Tetanus
By Samantha Chin

Etiologic Agent: Caused by an exotoxin produced by the bacteria *Clostridium tetani*.

Transmission: Transmission is usually through contaminated wounds. Can even be transmitted by surgery, burns, deep puncture wounds and animal bites. Some examples of where *Clostridium tetani* can be found include oil and dust. The contaminated reservoirs enter the body through breaks in the skin - usually cuts or puncture wounds that are caused by the contaminated objects.

Reservoirs: Primarily found in the soil and intestinal tracts of animals and humans.

General Characteristics: Tetanus is characterized by generalized rigidity and abrupt spasms of the skeletal muscles. The muscle stiffness usually involves the jaw (lockjaw) and neck. There are three different forms of tetanus. The first is Local tetanus which is an uncommon form of the disease. Here patients have persistent contractions of muscles in the same anatomic area as the injury. These contractions may persist for many weeks before gradually subsiding. Local tetanus may precede the onset of generalized tetanus but is generally milder. Only about 1% of cases are fatal. The next is Cephalic tetanus which is a rare form of the disease. This usually occurs with otitis media (ear infections) in which *C. tetani* is present in the flora of the middle ear, following injuries to the head. The most common type (about 80%) of reported tetanus is generalized tetanus. The first sign is trismus or lockjaw, followed by stiffness of the neck, difficulty in swallowing, and rigidity of abdominal muscles. Complete recovery may take months. Another form of the disease is also Neonatal tetanus (NT) is a form of generalized tetanus that occurs in newborn infants.

Key Tests: No laboratory findings are characteristic of tetanus. The diagnosis is entirely clinical and does not depend upon bacteriologic confirmation. In fact, according to the CDC *C. tetani* is recovered from the wound in only 30% of cases and can be isolated from patients who do not have tetanus.

Signs and Symptoms: The most common sign of Tetanus is spasms in the muscles of the jaw or “lockjaw”. Other symptoms include headache, jaw cramping, fever and chills, sudden and involuntary muscle tightening, painful muscle stiffness, difficulty swallowing, seizures (jerking or staring) and high blood pressure.

Historical Information: Although records from 5th century BCE contain clinical descriptions of tetanus, it was Carle and Rattone in 1884 who first produced tetanus in animals by injecting them with pus from a fatal human tetanus case. During the same year, Nicolaier produced tetanus in animals by injecting them with samples of soil. In 1889, Kitasato isolated the organism from a human victim, showed that it produced disease when injected into animals, and reported that specific antibodies could neutralize the toxin.

In 1897, Nocard demonstrated the protective effect of passively transferred antitoxin, and passive immunization in humans was used for treatment and prophylaxis during World War I. A
method for inactivating tetanus toxin with formaldehyde was developed by Ramon in the early 1920's, which led to the development of tetanus toxoid by Descombey in 1924. It was first widely used during World War II.

Virulence factors: C. tetani is a slender, gram-positive, anaerobic rod that can develop a terminal spore. C. tetani produces two exotoxins, tetanolysin and tetano-spasmin. While the function of tetanolysin is not known with certainty, Tetanospasmin is a neurotoxin that causes the symptoms of tetanus. Tetanus toxoid consists of a formaldehyde-treated toxin

C. tetani usually enters the body through a wound; a break in the skin. In the presence of anaerobic conditions, the spores germinate. Toxins are produced and disseminated via blood and lymphatics. Toxins act at several sites within the central nervous system, including peripheral motor end plates, spinal cord, and brain, and in the sympathetic nervous system. The typical clinical manifestations of tetanus are caused when tetanus toxin interferes with release of neurotransmitters, blocking inhibitor impulses. This leads to unopposed muscle contraction and spasm. Seizures may occur, and the autonomic nervous system may also be affected.

Control and Treatment: Treatments for Tetanus include hospitalization, immediate treatment with human tetanus immune globulin, the vaccination, drugs to help control muscle spasms, aggressive wound care and antibiotics. There is no technical "cure" for tetanus but rather, treatments to manage further complications and symptoms relief.

Prevention and Vaccinations: DTaP (diphtheria and tetanus toxoids and acellular pertussis vaccine) is the vaccine of choice for children of 6 weeks to 6 years of age. The schedule is a primary series of four doses at 2 months, 4, 6, and 15–18 months of age. Td is the vaccine used for children 7 years and older and for adults.

Local Cases and Outbreaks: Today, tetanus is uncommon in the United States, with an average of 29 reported cases per year from 1996 through 2009. During 2001 through 2008, the last years for which data have been compiled, a total of 233 tetanus cases were reported. Almost all cases of tetanus are among people who have never received a tetanus vaccine, or adults who don't stay up to date on their 10-year booster shots.

Global Cases and Outbreaks: Tetanus occurs worldwide but is most frequently encountered in densely populated regions in hot, damp climates with soil rich in organic matter. For cases worldwide about 58,000 neonates died in 2010. Globally in 2014 according to WHO 11,393 cases were reported.

Works Cited:

http://www.who.int/immunization/monitoring_surveillance/data/gs_gloprofile.pdf?ua=1


