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## Mycotoxins Are Not the Only Toxins Affecting Health

### Key Differences: Neurotoxins vs. Cytotoxins

Mycotoxins are often considered the primary concern regarding toxic mould exposure. However, a deeper understanding of toxic mould reveals a broader scope of toxins that can impact health.

The term “*toxigenic mould*” was introduced by the Institute of Medicine in 2004, combining the concepts of cytotoxic and neurotoxic properties. This terminology highlights the need to explore the various effects of these toxins and their origins. While mould itself is often the focus, it’s crucial to investigate the source of toxins affecting the body. Identifying and addressing these toxins can provide better insight into health concerns associated with exposure.

This paper distinguishes between two major toxin types—neurotoxins and cytotoxins—explaining their mechanisms, effects, and sources.

#### Neurotoxins

- **Target:** Primarily affect the nervous system.
- **Mechanism:** Disrupt nerve function by interfering with signal transmission between neurons. This can include blocking neurotransmitter release, binding to ion channels, or directly damaging nerve cells.
- **Effects:** Can cause paralysis, muscle weakness, seizures, and even death. These toxins typically impair sensory or motor functions.
- **Examples:**
  - **Botulinum toxin** (from *Clostridium botulinum*): Disrupts nerve signalling, causing paralysis.
  - **Tetrodotoxin** (from pufferfish): Blocks sodium channels, preventing nerve impulses.
  - **Saxitoxin** (from certain algae): Also targets sodium channels, disrupting neural activity.

#### Cytotoxins

- **Target:** Affect a wide range of cell types, not limited to neurons.
- **Mechanism:** Damage cell membranes, disrupt metabolic processes, or induce apoptosis (programmed cell death).
- **Effects:** Lead to cell death, tissue damage, or organ failure, often causing localized or widespread harm.
- **Examples:**
  - **Ricin** (from castor beans): Inhibits protein synthesis, leading to cell death.
  - **Certain snake venoms:** Contain cytotoxins that destroy red blood cells or cause tissue damage.

- **Diphtheria toxin** (*Corynebacterium diphtheriae*): Inactivates critical proteins, resulting in cell death.

## Key Differences

- **Target:** Neurotoxins specifically affect neurons, while cytotoxins target a variety of cells.
  - **Effects:** Neurotoxins impair nerve signalling, leading to neurological symptoms, whereas cytotoxins cause cell death and tissue damage.
  - **Role in Nature:** Neurotoxins often immobilize prey by targeting the nervous system, while cytotoxins may digest tissue or defend against threats.
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## Mycotoxins and Their Relationship with Neurotoxins and Cytotoxins

While mycotoxins are a distinct category of toxins produced by fungi, they can exhibit neurotoxic or cytotoxic effects in some cases.

### Mycotoxins as Neurotoxins

- **Definition:** Neurotoxins impair the nervous system.
- **Examples of Neurotoxic Mycotoxins:**
  - **Fumonisin B1** (*Fusarium* species): Disrupts sphingolipid metabolism, which is critical for brain function, potentially causing neurotoxicity.

### Mycotoxins as Cytotoxins

- **Definition:** Cytotoxins damage or kill cells.
- **Examples of Cytotoxic Mycotoxins:**
  - **Aflatoxin** (*Aspergillus* species): Causes liver damage and cancer.
  - **Trichothecenes:** Inhibit protein synthesis, leading to widespread cellular damage.

## Understanding Mycotoxins

- **Definition:** Toxic compounds produced by fungi as secondary metabolites.
- **Effects:** May be neurotoxic, cytotoxic, immunotoxic, hepatotoxic (liver-damaging), or nephrotoxic (kidney-damaging), depending on the specific mycotoxin.
- **Examples:**
  - **Aflatoxins:** Cytotoxic and carcinogenic, affecting the liver.
  - **Ochratoxin A:** Nephrotoxic but also has neurotoxic and immunotoxic effects.

## Conclusions

- **Not All Neurotoxins or Cytotoxins Are Mycotoxins:** These toxins can be produced by bacteria, plants, and animals, in addition to fungi.
- **Not All Mycotoxins Are Neurotoxins or Cytotoxins:** Mycotoxins can target various systems and may not fit neatly into these categories.

While some mycotoxins have neurotoxic or cytotoxic properties, they represent a broader class of fungal toxins with diverse effects. Understanding the distinctions between these toxin types helps clarify their roles and potential impacts on health.

Understanding the distinct mechanisms and effects of neurotoxins and cytotoxins is essential for identifying health risks associated with toxin exposure and developing targeted strategies for mitigation

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