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# Performance Suppressing Drugs:

## The Dangers of Medicating

**How do Performance Suppressing medications affect our horses? Dr Joan Norton explains the intended use of veterinary medications and how their misuse, and so-called beneficial side effects, are impacting the health and safety of our horses.**

By Dr Joan Norton

**R**ecently, there has been much media attention focused on performance enhancing drugs (PED). Barry Bonds, Sammy Sosa and Roger Clemens were denied entry into the Baseball Hall of Fame. Lance Armstrong finally admitted to the doping allegations he had been denying for years. Horse sport has also come under scrutiny. The *New York Times* ran a three-article series on medications in the racing industry and followed it up with a heartbreaking story of a small pony hunter which died due to a suspected medication error.

The over use of medications and supplementations, intended to produce a calming effect in show horses has been common practice for years. Many articles have been written recently about the reasoning behind these Performance Suppressing Drugs (PSDs), industry standards and how laws should be enforced. While many people are discussing the “Why”, few are talking about the “How”.

There are a plethora of products on the market that are used to quiet a horse. Some are proper equine pharmaceuticals; medications that were initially developed for horses for a specific therapeutic aim. Rarely is this aim “to produce a quiet hunter.” Sedation, depression or a quiet demeanor happen to be side effects of some drugs and the reason why they became popular as PSDs. But without knowing its true purpose (and non-sedating side effects) we could be putting our horses at risk by giving them a medication they do not need.

### MAGNESIUM SULFATE

Magnesium sulfate ( $MgSO_4$ ) is a prime example of this. Magnesium is a naturally occurring substance in the body and necessary for proper cellular function, but like any electrolyte, too much of a good thing can be dangerous.

Magnesium sulfate comes in two forms that are routinely used in veterinary medicine; a granule (Epsom Salt) or combined in a powder-mix intended for oral administration for the treatment of large colon impactions.

When given orally  $MgSO_4$  acts as a laxative by drawing water into the colon. Because the water is being taken from the circulation, these horses are at a risk of dehydration if additional water is not provided. When veterinarians administer  $MgSO_4$  for impactions, they dissolve it in several liters of water and place directly into the stomach via nasogastric tube. Often these horses are also placed on intravenous fluids. Horses which receive magnesium sulfate and do not have GI impactions are at risk of developing diarrhea, dehydration and complications associated with colitis. Magnesium toxicosis has been reported in horses that were given oral  $MgSO_4$ . They showed signs of impaired motor function, weakness and paralysis, respiratory distress, cyanosis and even cardiac arrest.

The proper use of intravenous  $MgSO_4$  is very limited in equine medicine. When given IV, this compound begins working directly on the cells. It is far easier to create hypermagnasemia (an overdose situation) with an injection versus oral administration. Magnesium works closely with calcium in the body to facilitate muscle contraction and relaxation. One such muscle is the heart.  $MgSO_4$  is used as an antiarrhythmic, in cases of ventricular tachycardia, to slow the rapid heart rate and return the rhythm to normal. If given to a horse with an already normal heart rate and rhythm it can cause an arrhythmia and lead to cardiac arrest and sudden death.

Hypomagnasemia (a total body deficiency of magnesium) can occur in some situations and injectable  $MgSO_4$  can be added to a slow infusion of intravenous fluids for treatment.

**“Proper equine pharmaceuticals are medications that were initially developed for horses for a specific therapeutic aim, and rarely is this aim “to produce a quiet hunter.”**

#### THE ‘QUIETING’ EFFECT

$MgSO_4$  also functions in the brain to block neurotransmission and has been used to treat seizures. This is how it can cause central nervous system depression and muscle relaxation in a normal horse.

It is for these reasons – decreased heart rate, muscle relaxation and nervous system depression – that horses become “quiet” after being given this drug. It is frightening enough to think of how these “beneficial” side effects alter your horse’s abilities, let alone the thought of getting atop an animal who is so impaired and attempting to compete.

$MgSO_4$  is such a potent and dangerous drug that it has been used in the past as a euthanasia solution in animals that were already anesthetized. So, while oral administration



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can be safe in moderation, but not without complications, intravenous administration should only be exercised when there is a proven medical condition requiring its use.

#### POTENT ANTI-INFLAMMATORY

The corticosteroid, dexamethasone, plays a very large role in veterinary medicine. It is a potent anti-inflammatory used for such conditions as, Inflammatory Airway Disease (IAD) and Heaves, anaphylactic and allergic reactions, spinal cord trauma and neurologic conditions and Inflammatory Bowel Disease (IBD). It works by stopping the body’s normal inflammation

pathway by blocking the white blood cells’ ability to signal each other and trigger the heat, swelling, pain and loss of function that is inflammation. Because the white blood cells are affected by dexamethasone (unlike Bute or Banamine which act on the chemical cascade that occurs after the cells have done their job) when given chronically or in high doses dexamethasone acts as an immunosuppressive drug.

That means it dampens the body’s natural ability to fight infections.

In veterinary medicine we do take advantage of this trait in treating conditions where an overactive immune system is to blame, such as, when the body destroys its own red blood cells or platelets in some cases of Equine Recurrent Uveitis and cancers. While the ability to suppress the immune system

# Route of Administration

Any medication, no matter how safe, can cause problems if given the wrong way.

## Orally (PO):

These medications are meant to be swallowed by the horse and absorbed in order to effect their action. They can come in tablet, powder or paste forms. Horses should not be trusted to eat these medications out of their feed. Pills or powders can be turned into palatable pastes by mixing them with water and molasses or applesauce. The pastes can then be injected into the horse's mouth with a dose syringe.

Some medications that are intended for IV or IM use can also be absorbed orally and can be squirted directly into the mouth. Many of these can be very bitter or caustic so make sure you check with your veterinarian before giving any solution orally. There is very little chance of error in the administration of oral medications but always make sure you are giving the right medication and the right amount. Confusing the methocarbamol tabs with the phenylbutazone tabs will lead to a massive overdose of Bute and serious GI and renal complications for your horse.

## Intramuscularly (IM):

IM injections are given into the muscle. This leads to quicker absorption and a more prolonged duration of action as the medication is absorbed from the muscle into the bloodstream over time. These injections are most commonly given into the larger muscle groups. The cervical muscles over the neck are the most common. Proper placement of the needle is imperative to make sure the injection is given in the muscle and not the nuchal ligament which runs across the top of the neck and avoids delicate structures like the vertebrae and spinal cord. IM injections can also be given in the hindquarters -- at the back of the haunches where the needle would be parallel with the ground. This way, if a swelling or abscess develops, there will be better drainage due to gravity. The pectorals, while a large muscle group, are not recommended for IM injections due to the high motion of this area.

Regardless of the site, after the needle is placed in the muscle, you must draw back on the plunger to ensure there is no blood in the syringe. It is possible for the tip of the needle to fall into a blood vessel, making it an intravenous injection by mistake. Many medications intended for IM use, such as procaine penicillin, and especially those in a slow-release, oil preparation, can be very harmful if given IV. The injection site should be rotated if multiple doses are given over a short period of time.

## Intravenously (IV):

This is the most direct way to administer medications for the fastest onset of action, but the solution must be formulated for IV use and in a sterile container. These injections are given almost exclusively in the jugular vein, which runs along either side of the horse's neck in the jugular groove. Injections can be

given via direct stick, where a needle is placed in the vein only for the purpose and duration of a single injection, or they can be given through an intravenous catheter with the intention of giving multiple or repeated doses or a continuous infusion of fluids or medications.

Problems are encountered with IV medications when the needle placement is not in the vein. Many substances intended for IV use, such as IV phenylbutazone, can be very caustic to the surrounding perivascular tissue. If these solutions are injected around the vein instead of in it, there can be tremendous tissue damage and pain. This is why it is so important that before you inject a solution, you draw back with the plunger and see blood flow into the syringe to confirm you are in the vein. It is also recommended that during the injection you draw back again to make sure the tip of the needle has not moved and you are still in the right place.

Beware intracarotid injections. The carotid artery lies just beneath the jugular vein. Solutions injected into this artery travel straight to the brain, causing significant shock and inflammation. Typically horses that receive an intracarotid injection (regardless of the substance) will collapse and/or display seizure like activity. This complication can be short lived or cause permanent damage and even death, depending on the medication. Intracarotid injections can be avoided by giving the injections higher in the neck. The farther down the neck, the more superficial the carotid artery is and the more likely it is to be involved. To reduce the risk of intracarotid injections, detach the needle from the syringe and instead of puncturing the vein with the needle tip facing the head, place the needle in the vein with the tip facing down towards the body of the horse. If your needle is placed in the vein the blood will drip slowly from the needle's hub. If the needle is in the carotid artery, blood will spurt out in a stream.

It is vital when giving an IV injection that before injecting you draw back with the plunger and see blood flow into the syringe to confirm you are in the vein. It is also recommended that during the injection you draw back again to make sure the tip of the needle has not moved and you are still in the right place.



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is key in these disease processes, it is a detrimental side effect when using this drug inappropriately. Immunosuppressed horses are more prone to contracting upper respiratory viruses when traveling to shows and are at risk of developing a multitude of bacterial infections from dermatitis, pneumonia, sinusitis and even foot abscesses. Systemic fungal infections, which are uncommon in horses, are seen in those which are immunocompromised.

### STEROID-INDUCED LAMINITIS

While a malfunctioning immune system is quite a drawback, the steroid-induced complication that gets the most press, and rightfully so, is laminitis. This is a condition characterized by inflammation, destruction and separation of the sensitive lamellar soft tissue that, through a series of delicately interdigitating projections, holds the horse's hoof wall to the coffin bone underneath. Laminitis is an extremely painful

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condition causing lameness. There is long term damage to the integrity of the hoof and severe conditions often necessitate euthanasia. The exact mechanism of laminitis in every form is unknown but there is a strong association between the use of corticosteroids (such as dexamethasone) and the incidence of laminitis. This correlation is thought to be particularly strong in overweight or obese horses that are suffering from Equine Metabolic Syndrome (think of a nice rounded hunter).

Other side effects that are equally frightening include: worsening of gastric ulcers, severe electrolyte imbalances if used concurrently with furosemide (Lasix), abortion in pregnant mares, interference with vaccinations and masking the signs of illness, such as fever and pain. However, the side effect of dexamethasone that leads to its abuse as a calming agent is the feeling of euphoria that is reportedly felt by users. Doses of dexamethasone cause horses to become dull and lethargic yet there are also reports of corticosteroid induced psychosis in humans. The use of dexamethasone will relieve pain in your horses and make them calmer to ride but with all of the other potential ill effects, it hardly seems worth the risk.

### THE TROUBLE WITH THIAMINE

Thiamine is a water-soluble vitamin that is part of the B-complex (B<sub>1</sub> to be exact). It functions in the body to help cells convert carbohydrates to energy, promote proper neuronal function, aids in muscle contraction and helps produce products needed for digestion. True thiamine deficiency in horses is rare as it is readily available in well formulated and balanced diets. It can be seen with cases of starvation or after chronic ingestion of the toxic plant Bracken Fern (*Pteridium aquilinum*). Thiamine supplementation is also used for a variety of neurologic diseases to support neuronal activity and health.

Horses can be supplemented with thiamine via an oral, intramuscular or intravenous route. Oral supplementation is fairly safe. Thiamine is easily dissolved and processed by both the liver and the kidney and any excess that the body does not need is excreted. Intramuscular injections of thiamine will be absorbed more quickly than oral formulations but are also subject to the filtering power of the liver and kidney and poses no additional side effects other than the ones that can occur with any IM injection (pain, swelling, abscess formation or inadvertent IV injection).

Intravenous administration of thiamine is a different story, especially when large doses are given (which is often ‘recommended’ to obtain the desired calming effect). Rapid injection of thiamine intravenously can cause a precipitous drop in blood pressure. This sudden hypotension causes collapse of not only the entire horse but also the cardiovascular system. In many veterinary clinics, thiamine

is only administered IV as part of large volume fluid therapy to ensure that the desired dose is diluted and given over a long period of time. These injections have also been associated with anaphylactic reactions that immediately affect the cardiovascular and respiratory systems leading to collapse, respiratory distress and even death.

Thiamine may calm horses through its action on the nervous system, and humans taking oral supplementations report a greater sense of calm. However, they also report increased levels of energy and faster reaction times after dosing. Much like tryptophan, there is no scientific evidence that thiamine supplementation in horses alters mood, behavior or activity. While oral supplementation is safe, great caution should be taken when it is administered intravenously.

### AND MANY, MANY MORE...

These are only a few examples of the inappropriate use of medications; there are many more. The important thing is to educate yourself. Even if products are intended for veterinary use and approved in horses, make sure you understand how they work, what they are intended for and what side effects may occur. **HSI**



*Dr. Joan Norton VMD  
DACVIM founded Norton  
Veterinary Consulting and  
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