

## New Regenerative Therapies at VEI

One of the most exciting groups of therapeutic agents in recent years is the bio-regenerative treatments. Each of these therapies use the body's own healing properties; stem cells, growth factors, and other anti-inflammatory mediators to help produce a healed equine athlete. Since there are several of these and they are fairly new to equine sports medicine, I thought I would summarize them for you.

**A-cell injection:** This was one of the first of the bio-regenerative therapies and is the only one that is not derived from the horse being treated. The agent is a pig extract that is designed to provide a scaffold that improves equine tendon fiber alignment and speeds the healing process. This agent is injected into larger tendon or ligament lesions. There often is some heat or swelling post-injection, therefore we recommend the use of a cooling device such as Game Ready post-injection.

**Stem cell injection:** There are two populations of stem cells utilized in equine medicine, those found with fat cells and those in bone marrow. Those with fat cells are removed surgically from near the tail of the horse. They are processed to concentrate their numbers and injected back into the affected tendon, ligament or joint. Those stem cells from bone marrow are obtained from the sternum or the point of the hip. They are then sent to a separate laboratory where they are cultured to increase their numbers. After three weeks they are sent back to VEI for injection into the affected area. We have observed good results from both types of stem cells however the cost of processing makes this treatment modality the most expensive of the bio-regenerative therapies. Understanding stem cells is fairly simple. Stem cells tend to change into whatever type of cells they are injected into. So if you inject into tendons they tend to become tendon cells.

**IRAP injection:** The acronym stands for Interleukin-1 Receptor Antagonist Protein. Blood is collected from the horse into a special container that is then incubated for 24 hours then centrifuged. The resulting serum is extracted and either used immediately or frozen for use for up to one year later. This specially conditioned serum has been used with great success in joints and tendon sheaths for some years. It has also been used recently for smaller tendon lesions by injecting directly into the affected tendon.

It is thought that serum drawn from the same horse that is to be injected is conditioned to concentrate beneficial proteins that will bind inflammatory proteins in joints and/or tissues. In particular, IRAP serum has been beneficial in joints that have not responded to standard joint injections, in young horses, or in horses where you would prefer not to use corticosteroids in their joints.

**Platelet rich plasma (PRP):** This is a relatively new technique in which blood is collected from the horse and within one hour centrifuged. A small fraction of the blood is collected and subsequently injected into a soft tissue lesion with ultrasound guidance. The portion of the blood that we are looking for after centrifugation is the platelet concentrated portion containing numerous growth factors thought to speed and improve the healing process. This portion can also be combined with stem cells or bone marrow supernatant to further enhance the healing process.

**Bone marrow supernatant (BMS):** This is a newer technique in which bone marrow is harvested from the sternum or point of the hip area by a specially designed needle and then centrifuged to collect the supernatant, or non-cellular portion of the bone marrow, which is then suspended in saline. While bone marrow has been injected in certain areas of the body (such as the origin of the suspensory) for years, the BMS technique is a refinement that enhances healing

and reduces complications. One of the difficulties in bone marrow injections has been that the cellular portion of the bone marrow can be quite reactive in some horses, causing unintended swelling and lameness. Removing the cellular component via centrifugation prior to injection or culture of the stem cells (as in bone marrow derived stem cells) seems to greatly reduce the incidence of complications. As in the other techniques, the BMS is injected with ultrasound guidance into the damaged tendon or ligament to enhance the healing process.

All of the newer regenerative therapies are very exciting in their promise to speed the healing process and reduce the incidence of re-injury. Some have been in use for several years while others are quite new. Like all new therapies, careful evaluation and comparison to more conventional therapies is indicated on an individual case basis to look at cost/benefit/risk factors. One of the concerns with injecting any product, biological or non-biological, into tendons or joints is the risk of further inflammation. Utilizing the horse's own blood, bone marrow, or fat greatly reduces this complication. Another technique that reduces post-injection inflammation is cooling and compression (such as a Game Ready device) after the injection.