

## Healing equines with stem cells - Los Olivos clinic on the cutting edge since 1995

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Stem-cell therapy has been shown to have benefits in a variety of ailments from spinal cord injuries to heart failure. And just this week, Italian researchers released findings from a study on patients left blinded after exposure to chemicals whose sight was restored using corneas grown from their own stem cells.

Such curative value has not gone unnoticed by the veterinary world - and one of the pioneers in the use of adult equine stem cells to treat injured horses is Dr. Doug Herthel, owner and founder in 1972 of Alamo Pintado Equine Medical Center in Los Olivos.

From humble beginnings performing abdominal surgeries in the front yard of his first home-office, not far from what is now the tasting-room capital of the Valley, Dr. Herthel has grown his practice to encompass internal medicine, lameness evaluation, diagnostics, physical rehabilitation, hyperbaric treatment and state-of-the-art stem-cell therapy on a sprawling 40-acre ranch south of town.

And on a nearby 15 acres, he grows and harvests alfalfa hay for another aspect of healing that he finds to have tremendous benefit, nutrition.

As in humans, the idea of stem-cell therapy in equines is to make life a little better.

"The need has arisen for many, many years to improve healing the horse, whether it be tendon, ligament or bone," Dr. Herthel said while showing a visitor around the ranch on a recent day.

At the same time, he said, is the hope of preventing injury and congenital acquired illnesses.

"Our focus in '95 started with using the biological approach to healing, which encompasses stem-cell therapy and nutrition, and more recently hyperbaric oxygen."

In the case of stem-cell treatment, Dr. Herthel uses material drawn from a patient's own bone marrow -- adult stem cells.

Sometimes they are placed at the site of an injury, while other times they are placed in nearby blood vessels, the expectation being they will find and fix the injury.



Research scientist Dr. Tara Hembrooke works with stem cells bound for an out-of-state patient at Alamo Pintado Equine Medical Center

MIKE ELIASON / NEWS-PRESS PHOTOS



Above, Dr. Tara Hembrooke takes mesenchymal stem cells from a centrifuge at Alamo Pintado Equine Medical Center. Below, part of this gelding's post-surgery treatment for a fractured leg includes stem-cell therapy.

"We're using the stem cells for the healing effects, the anti-inflammatory effects," Dr. Herthel said. "They also help produce new blood vessels in a tremendous way. It's a combination of a lot of good things."

How exactly do stem cells work?

Think of them as the necessary first step in regenerating cells of all types.

Mesenchymal stem cells, the type used by Dr. Herthel, are especially good for human and equine tissue repair. They can be harvested, grown and stored with relative ease and they have the ability to form fat, muscle, nerve, bone and many other cells in the lab.

"We take the mesenchymal stem cells and we concentrate those into bigger numbers," said Dr. Herthel. "We also expand them, we grow them."

"It appears the benefits of mesenchymal stem cells for treating vascular problems, joint problems, even nervous-tissue problems and tendons is the numbers. The bigger the numbers, it seems like, the better (the) effects."

This means a horse is back on its hooves faster.

The stem-cell lab at the Santa Barbara Avenue equine center is a one-story "clean" building that requires staff and visitors to wear protective garb in some areas.

It is here that the cells are harvested from donors' marrow.

"If a patient comes in need of stem-cell (therapy), we can actually take the bone marrow, concentrate it and inject it back into the damaged tendon or ligament within an hour or two," said Dr. Herthel.

"We can grow the horse's own stem cells. Within about two weeks, we can have 50 million cells."

The cost is about \$2,500.

"We don't do anything with embryonics," he added. "Adult stem cells have their own characteristics that are incredibly safe and have a lot of medical benefit."

During this visit, Dr. Tara Hembrooke, a research scientist with a doctorate from UC Davis, was using a centrifuge in the process of growing stem cells in two flasks.

In an adjoining room, she stationed the flasks, which had a red growth medium inside, under a vacuum hood and started injecting them with a clear solution.

"I'm washing the cells," she said. "They incubate in fetal bovine serum and equine serum, so we want to get all those proteins washed off."

Washing also helps separate the cells, which, because of the centrifuge, accumulate in the conical bottoms of the flasks.

As the red faded with each squirt of the wash, a small pile of off-white material appeared in the flasks.

"Those are stem cells right there," said Dr. Hembrooke, noting they were bound for an out-of-state patient. "At the next wash I'll probably combine them. It's a large treatment so I was working with a large volume."

In all, Dr. Hembrooke said the flasks contained at least 150 million stem cells.



Lab tech Beth Schembri examines the concentration of cells.

The goal was 100 million.

"We're going to be shipping them out today," she added. "Someone's going to inject them tomorrow."

In a surgery room elsewhere on the property, Dr. Mark Rick was about 20 minutes into a three-hour surgery to repair a broken leg suffered when the gelding took what the doctor described as "a bad step" during team roping a day earlier.

The procedure entailed placing pins and screws in the affected area.

"We're going to reconstruct it as best we can," said Dr. Rick from behind his surgical mask, the giant animal anesthetized on the table before him. "We'll save him to be a pasture-comfortable horse, but he won't be a rope horse again."

That's OK with the owners.

"He's a family member," said Dr. Rick.

Like other horses seen at the center -- and through house calls around the world -- treatment for this horse also will include the use of its own tissue stem cells.

"These cells have the capability of homing," said Dr. Herthel. "If there's an injured ligament, tendon, whatever, it's sending out signals, like 'Help.' The stem cells pick up on that and they home to the injury."

The leaps and bounds of stem-cell therapy since the early days have been many, said Dr. Herthel.

"The field, when we started, there was almost nothing going on. Now, there's tremendous research all over the world going on."

In May, Alamo Pintado Equine Medical Center hosted more than 300 veterinarians, orthopedic surgeons and others involved in regenerative medicine and cell therapy at the first North American Veterinary Regenerative Medicine Conference in Buellton.

What a difference 15 years makes. At that time, a ligament injury spelled bad news for a horse.

"They heal but they heal poorly and they scar, so they're never really as good as they were," said Dr. Herthel. "The return to full work (in '95) was 20 percent in some of these horses, which was not very good."

In 1995, the theory at the center was that bone marrow's got everything needed to regenerate tissue.

"It's got growth factors, it's got all kinds of bioactive proteins, it's got stem cells," said Dr. Herthel. "So we tried it on two horses that had been lame for two years and had been treated with everything under the sun."

"The first two horses went sound in two months, with the injection of their own stem cells."

The next year saw 20 cases and more tremendous results.

In 2001 at the American Association of Equine Practitioners, Dr. Herthel and his team published a retrospective study comparing 100 cases that weren't treated with stem cells from bone marrow with 100 cases that were.

"The ones that weren't, 20 percent returned to soundness," said Dr. Herthel. "The ones that were, 82 percent returned to soundness."

Those first two cases grew to more than 5,000 stem-cell cases around the world -- including some Olympic horses.

"This is very satisfying," said Dr. Herthel. "We're talking about a cure. We're also talking about something that has, from what we can see, no negative side-effects."

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