

Reminiscence

Justinus Kerner and sausage poisoning: the birth of botulinum toxin

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doi: 10.1111/ijd.13364

Botulinum toxin has a host of cosmetic and non-cosmetic dermatological applications that rely upon its inhibitory effects upon the neuromuscular junction and autonomic nervous system. Although many can name the toxin-producing *Clostridium botulinum*, the origins of its discovery are less frequently discussed.

The population of 18th century Württemberg, Germany, was beset by a bout of "sausage poisoning", one episode of which resulted in the development of severe illness associated with the eating of the same large sausage in 13 people, six of whom died.¹ This led the provincial government to issue an admonitory edict on the "harmful consumption of blood sausages".¹

Justinus Andreas Christian Kerner (1786–1862), a German physician, Romantic poet and polymath (Fig. 1), made the association between the consumption of putrid sausages and flaccid paralysis, and provided the first comprehensive description of sausage poisoning, which later became known as botulism (derived from the Latin word *botulus* [= sausage]). Kerner described in great detail the collection of symptoms of the condition now referred to as botulism, including respiratory failure, muscular weakness, dysphagia, mydriasis, gastroenterological spasms, reduction of salivary and lacrimal gland secretions, reduction of palmo-plantar sweating and impaired micturition.²

Later, Kerner was able to extract the toxin, with which he conducted experiments in a variety of animals, ranging from snails to rabbits, and from locusts to himself, that enabled him to infer that sausage poison (now recognized as botulinum toxin) inhibits the autonomic and motor nervous systems whilst leaving sensation and the central nervous system intact.



Figure 1 Justinus Andreas Christian Kerner, painted by Alexander Bruckmann in 1844. (Reproduced with permission of John Wiley & Sons Ltd from Erbguth.¹)

Interestingly, in the final chapter of his thesis on sausage poisoning, Kerner mused on the potential therapeutic applications of the toxin to reduce sympathetic nervous system hyperexcitability. Although some of Kerner's hypothesized uses have

been realized in contemporary practice in protocols aimed at the reduction of hyperhidrosis, treatment of ulcers and aiding of symptoms following burn scars, others, targeted at the management of delusions and the treatment of infections such as tuberculosis, have not.³

Over six decades were to pass before *Bacillus botulinum* (later designated *Clostridium botulinum*) was isolated by van Ermengem.⁴ Medical applications of botulinum toxin were subsequently developed and continue to be refined to the present day.

References

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