

Difference Between Toxin and Toxoid

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Key Difference – Toxin vs Toxoid

A toxin is a substance that is poisonous. Toxins are produced during the biological processes of living organisms. They are inherently toxic and immunogenic. Toxicity of the toxins can be altered or inactivated, and vaccines can be made from toxins to treat diseases; these are known as toxoids. Toxoid is an attenuated form of toxin. Toxic nature of the toxin is weakened in toxoid. However immunogenic property is maintained the same as toxins to induce antibodies. When the toxoid is introduced to a body, the immune system is capable of responding against both toxoid and original toxin to inactivate them. Hence, toxoids can be used as safe vaccines to combat toxin-based diseases by allowing the building of immunity in our bodies. The key difference between toxin and toxoid is that **toxin is a poisonous substance produced by organisms which is toxic and immunogenic** while **toxoid is an attenuated form of toxin which is non-toxic and immunogenic**.

What is a Toxin?

A toxin is a poisonous substance produced during the biological processes of living cells of an organism. Toxins are produced by different types of organisms such as bacteria, fungi, plants, animals, etc. Among the toxin producers, bacteria are popular microorganisms which produce toxins that cause severe diseases such as tetanus, cholera, anthrax, botulism, scarlet fever, gas gangrene, diphtheria, etc. Bacteria produce two types of toxins named endotoxins and exotoxins. Endotoxins are located within the gram negative bacterial cell wall. They serve as a part of the bacterial outer membrane. They are made up of lipopolysaccharides. Endotoxins are released to the outside when the bacterial cell is lysed. Exotoxins are produced and released out of the bacterial cells. Enterotoxin is a type of exotoxin which targets the intestine. These enterotoxins are produced by certain bacterial species and cause food poisoning and several intestine diseases.

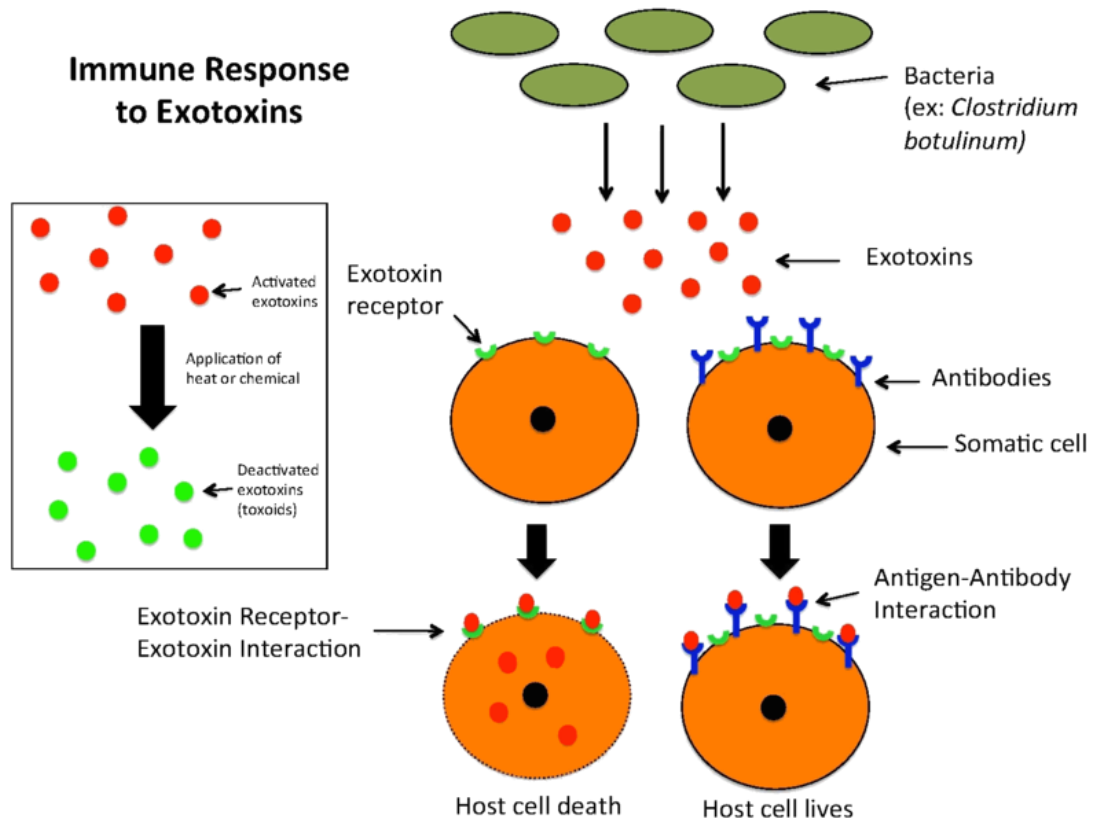


Figure 01: Immune Response to Exotoxin

Toxins are also naturally produced by plants and animals to use as protective chemicals or as offensive mechanisms. Toxins are small molecules of polysaccharides or polypeptides. These toxins can affect our nervous system or digestive system and cause diseases. The effect of the toxin can be acute or chronic depending on the toxicity. Some toxins only affect specific organisms. They initiate action by binding to the cellular receptors located on the cell surfaces, and they are able to inhibit the enzymatic actions.

What is a Toxoid?

Toxins cause severe diseases. Scientists have tried to develop methods to fight against toxins. As a result of these experiments, they have been able to develop weapons called toxoids. Toxoid is an inactivated or weakened form of toxin. Toxoids fight against toxins. Toxoids are introduced as safe vaccines to cure toxin-based diseases. The toxic nature of the toxin is removed from the toxoid. However, the structure of toxoid is similar to its original toxin. But the toxicity is not more retained in the toxoid. Immunogenic property of the toxin is maintained in the

toxoid to induce immune system of the host. The composition of the toxoid is altered to remove harmful effects. The properties are changed by heating the toxins properly. Toxoids are not natural. They are manmade though derived from original toxins.

Toxoids are developed as vaccines and given to animals and people in order to develop immunity against toxin-based diseases. If an animal or a person is vaccinated with a toxoid, they become immune to that specific type of toxin. The immune system of that person or animal is able to defend the body against the particular toxin for a long time. Toxoids are given as small doses to induce the immune system to develop antibodies.

Toxoid vaccines are safe since the virulence cannot be reversed after inactivation. They are stable and not subjected to denaturation by environmental conditions. Tetanus toxoid and diphtheria toxoid are two toxoid vaccines successfully developed by scientists.



Figure 02: Tetanus Toxoid Vaccine

What are the similarities between Toxin and Toxoid?

- The structures of toxin and toxoid are similar.
- Both are immunogenic.
- Our body recognizes toxins and toxoids as threats.

- Antibodies react against both toxins and toxoids.

What is the difference between Toxin and Toxoid?

Toxin vs Toxoid	
Toxin is a poisonous substance that is produced within the cells of living organisms.	Toxoid is an attenuated form of toxin which serves as a safe vaccine.
Origin	
Toxins are naturally made.	Toxoids are man-made. Hence they are synthetic.
Alteration of Composition	
Toxin composition is the same as the original.	Toxoid composition is changed to remove harmful properties.
Properties	
Toxin has both toxic and immunogenic properties.	Toxoid has immunogenic properties. They are not toxic.

Summary – Toxin vs Toxoid

Toxin is a poisonous substance produced by living organisms, often bacteria and fungi. Toxins are responsible for various types of acute and chronic diseases. Toxoid is an attenuated form of toxin produced by removing the toxicity while maintaining the immunogenicity. They are introduced as vaccines to animals and humans to cure or fight against toxin-based diseases. Toxoids are safe and stable. They are made synthetically changing the composition of the toxoid. This is the difference between toxin and toxoid.

References

- 1."CONTENT." Vaccine Safety Basics. N.p., n.d. Web. [Available here](#). 04 July 2017.
- 2."Toxins Causing Health Effects, Bacterial Toxin Diseases." Health Information and Disease Causes, Symptoms, Treatment. N.p., n.d. Web. [Available here](#). 04 July 2017.

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