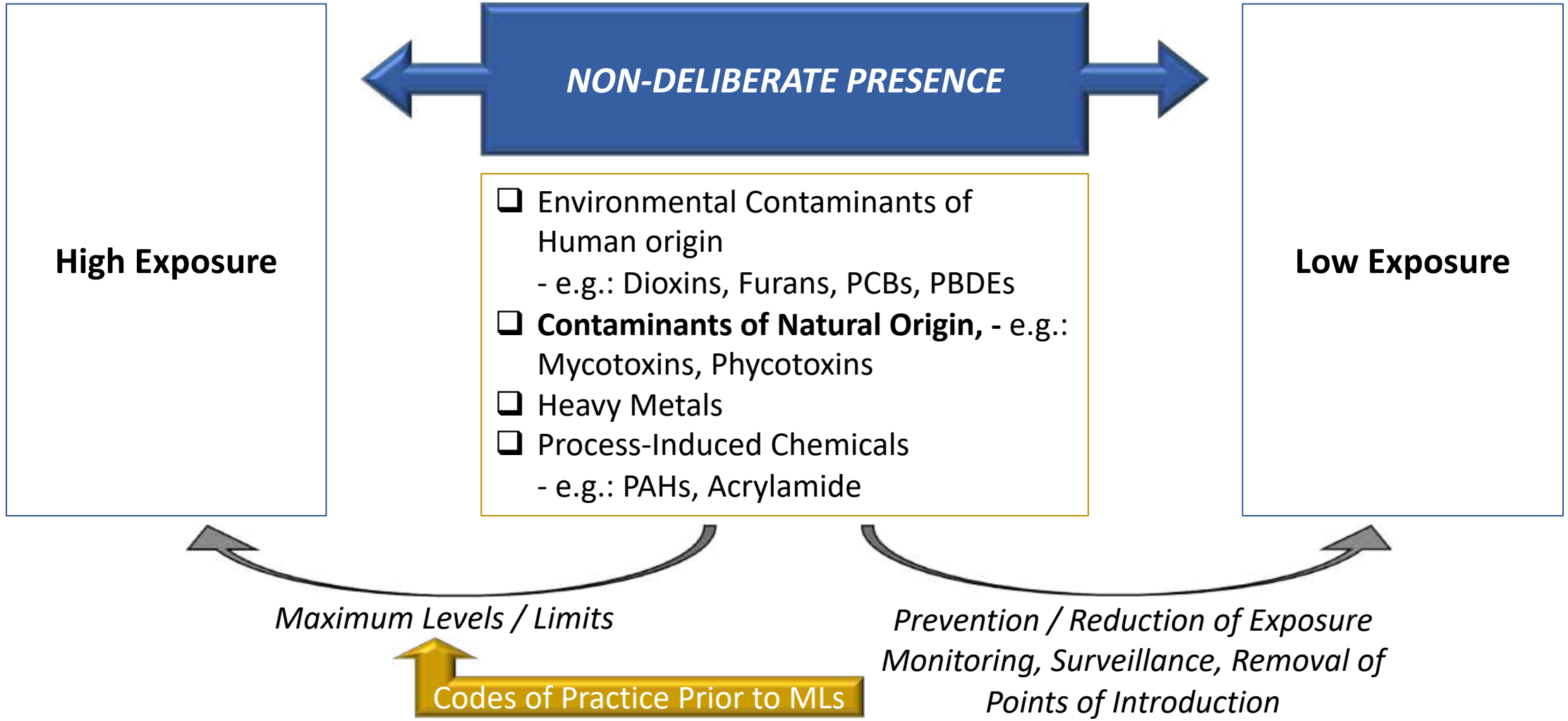
Managed through Maximum Levels

One of the Key Objectives Pursued

From Food Chemical Risk Management Efforts

As Low As Reasonably Achievable

Non-Deliberate Presence of Chemicals



Egypt – Review of Food Contaminant Regulations

Egypt is currently reviewing its Food Contaminants Regulations

Importance to be set in alignment with international guidance

If Maximum Levels Are Needed

Principles

- MLs should be set for food in which the contaminant may be found in amounts that are significant for the total exposure of the consumer.
- MLs should be set in such a way that the consumer is adequately protected.
- MLs should be based on sound scientific principles leading to levels which are acceptable worldwide, so that there is no unjustified barrier to international trade.
- MLs shall be clearly defined with respect to status and intended use.

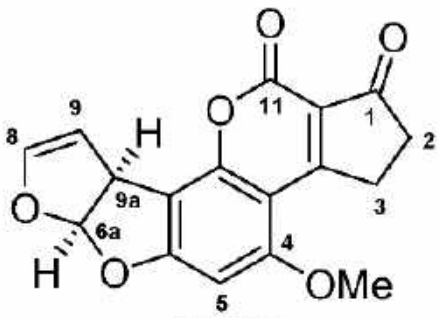
Mycotoxins - Among the Most Important Chemical Contaminants

- Mycotoxins: Mycotoxins are toxic chemical products formed by fungi that can grow on crops in the field or after harvest.
  - Small molecules (< 1000 Da)
  - Produced as secondary metabolites
  - Not biodegradable
  - Resistant to heat and freezing
  - Resistant to food processing (no elimination)

- There are now more than 300 known mycotoxins of widely different chemical structures and differing modes of action.

Common Mycotoxins

Aflatoxins (produced by *Aspergillus flavus* and *A. parasiticus*)



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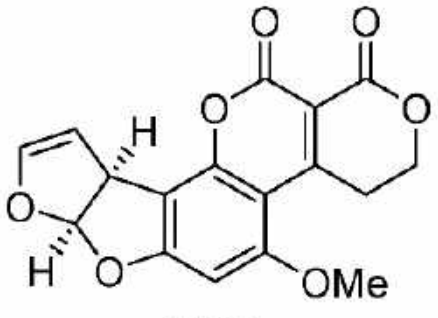

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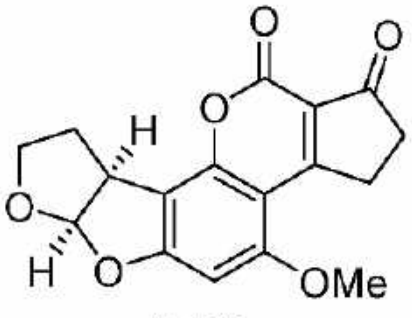

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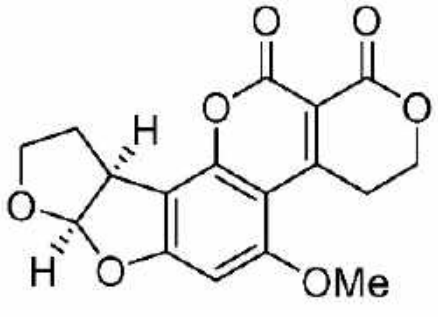

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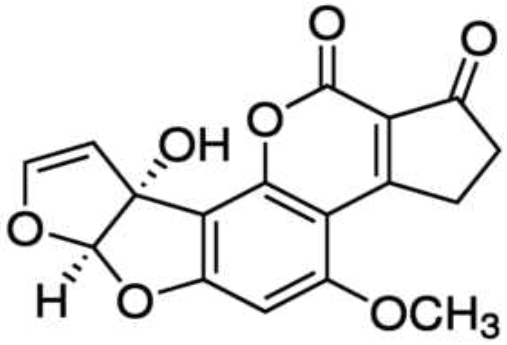


AFM1

Common Mycotoxins (2)

Ochratoxin A (*Penicillium* and *Aspergillus*)

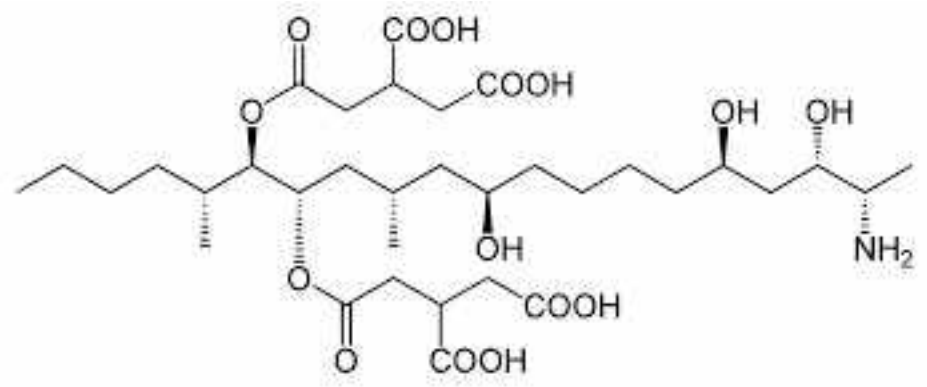
From Koszegi and Poór (2017)

Common Mycotoxins (3)

Fumonisins

Trichothecenes such as deoxynivalenol

Zearalenone



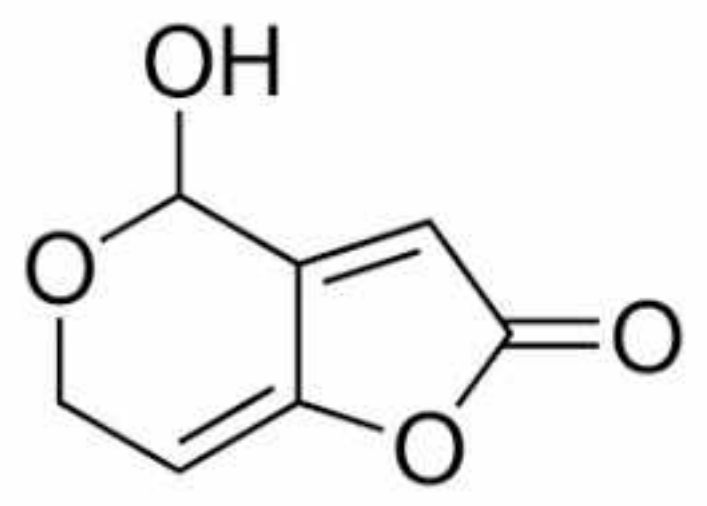
Fumonisin B1

Common Mycotoxins (4)

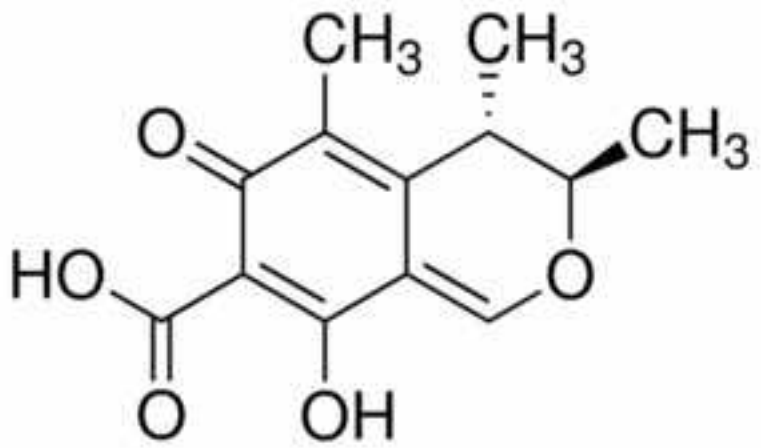
Ergot alkaloids (*Claviceps*),

Patulin (*Penicillium* and *Byssochlamys*),

Citrinin (*Penicillium citrinum*)



Patulin



Citrinin

Mycotoxins

- The foods that can be affected include cereals, nuts, fruit and dried fruit, coffee, cocoa, spices, oilseeds and milk.

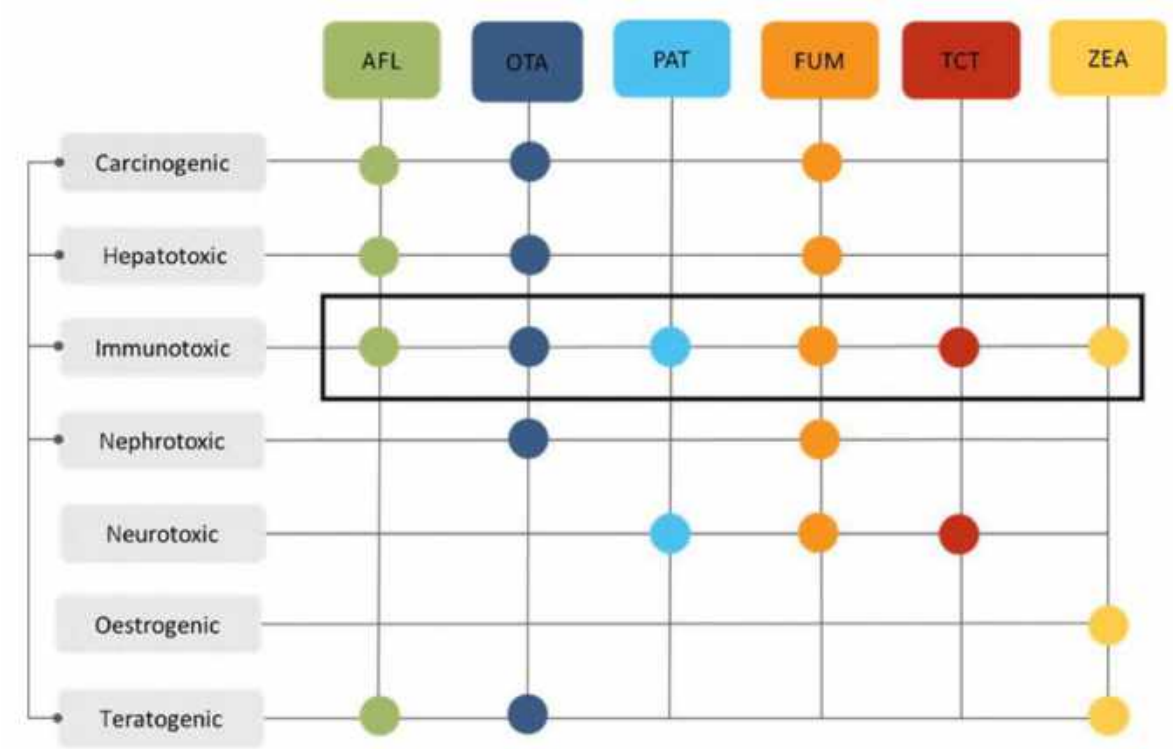
- Importance of environmental conditions
- High humidity (over 70%)
- High temperature (over 30 degrees)
- Insect infestations, etc…

Mycotoxins

Health Impact

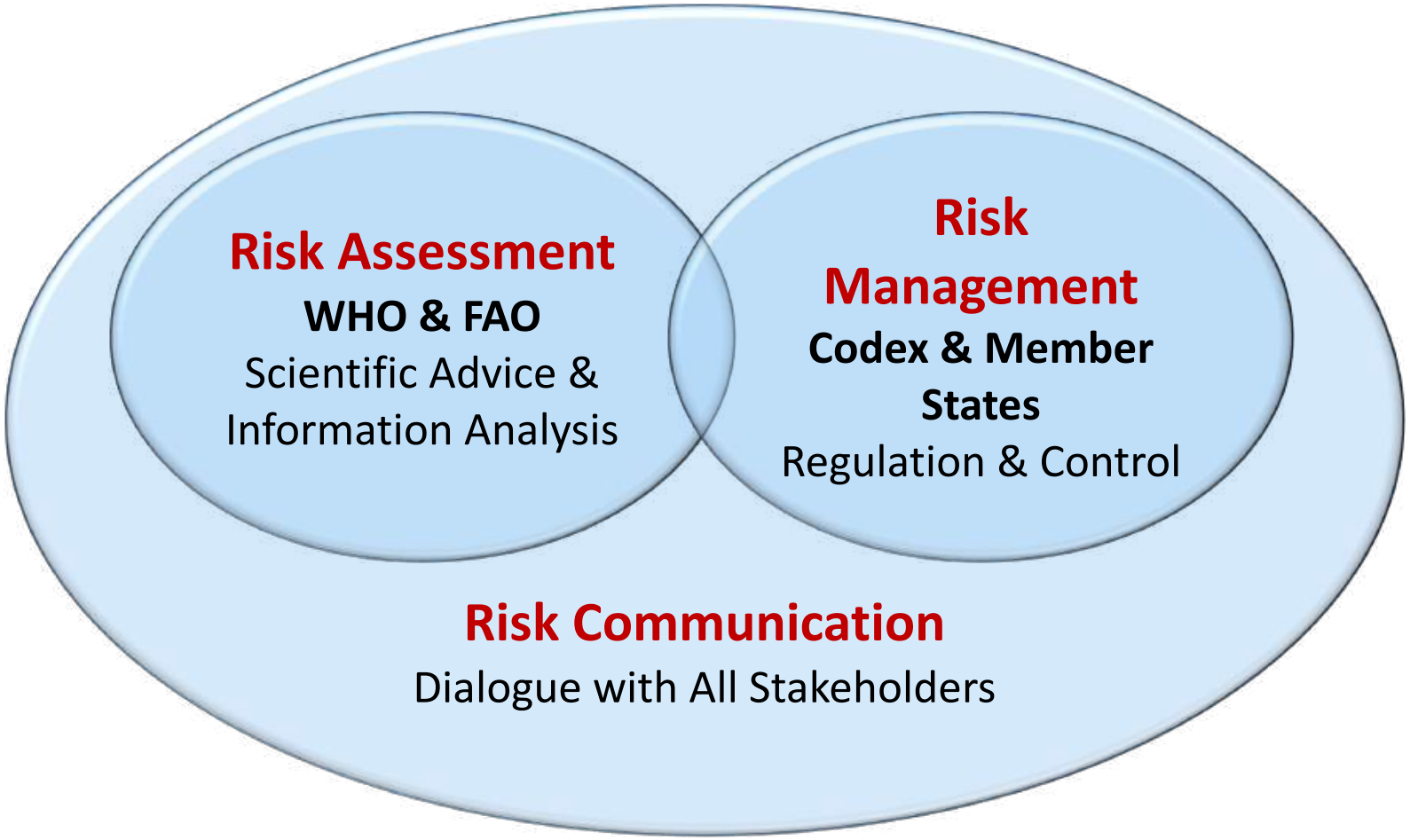
Some target the kidney, liver, or immune system and some are carcinogenic

From Cinar and Onbaşı (2019)

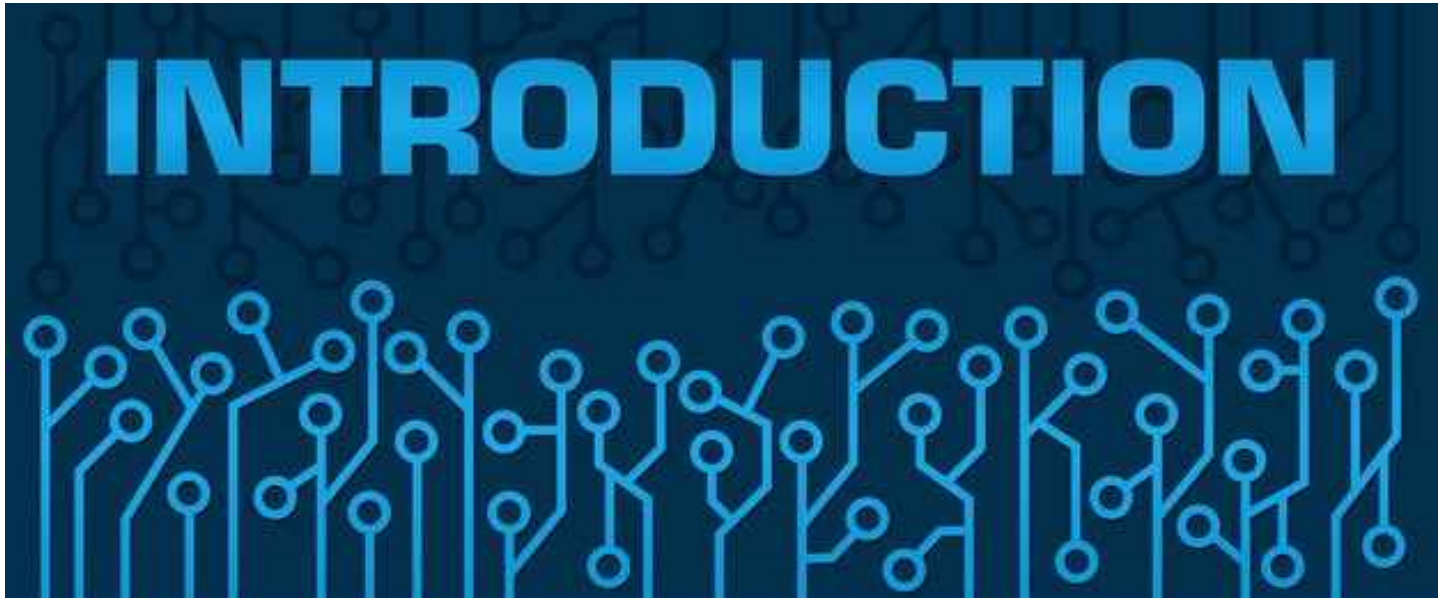


Applying the Risk Analysis Paradigm

Require the reliance on Good Analytical Strategies!



Review of Challenges of Mycotoxin Analysis



TO RAPID ANALYTICAL APPROACHES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Баярлалаа
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tapadh leat
спасибо
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blagodaram
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misaotra
matondo
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grazzi
thank you
gracias
хвала
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nanni
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mercé
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তোমাকে ধন্যবাদ
감사합니다
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ευχαριστώ
merci


شكرًا