



TETANUS

A CRUEL, EASILY - PREVENTED DISEASE[©]

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***Tetanus is not uncommon in unvaccinated horses.
Most cases end with the death of the horse.***

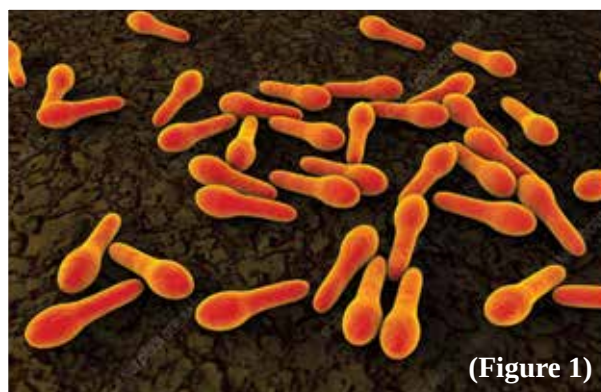
At first glance, tetanus and botulism appear unrelated as the symptoms are opposite - spastic paralysis in tetanus and flaccid paralysis in botulism. Both however are caused by nerve toxins produced by clostridial bacteria that interfere with normal muscle contractions, have a worldwide distribution, affect nearly all species, have a high death rate and have been known for centuries - and still occur today. An early description of tetanus was made by Hippocrates in the 5th century BC - around 2500 years ago. In 1884, the cause was identified. In 1924 the first vaccine was produced and in 1932 vaccination to protect horses from the toxin began.

Tetanus is caused by toxins produced by a bacteria called *Clostridium tetani* which has an almost universal distribution in nature. It is found in human and animal manure, hay dust, soil and also on clothing and skin contaminated with soil or manure. It has also been identified in mud dredged from the bottom of Lake Geneva, the Dead Sea, ship bilge water and gun-wads. The toxin, 1mg (ie 1/1000 of a gram) of which can kill 100 million mice, has been used on poison arrows where it was obtained from burrows of large crabs.

Horses, guinea pigs, goats, monkeys, mice, sheep and humans are highly sensitive to tetanus toxin, cattle, dogs, and cats less so, and birds are resistant - due in part to the inability of the toxin to penetrate and bind to their nervous system. Cats are around 10 times more resistant to infection than dogs and dogs

are 600 times more resistant to tetanus than horses. Based on the amount of toxin required to produce lethal disease, horses are one of the most susceptible species.

When growing in soil, *C. tetani* is rod-shaped and has flagella that give it sluggish mobility. As it matures and produces spores, it enlarges at one end - resembling a drumstick. (Figure 1).



(Figure 1)

The spores are incredibly resistant to destruction – surviving extreme environmental conditions, withstanding anti-septics and killed only by boiling for at least four hours or autoclaving at 115°C. The organism does not grow in normal tissue, but when the skin is breached, tissue underneath gets damaged and dies. This creates a perfect environment for the bacteria to grow and multiply. The growing bacteria release a neurotoxin that enters the blood stream and binds to nerves, causing

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muscle contractions and spasms. Tetanus in all species is usually contracted via a contaminated open wound. Puncture wounds and foot penetrating wounds carry the highest risk, but tetanus can be acquired by gastric ulcers when horses eat manure or highly contaminated soil and rough feedstuffs that cause wounds in the mouth or gut. In 30% of clinical cases a wound or history of a wound cannot be found.

The spores germinate in the dead and injured wound tissue and produce toxins - tetanospasmin that blocks transmission at nerve-muscle junctions throughout the body, and tetanolysin that exacerbates tissue breakdown and death at the site of initial infection. Travelling at 75 to 250mm a day, the tetanospasmin heads for the central nervous system where it binds irreversibly to brain cells. The outcome is muscular spasms and rigidity (which are extremely painful, last for several minutes, may be severe enough to fracture bones and persist for 3-4 weeks), hypersensitivity to touch, light and sound, and eventually convulsions, respiratory arrest and death.

Reduced intestinal activity, colic and dehydration are frequent complications. Most cases that are unable to stand are euthanised on welfare grounds. If the horse (or human) survives treatment, regrowth of the nerve terminals takes many months. Unvaccinated horses that recover are unlikely to develop any significant protective immunity.

TABLE 1.
RANGE OF CLINICAL SIGNS OF TETANUS

Hypersensitivity to sound, touch
Limb spasticity
Stiff neck
Muscle spasms
Restricted jaw movement
Sweating
Dilated pupils
Anxious expression
Trouble swallowing
Increased heart and respiratory rate
Prolapse of third eyelid
Elevated tail
Stiff, erect ears
Fever
Lying down

Treatment requires heroic intensive care and nursing, including wound care, tetanus antitoxin - (very expensive), antibiotics, muscle relaxants and sedation, tracheostomy (and sometimes mechanical ventilation), intra- venous or tube feeding, tetanus vaccination, manual evacuation of the rectum and urinary catheterisation. The mortality rate remains high and has not changed in the past two decades. The solution to the problem of tetanus lies only in vaccination.

Tetanus is a preventable disease, but a 2018 Australian survey discovered that over 25% of owners don't vaccinate their horses, 48% of older horses in Queensland remain unvaccinated and only 2 out of 41 pony club families vaccinated their horses to protect them against tetanus. Statistics from England and Ireland revealed similar vaccination rates. The Pony Club Manual advise tetanus prevention via vaccination of horses and riders. The Australian Horse Welfare Protocol states that vaccination should be routine.

Horses that develop tetanus have a better prognosis if vaccinated within 1 year prior to sustaining the wound. When a horse is not up-to-date on his vaccination and gets a foot abscess or a wound, a booster should be given immediately.

The disease tetanus progresses very quickly and by the time an injury is detected and antitoxin administered it may be too late. Most importantly, in many cases of tetanus no known injury has occurred or the initial wound/the source of infection cannot be found and may be almost completely healed before symptoms occur. The early stages of tetanus can look like colic, laminitis or tying-up which can delay correct diagnosis so if your horse is not vaccinated and shows any signs of disease (**Table 1**), seek prompt veterinary advice.

The toxoid vaccine is not immediately effective and takes at least 2 weeks for the horse's immune system to fully respond. In some instances an anti-toxin may be administered. The anti-toxin binds to circulating toxins and prevents them from attaching to nerve endings. It is not as effective as the vaccine and should not be relied on for any sort of protection. Administering the anti-toxin to protect an unvaccinated horse that has an injury only protects the horse for 10 days, only inactivates the toxins that haven't yet reached the nervous system – and is not 100% effective in preventing the progress of the disease.



A single vaccination does not always confer immunity and individual horses vary in their immune response. The optimal frequency of revaccination has not been established. In humans, unless an injury has occurred, it is currently recommended that people receive a toxoid booster every 10 years. Horses are more susceptible to tetanus and all horses should be vaccinated for tetanus as recommended by their veterinarian. The vaccination protocol varies according to the age and status of the horse.

Foals from unvaccinated mares require a different vaccination program to foals from vaccinated mares, as do brood mares, adult vaccinated and unvaccinated horses. Revaccination is recommended on the occurrence of wounds or before surgical procedures.

Tetanus is rarer now due to vaccination and improved medical management of wounds. The reduction in cases, however, is not due to a reduction in the number of environmental bacteria and every unvaccinated horse is still at risk. Although antiseptic surgical procedures and correct treatment of wounds are important in tetanus prevention, one cannot be certain that all spores from the wound have been eliminated – once spores have lodged in the tissues of the horse, even a bump or bruise months later can damage tissue and create favourable conditions for the spores to germinate and begin producing toxins.

There is no more horrible yet easily preventable disease than tetanus. Nonchalance is an avoidable risk. Horses are the most vulnerable species and as excellent vaccines are available, every horse should be vaccinated.



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Dr Jen Stewart have been an equine veterinarian for more than 40 years and a equine nutritionist for more than 10 years. Jen has been developing premium formulas for studs, trainers & feed companies in Australia & around the world and regularly consults to leading International studs & trainers in various countries.

Jen has spent a fair bit of time researching & being involved in nutritional management of developmental orthopedic diseases, colic, tying-up, laminitis, performance problems, post-surgery & other conditions. And is currently the only practicing equine veterinarian & clinical nutritionist in Australia. Jen's promise is to continue to BRING SCIENCE TO YOUR FEED BIN. For more information visit www.jenquine.com

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