



Horse Care

by HEATHER SMITH THOMAS

Stem cells are the primitive cells stored in various parts of the body (especially fat tissue), waiting to be sent out to repair injuries. If a bone breaks or a ligament tears, signals are picked up by the stem cells and they travel to the site of injury, where they transform into whatever tissue is needed. Veterinarians can send a small sample of fat from an injured horse to have stem cells harvested in the laboratory and sent back in concentrated form—to be injected directly into a torn tendon or ligament, for instance. A small piece of fat can be extracted from the fatty tissue next to the horse's tail head, to obtain the necessary stem cells.

If enough cells are injected into an injured tendon, they create elastic, normal tendon tissue. Best results occur if this is done during the first month after the injury, while the body is still trying to regenerate new tissue—before it gives up and creates a scar. But chronic tendon lesions can benefit from these cells to help remodel the scar tissue.

A good example is the five-year-old racehorse, Prospector's Trick, owned by veterinarian Frederick Lewis (in Maryland), and trained by Jeff and Susan Runco at Coleswood Farm at Ranson, West Virginia (near Charlestown, WV, and Middleburg, Virginia). The horse had a promising future (one win, three seconds and a third place in eight starts) but injured a tendon in a race during April, 2003. Even with a year off, the tendon had not healed properly; every time they tried to bring the horse back into training the tendon became sore, with heat in it. So Dr. Lewis decided to try stem cell therapy. Now, after months of careful rehab, since easing back into training, the horse seems to be sound with two starts under his belt after returning to the track in December, 2004.

"Prospector's Trick is a nice horse. But every time we tried to bring him back into training, the tendon would give him trouble again. It just wouldn't hold up when we started breezing him. When we ultrasounded it, the tendon had some suspicious areas. It just never healed properly," says Susan.

The colt was very correct, conformation-wise when pur-



In the second start of his comeback, Prospector's Trick canters back after a third-place finish in an allowance race at Charles Town on January 9, 2005.

Stem Cell Therapy for Tendon Injuries

chased at a two-year-old in training sale. "But he grew a lot after we got him, between his two- and three-year-old year. He grew quite fast and ended up a little too straight in the pasterns, which may have had a bearing on his injury, leading to the strain," she says.

After unsuccessful attempts to get it healed, Dr. Lewis, the owner, decided to try stem cell therapy. The procedure was done at Valley Equine Clinic at Ranson, WV, by Ian Harrison BVSC, ACVS. Dr. Harrison has done stem cell therapy on six horses now. "Prospector's Trick was the third one we did. He had a significant lesion in his superficial flexor tendon. He had the earlier injury, so it was a mixture of acute injury and a chronic injury. The thing I was amazed with, on ultrasound examination six weeks after the procedure, was that it basically looked like a normal tendon. The ultrasound showed dramatic improvement," says Harrison.

Susan Runco put Prospector's Trick on a rehabilitation program immediately after the stem cells were injected. "The horse had been resting for awhile before we made the decision to try this. I walked him the very day of his stem cell injection, because I'd read a lot about this and read the research articles (and have a masters degree in biology, myself, and could understand the medical aspects of this) and knew the importance of proper rehab. The veterinarian at Vet Stem Inc. who came up with this procedure recommends immediate light use of the tendon, so the cells will line up properly as they heal. Use of the tendons trains the stem cells to turn into the proper kind of tissue," explains Susan.

"So we walked him that very day, then started using our EuroCizer, which is a big exercise machine. These are used a lot in Europe and we use this one for the racehorses. It's actually a big ring that's divided into sections. There's a central turnstyle arrangement, with moving gates. The horses are on a track and move normally. But the gates (in front and behind him) move, so the horse has to move to keep up with it. The horse has his own section; ours is a six-horse model. We had him on one of those, walking half an hour a day for a month. Then we walked him 40 minutes a day for another month. So I gave him two full months of walking before he started any faster work," she says.

"Then he had two full months of jogging. This machine is well calibrated so you can set it at various speeds. He was walking about four miles per hour. He was jogging about 10 miles per hour. We had him jogging about 2 1/2 miles per day, after starting him gradually—shorter distances at first. He had a solid month of 2 1/2 miles per day before he went to the track," she says.

"He hasn't raced yet, but is doing very well. He worked five-eighths of a mile just a couple days ago (late November) and came out of the work in excellent shape. He's never made it this far (in his recovery from the original injury) with traditional rehab. Every time we tried to bring him back into

training, as soon as he was breezing three-eighths of a mile, that tendon would flare up. But now he's made it through five-eighths and after a couple long breezes he should be ready to run. We're hoping he's going to make it!" says Susan. "So far, we've not had a moment's trouble with that leg."

From a biological standpoint, stem cell therapy makes a lot of sense, she says. "It's fairly non-invasive and innocuous because it uses the horse's own stem cells. There's no immunological issue (with cells coming from an outside source). The only risks are very minimal; if you use sterile procedures there's not much risk at all. The only set-back at all is the expense. It costs about \$2,500 to have this done. But if I had a horse I thought very much of, it would be worth doing, especially if it makes the difference between him becoming (and staying) sound and able to compete."

Dr. Harrison says that when ultrasound is used as one of the criteria for monitoring healing, it shows a dramatic improvement when using stem cells, compared with other products. "There are other products with similar sorts of claims. One of the old ones was Baptin, but horses treated with Baptin had a very high rate of breakdown injury. My interest in stem cell therapy is that it seems to be one of the few physiologic treatments for the tendon. By putting cells in there that will produce normal tendon fibers, we help the horse create a strong structure again," he says.

"We harvest the fat under local anesthesia or with the horse anesthetized. We've found that if we anesthetize the horse with Rompum and Ketamine it only takes about five minutes to harvest the 30 grams of fat that's required and there's no protest from the horse. We are not jumping

around trying to obtain the fat sample. We use an intravenous anesthetic and the horse is down for about 10 minutes. With the more fractious horses, this is much easier on the horse and on us," says Harrison.

The fat sample is shipped to Vet Stem Inc. in California, where the stem cells are concentrated and shipped back. "Generally we try to harvest the fat on a Monday, and the samples are back to us by Wednesday. We inject them that day, bandage the horse's leg, and the horse goes back home," he says.

"Several of these horses are back in training now, after their rehab. It's yet to be determined whether stem cell therapy can shorten the time of rehabilitation. Many horses with significantly injured superficial flexor tendons take a minimum of four to six months to get back to training," says Harrison. The stem cell therapy may not shorten that, but certainly seems to aid normal healing so the tendon will be strong again, without the scar tissue that puts it at risk for further injury and tearing. Four of the horses he's done, including Prospector's Trick, are back in full training and doing fine.

"If you look at the possibilities for stem cell therapy, and use your imagination, we should theoretically be able to use this to help heal lots of things—such as fractured sesamoids. These cells become whatever they are needed to be. We could try putting them into the muscle or nerve supply of horses with paralyzed larynxes, for example. There are many things we might be able to fix with stem cells, besides tendons—and I think there will be a lot of work done on this in the near future."