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Introduction:

What is it

Sarin gas (military designation GB), is one of the most dangerous and toxic chemicals known. It belongs to a class of chemical weapons known as nerve agents, all of which are organophosphates, it's colorless, odorless.⁽¹⁾

Synthesized

Developed in Nazi Germany by a team of German scientists lead by the german chemist Gerhard Schroeder seeking a tougher pesticide⁽²⁾. Hoping to make progress in the fight against hunger in the world.⁽³⁾

1938

First Use

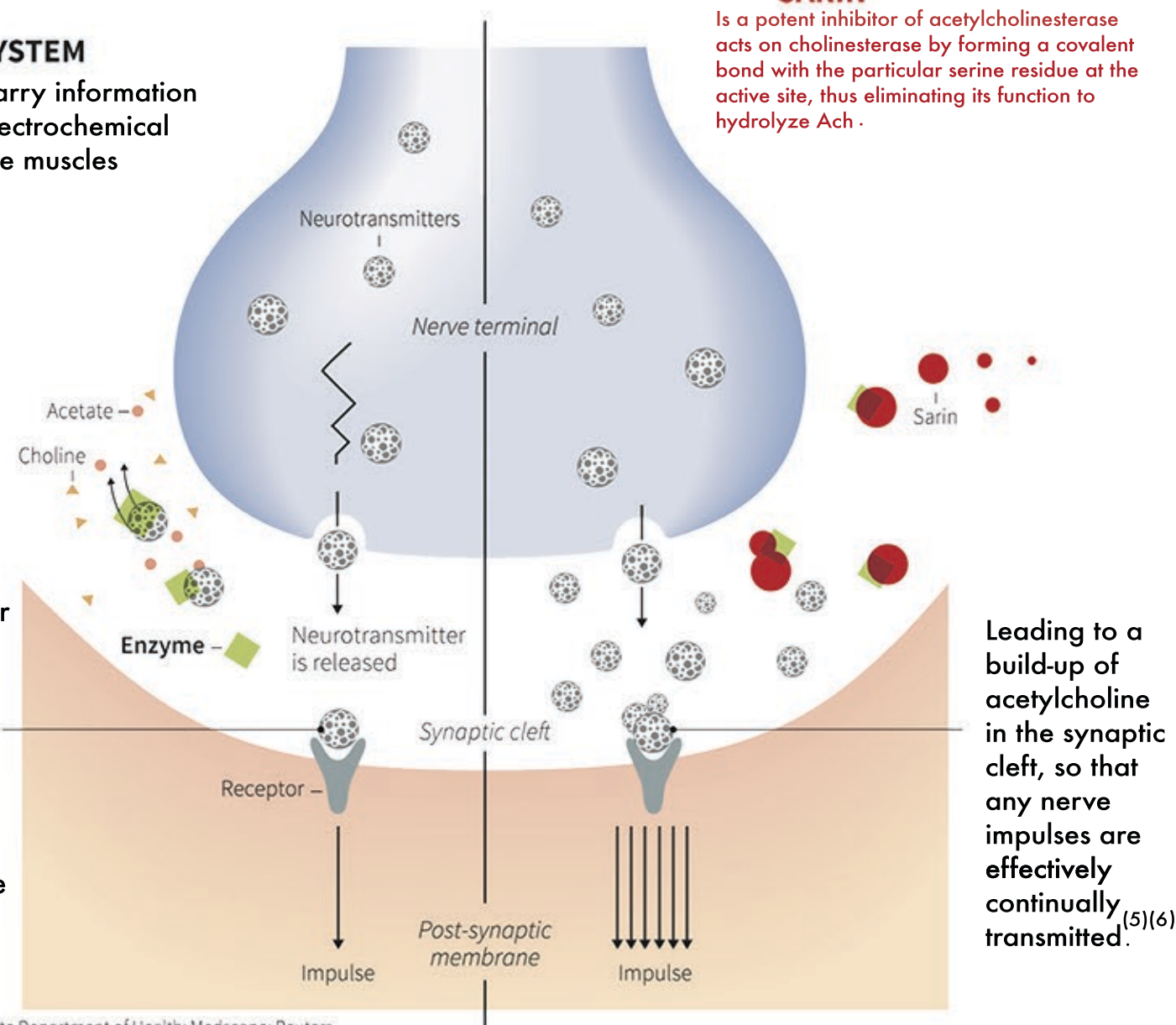
The ethnic Kurd city of Halabja in northern Iraq (population 70,000) was bombarded with chemical bombs at the end of the Iran-Iraq war, which included sarin. Figures for the final total of dead range from 3,200 people to 5,000.⁽⁴⁾

1988
March 16

Mechanism of Action:

HEALTHY SYSTEM

Nerve cells carry information by sending electrochemical impulses to the muscles and organs.



Sources: New York State Department of Health; Medscape; Reuters
K.Pong, S. Scarr 05/06/2013

Health effect:

Symptoms

occurring within seconds to hours of exposure

SLUDGEM syndrome:

- ⊗ Salivation.
- ⊗ Lacrimation.
- ⊗ Urination.
- ⊗ Diarrhea.
- ⊗ Gastrointestinal distress.
- ⊗ Emesis: Vomiting.
- ⊗ Miosis.
- ⊗ Muscle spasm.

Exposure to large doses result in:

- ⊗ Convulsions.
- ⊗ Paralysis.
- ⊗ Respiratory failure (due to bronchorrhea and bronchospasm).⁽⁷⁾

Long-term

Mildly exposed people usually recover completely. Severely exposed people are less likely to survive.⁽⁷⁾



T-Health Topics-Epilepsy with Tonic-clonic Seizures. Qmedicinecoin. 2017. Available at .1
<http://www.qmedicine.co.in/top%20health%20topics/T/Epilepsy%20with%20Tonic-clonic%20Seizures.html>

Management:

Decontamination

- Remove & dispense of contaminated clothing As quickly as possible.
- Wash skin with large amounts of soap and water.
- Rinse the eyes with water for 10 to 15 minutes.⁽⁸⁾

Antidotes

Atropine and Pralidoxime.⁽⁸⁾

Recent uses as a weapon:

- On **March 19, 2013**: a chemical attack in Khan al-Assal Aleppo, Syria⁽⁹⁾ resulted in at least 124 wounded persons and killed 20⁽¹⁰⁾.
- On **August 21, 2013**: sarin was used in an attack in the Ghouta region of the Rif Dimashq, Syria death toll range from at least 281 people to 1,729.⁽¹¹⁾
- On **April 4, 2017** Khan Shaykhun in Idlib Governorate, Syria⁽¹²⁾ .sarin gas was released during an airstrike by Bashar Al Assad forces. at least 74 people where killed and more than 557 where injured.⁽¹³⁾

Conclusion:

- Sarin is a highly toxic invisible, synthetic organophosphorus compound.
- Classified as a nerve agent because of its poisonous effects on the body's central and peripheral nervous systems.
- It binds to AChE inhibiting it from hydrolysing ACh thus accumulation of ACh.
- Leading to unwanted repeated muscle contraction.
- It's deadly due to asphyxia.
- Sarin, like all chemical weapons, is banned under international law.

References:

- 1 Sarin Gas - History And Global Production Of Sarin, Sarin As A Weapon, Sarin Poisoning. Sciencejrankorg. 2018. Available at: .
<http://science.jrank.org/pages/5965/Sarin-Gas.html>
- 2 Jones B. Only A Few People In History Have Dared To Use Sarin Gas. Business Insider. 2013. Available at: .
<http://www.businessinsider.com/devastating-history-of-sarin-gas-2013-8?IR=T>
- 3 Leitenberg M, Jonathan B. Tucker, War of Nerves: Chemical Warfare from World War I to al-Qaeda. Journal of Cold War .
.Studies. 2008;10(1):116-119. doi:10.1162/jcws.2008.10.1.116
- 4 .Available at: http://news.bbc.co.uk/onthisday/hi/dates/stories/march/16/newsid_4304000/4304853.stm .2017 .
5. Millard, C., Kryger, G., Ordentlich, A., Greenblatt, H., Harel, M., & Raves, M. et al. (1999). Crystal Structures of Aged . Phosphorylated Acetylcholinesterase: Nerve Agent Reaction Products at the Atomic Level†,‡. Biochemistry, 38(22), 7032-7039. <http://dx.doi.org/10.1021/bi982678l>
- 6 Hörnberg, A., Tunemalm, A., & Ekström, F. (2007). Crystal Structures of Acetylcholinesterase in Complex with - Organophosphorus Compounds Suggest that the Acyl Pocket Modulates the Aging Reaction by Precluding the Formation of the Trigonal Bipyramidal Transition State†,‡. Biochemistry, 46(16), 4815-4825. <http://dx.doi.org/10.1021/bi0621361>
- 7 .CDC | Facts About Sarin. Emergencycdc.gov. 2018. Available at: <https://emergency.cdc.gov/agent/sarin/basics/facts.asp>
- 8 Sarin [TUSOM | Pharmwiki]. Tmedwebtulaneedu. 2013. Available at: <http://tmedweb.tulane.edu/pharmwiki/doku.php/sarin>
- 9 Barnard A. Syria and Activists Trade Accusations on Chemical Weapons. Nytimescom. 2013. Available at: <http://www.nytimes.com/2013/03/20/world/middleeast/syria-developments.html?pagewanted=all>. Accessed February .5, 2018
- 10 United Nations, 12 December 2013,United Nations Mission to Investigate Allegations of the Use of Chemical Weapons in the Syrian Arab Republic: Final report. 12 December 2013
- 11 Syria/Syrian chemical programme – National executive summary of declassified intelligence" (PDF). France-Diplomatie –" Ministry of Foreign Affairs and International Development. 3 September 2013
- 12 www.dw.com) D. Death toll rises in Syria 'gas attack' | News | DW | 04.04.2017. DWCOM. 2017. Available at: <http://www.dw.com/en/death-toll-rises-in-syria-gas-attack/a-38282661>
- 13 Idlib town reels following major chemical attack: 'No rebel positions, just people'. Syria Direct. 2017. Available at: .10 - <http://syriadirect.org/news/idlib-town-reels-following-major-chemical-attack-%E2%80%98no-rebel-positions-just-people%E2.%80%99>