

## **What is Insulin Resistance?**

Insulin resistance is a form of “pre” diabetes and is unfortunately very common in the horse as well as in humans. Insulin resistance or IR is a physiologic condition in which the cells in the body have a decreased response to insulin. Insulin is a hormone secreted by the pancreas and serves the main function of “driving” sugar (glucose) into the cells so that it can be used as energy. In IR horses, the cells fail to respond to the insulin and thus there is a reduced ability of the cells to gather sugar for use as energy. If you deprive a cell of an energy source for an extended period of time, the cells begin to weaken, potentially alter in form and die. Due to the decreased burning of sugar by the cells, there is a tendency to build fat accumulations in the body. Most IR horses are noted to be overweight due to this fact.

All cells in the body are affected by insulin resistance as all cells require an energy source. In most instances of equine IR, there is an associated change in bloodflow to areas of the body such as the feet as well as a breakdown in the connective tissue of the feet due to cellular alteration. Due to these changes, the coffin bone within the hoof capsule is then prone to rotation, leading to laminitis and associated clinical disease such as severe pain.

Insulin resistance is thought to be closely associated with a condition called oxidative stress. Oxidative stress is discussed in detail elsewhere, but is essentially an imbalance between oxidants (free radicals) and antioxidants within the body. Persistently elevated levels of free radicals lead to oxidation of various tissues within the body, such as cellular membranes. When the cellular membranes become oxidized, their function changes as well as potentially receptors on its surface for things like insulin. This is potentially what leads to a decreased overall responsiveness of the cells to insulin, leading to insulin resistance. Along with high levels of free radicals, there is an associated overall inflammatory response that leads to high levels of inflammatory proteins such as PGE-2, MMP-9 and IL-1. When IR horses are evaluated for oxidative stress utilizing the FRAS-4 device, they typically have elevated levels of d-ROM (free radicals) as well as a reduced BAP (antioxidant potential), which is indicative of oxidative stress.

Cur-OST® has been demonstrated in clinical trials performed by Timbercreek Veterinary Hospital, PC to actively reduce levels of inflammatory proteins such as PGE-2 and MMP-9, as well as aid in the correction of oxidative stress by reducing free radical levels and restoring the antioxidant potential of the patient. Typical anti-inflammatories such as non-steroidals have been shown only to reduce some inflammatory

proteins with no noted impact on oxidative stress. This may explain why routine use of NSAIDs may not completely resolve the underlying problem and improve the patient long term. Oxidative stress is an extremely important inflammatory entity within the body that requires direct therapy in chronic cases.