

Engineered botulism toxins could have broader role in medicine



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already used medically in small doses to treat certain nerve disorders and facial wrinkles — could be re-engineered for an expanded role in



helping millions of people with rheumatoid arthritis, asthma, psoriasis and other diseases, scientists are reporting. Their study appears in ACS' journal *Biochemistry*.

Edwin Chapman and colleagues explain that toxins, or poisons, produced by *Clostridium botulinum* bacteria, cause of a rare but severe form of food poisoning, are the most powerful toxins known to science. Doctors can inject small doses, however, to block the release of the neurotransmitters, or chemical messengers, that transmit signals from one nerve cell to another. The toxins break down a protein in nerve <u>cells</u> that mediates the release of neurotransmitters, disrupting nerve signals that cause pain, muscle spasms and other symptoms in certain diseases. That protein exists not just in nerve cells, but in other cells in the human body. However, these non-nerve cells lack the receptors needed for the botulinum toxins to enter and work. Chapman's group sought to expand the potential use of the botulinum toxins by hooking it to a molecule that can attach to receptors on other cells.

Their laboratory experiments showed that these engineered botulinum toxins do work in non-nerve cells, blocking the release of a protein from immune cells linked to inflammation, which is the underlying driving force behind a range of diseases. Such botulinum toxin therapy holds potential in a range of chronic inflammatory diseases and perhaps other conditions, which could expand the role of these materials in medicine.

More information: "Retargeted Clostridial Neurotoxins as Novel Agents for Treating Chronic Diseases" *Biochemistry*, 2011, 50 (48), pp 10419–10421. <u>DOI: 10.1021/bi201490t</u>

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