**Clostridium botulinum**

the Dr. Jekyll and Mr. Hyde bacteria

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**INTRODUCTION**

*Clostridium botulinum* is a Gram-positive, rod-shaped bacterium that produces the most potent substance known → the *botulinum toxin* (BoNT), responsible of the neuroparalytic illness called botulism.

1μg is lethal to a person and only 2μg of crystallized toxin is enough to kill a million people!!

C. botulinum can produce 7 different types of neurotoxin, distinguished by their antigenic characteristics.

It is an obligate anaerobe with peritrichous flagella and oval subterminal spores.

This microorganism was first recognized and isolated in 1887 by Emile van Ermengem who described the toxicological mechanisms of action responsible for botulism.

This organism and its spores are globally distributed in nature (both terrestrial and aquatic ecosystems) but it’s particularly interesting because it can grow in almost any type of food

As Dr. Jekyll and his alter ego, Mr. Hyde, BoNTs also possess two seemingly disparate characteristics: is a widely utilized therapeutic and cosmetic agent, and the cause of the lethal botulism

The objective of this work is to familiarize the ordinary people with *C. botulinum* and this two sides

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**THERAPEUTIC USE**

BoNTs are now the most widely used therapeutic proteins → Due to their high efficacy, longevity, and satisfactory safety profile

**BoNTs block the release of acetylcholine attaching to the end of the motor neurons in the neuromuscular junction, which does not allow the interaction between this neurotransmitter and the muscle receptor, preventing the nerve impulse from reaching the muscle, and the muscle contraction cannot be produced**

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**CONCLUSIONS**

- Although *Clostridium botulinum* is a microorganism that has been studied much, there is still much research to be done!
  - All aspects involved in its mechanism of action, how can we prevent and/or stop the intoxication as soon as possible to avoid the disease...
  - Even though botulism is not very frequent nowadays, we have to keep it in mind due to its high mortality and its possible use in a large-scale terrorist attack.
  - The future of BoNTs in therapeutic applications is bright, yet more research is needed to improve their medical uses.
  - Study the mechanism of action in every application, approve more indications by the FDA and discover new ones

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**BOTULISM**

**Botulinum toxin as a biological weapon**

<table>
<thead>
<tr>
<th>Advantage</th>
<th>Disadvantage</th>
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<tr>
<td>Most pernicious substance known</td>
<td>Constrains in concentrating and stabilizing the toxin</td>
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<td>Highly lethal (1 ng kills 1 million people)</td>
<td>Rapid degradation in the environment minutes</td>
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<td>Deliberate, contaminated food, water, or in an aerial attack</td>
<td>Rapidly masked by standard water sanitation protocols</td>
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<td>Can be stored in cold environments</td>
<td>Does not present a risk to wildlife</td>
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<td>Requires special actions for public health officials</td>
<td>Not transmissible from person to person</td>
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<td>Colorless, odourless and tasteless</td>
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Botulism is likely to occur as SPORADIC ATTACKS, due to the difficulties in dispersing the toxin

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