



## **Hyperkalemic Periodic Paralysis (HYPP)**

Hunter Ortis, DVM

In recent years Hyperkalemic Periodic Paralysis (HYPP), has been a familial disorder affecting many pure and crossbred quarter horses, paint horses and appaloosa horses. The disorder has been linked to the quarter horse stallion Impressive and has been genetically passed on. Impressive-bred horses were favored by many due to their heavy muscling and success in the halter show ring.

Muscle contractions are stimulated by changes in sodium and potassium levels at the cellular level. This is controlled by lots of tiny cellular pumps that move sodium and potassium in and out of the cell. During muscle contraction there is a higher level of sodium inside the cell and lower level of potassium outside the cell and for a relaxed muscle the opposite is true. In a HYPP affected horse there is a genetic defect or mutation that results in pumps that malfunction periodically causing a sustained high level of sodium in the cell and a high level of potassium outside of the cell leaving the horse with uncontrolled muscle contractions.

A blood or, more commonly now, a hair sample can be submitted to a diagnostic lab to be evaluated to see if a horse has the genetic potential to carry the disorder. Results will be reported as H/H, N/H, or N/N. Horses with H/H or N/H have the potential to have the disorder and also pass it on to their progeny. If a horse is H/H, it received the gene from both its sire and dam. An H/H horse will pass the gene on to 100% of all its foals. If a horse is N/H it received the gene from either its dam or sire and will pass the gene on to 50% of all its foals. Horses that are N/N, do not have the disorder nor do they have the genetic potential to pass the disorder on to their progeny.

The AQHA is taking steps in reducing the number of horses affected by the disorder by placing new registration restrictions regarding HYPP. According to the 2006 Official Handbook, registration rule 205(c)(3), "Effective with foals born on or after January 1, 2007, all descendants of the stallion Impressive, AQHA registration number 0767246, shall be required to be parentage verified and HYPP tested, subject to the conditions in (c)(2) above. Any foal testing homozygous positive for HYPP (H/H) will not be eligible for registration with AQHA." Rule 205(c)(2) states that HYPP testing is not required if "the foal's closest ancestors, tracing to the HYPP line, have been tested negative and designated on their registration certificates, these foals will automatically be designated "N/N" on their registration certificate."

Horses that are H/H or N/H may or may not show clinical episodes of the disorder. Usually if episodes are going to occur they will begin by 3-4 years of age. Although episodes are often unpredictable there are common stimuli that may precipitate episodes such as trailer rides, stress, and fasting. Most episodes begin with a period of muscle fasciculations of the neck and head, sweating and third eyelid prolapse. There is commonly a period of muscle weakness during episodes that may progress to the horse lying down or dog sitting. Horses usually remain bright and alert and respond to stimulation. In severe episodes respiratory distress associated with "roaring sounds" may occur and even death.



All horses that have Impressive in their lineage should be tested so owners will know if there is potential for HYPP episodes. If a horse is having an episode the owner should contact their veterinarian immediately. Commonly veterinarians will give calcium gluconate intravenously at a slow rate and or dextrose intravenously to rapidly drive the potassium back into the cell. The veterinarian will also be able to evaluate the horse to see if there is other supportive care needed and give you advice on hopefully preventing further episodes such as using acetazolamide, a diuretic that helps decrease excess potassium.

If you have an H/H or N/H horse that has episodes there are a few steps you can take to help prevent episodes.

- Avoid feeding feeds that are high in potassium such as alfalfa hay, brome hay, molasses, soybean oil and canola oil. Replace with feeds such as timothy or bermuda grass hay, grains and beet pulp.
- Feed multiple small meals each day instead of just once or twice daily.
- Regular exercise or being allowed access to large pasture or paddock is helpful in preventing episodes.

These steps may not control episodes in all affected horses, but astute owners, who notice early signs, can minimize an episode by administering corn syrup orally (The syrup will trigger an insulin release driving the potassium back into the cell).

Since this is a heritable trait it is recommended not to use horses that are H/H or N/H as breeding animals. In light of the recent AQHA rule changes, breeders risk having an unregistrable foal when breeding N/H to N/H or N/H to H/H. If you own a horse that has episodes work with your veterinarian to come up with a plan with treatment and prevention.