

Chemical Poisons Vs Biological Toxins

- **Poison:** A chemical substance that can cause illness or death when it enters our bodies.
- **Toxin:** A poison of biological origin, specifically a protein molecule produced by a plant, animal or microbe.
- **The terms are often used interchangeably.**
- *Toxins from bacteria are large protein molecules.*
- *Mycotoxins from molds are much smaller.*
- Frequently toxins are the main pathogenic factor.
- **Toxigenicity:** Ability of a microbe to produce toxins.
- **Toxemia:** Presence of toxins in the blood.
- **Toxin effects:** May include fever, cardiovascular problems, diarrhea, shock, destruction of red blood cells and blood vessels, and nervous system disruptions.
- **Of 220 known bacterial toxins, 40% damage eucaryotic cell membranes.**
- Two types of toxins:
 - Exotoxins
 - Endotoxins

What are toxins?

- A toxin (from Ancient Greek Ancient Greek: toxikon) is a poisonous substance produced within living cells or organisms). Synthetic toxicants created by artificial processes are thus excluded.
- The term was first used by organic chemist **Ludwig Brieger**.
- Toxins can be small molecules, peptides, or proteins that are capable of causing disease on contact with or absorption by body tissues interacting with biological macromolecules such as enzymes or cellular receptors.
- Toxins vary greatly in their severity, ranging from usually minor (such as a bee sting) to almost immediately deadly (such as Botulinum toxin).
- Toxins were the first bacterial virulence factors to be identified (**Diphtheria toxin isolated in 1888**), and were also the first link between bacteria and cell biology.
- Cellular microbiology was, in fact, naturally born a long time ago with the study of toxins, and only recently, thanks to the sophisticated new technologies, has it expanded to include the study of many other aspects of the interactions between bacteria and host cells.



Types of toxicity

- There are generally three types of toxic entities; **chemical, biological, and physical:**
- **Chemical toxicants** include inorganic substances such as **lead, mercury, hydrofluoric acid, and chlorine gas,** and organic compounds such as **methyl alcohol,** most medications, and poisons from living things.
- **Biological toxicants** include **bacteria and viruses** that can induce disease in living organisms. Biological toxicity can be difficult to measure because the "**threshold dose**" may be a single organism. Theoretically one virus, bacterium or worm can reproduce to cause a serious infection.
- **Physical toxicants** are substances that, due to their physical nature, **interfere with biological processes.** Examples include **coal dust, asbestos fibers or finely divided silicon dioxide,** all of which can ultimately be fatal if inhaled. Corrosive chemicals possess physical toxicity because they destroy tissues, but they're not directly poisonous unless they interfere directly with biological activity.

Exotoxins versus Endotoxins

