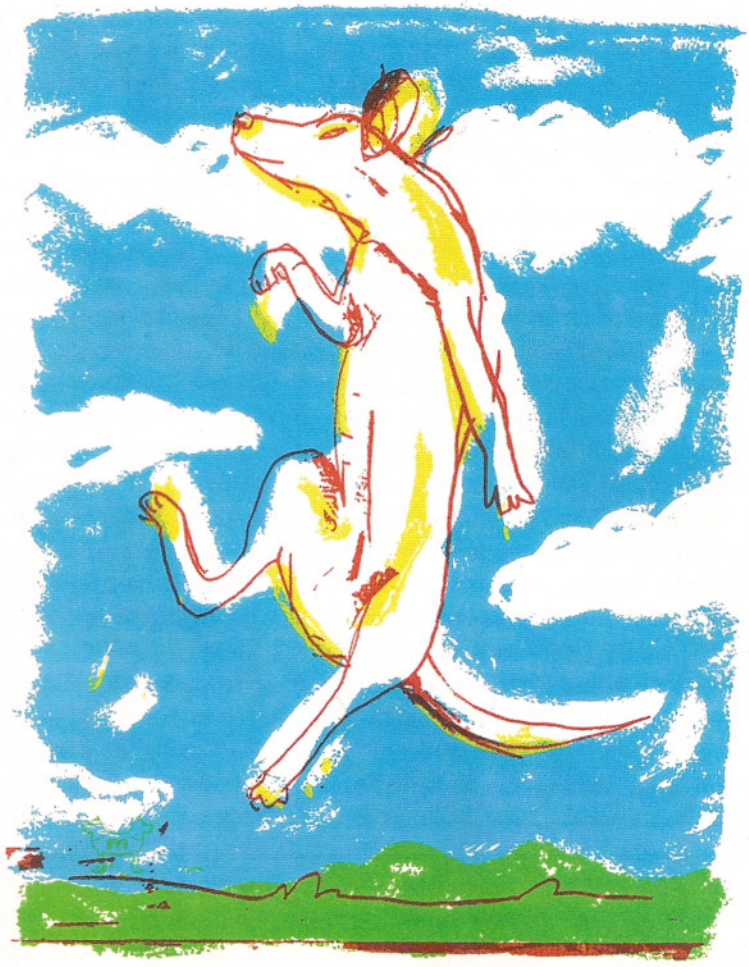
Give a Dog a Bone

When an expert in human tissue banking set her sights on the animal kingdom, she dramatically improved the frolic outlook for countless dogs.

By Lisa Wogan



ONE LATE SUMMER DAY IN 2003, Amy Rutledge let her four dogs out to romp in the yard behind her Lilburn, Georgia, home. Among them was Delenn, a seven-year-old Sheltie with a bushy tricolor coat. Up to that day, the bossy herder, with AKC and UKC obedience titles to her credit, had been enjoying middle age—chasing small critters and peppering the backyard with tiny holes. But when Rutledge called the dogs back to the house, Delenn lagged behind, limping badly.

"I thought, this doesn't look good at all," Rutledge says. "As far as I can figure, Delenn was chasing after something and stepped into one of her own little holes and torqued her leg." The Sheltie's injuries were serious—the femur had splintered as it broke. Delenn's regular vet employed a traditional fix: screwing an external rod into the bone above and below the break, creating a splint to hold the bones in place so they could eventually knit back together. After two surgeries, it became clear there was not enough bone in the gap for a full mend. Worse, the bone ends were shrinking away from each other.

Rutledge was referred to orthopedic surgical specialist Ken Greenwood at Northlake Veterinary Specialists in nearby Clarkston. "Twenty years ago, we probably would have amputated the leg. And it wouldn't have been the wrong thing this time," Dr. Greenwood says. Instead, he suggested they try a bone transplant.

"I looked at him like, you mean they do that for dogs?" Rutledge remembers. Greenwood explained that thanks to a veterinary tissue bank in the Pacific Northwest, a customized canine bone transplant was possible. "He said Delenn had an 85 percent chance of being able to walk … afterwards," Rutledge says. "And I thought, I'll take those odds."

Greenwood used a segment of metacarpal bone (originally from the paw of a mastiff) to bridge the break, and packed the area with a mix of demineralized bone chips and bone powder. (When bone is demineralized in a lab it releases growth factors quickly, spurring the healing process in the patients' own bones.)

"We did this with the understanding that it might not work," Greenwood says. "Delenn recovered far past my expectations. I was astounded."

Rutledge believes Delenn wouldn't have fared well after an amputation, so the results are a big relief. "Two years later, she's her same little self," Rutledge says, "bossing my big dog around."

The limb-saving bone, chips and powder for Delenn's surgery came from Veterinary Transplant Services (VTS) in Kent, Washington, the country's first and only tissue bank for canine and feline surgical procedures. Before VTS, most veterinary

Michael S. Wertz

orthopedic surgeons used nonbiological materials such as Teflon. In cases where bone was essential, surgeons had to take it from another spot on a patient (an autograft) or from the body of a donated animal (an allograft).

There are several shortcomings to autografts, including the chance of infection at the site where bone is removed, additional pain, extended recovery time, and limitations on where and how much bone can be retrieved. In Delenn's case, for example, Greenwood could not have taken a large enough segment of bone from any other location in her body for the femur repair. As for allografts, most veterinarians do not have the specialized instruments for collecting and preserving tissue in this way.

Knowing that allografts are such a boon in cases like Delenn's, you might wonder why it took so long to create a ready supply. On the one hand, a bone bank didn't exist before VTS because there wasn't a sufficiently large demand. On the other hand, there wasn't demand because a convenient, reliable source didn't exist. What this impasse required was the vision and drive of someone who understood the enormous potential of tissue transplants in an entirely different context.

Enter Dr. Helen Newman, a tall, fast-talking redhead with a BS in biochemistry and a PhD in anatomy. After more than 16 years banking human tissue, Newman took the necessity of her work for granted until she discovered the meager state of affairs in canine medicine.

She was drawn into the vet world by Ted Rigley, one of the lab technicians at the Northwest Tissue Center in Seattle, where she was associate director. Rigley's beloved leopard-spotted Catahoula needed femoral neck-lengthening surgery for a bad case of hip dysplasia. When veterinary orthopedic specialist Ken Sinibaldi said he'd be using a plastic wedge for the operation, Rigley and Newman were flabbergasted.

Dr. Sinibaldi enlightened the human tissue pros with a few realities. Then he encouraged them to create a biocompatible wedge that he would use on one side of Rigley's dog. He even provided sterile dog bone.

"Bone is more biocompatible, whereas the plastic is plastic. It's inert. The bone grows *around* the plastic wedge and holds it in place," Sinibaldi says. "An allograft is the same principle, the addition is that that graft will be eventually replaced by the dog's own bone."

When the real-bone wedge proved a success, Sinibaldi pressed Rigley and Newman to turn the one-time experiment into something lasting. He became a loyal customer and continues as a sounding board and advice-giver for VTS.

During the next three years, Newman, Rigley and two other technicians spent their weekends in a lab in the basement of Newman's home, creating allografts for a growing number of veterinarians. By 1999, the overtime schedule took its toll and only Newman wanted to expand the company, so she bought out her partners.

Today, the full-fledged tissue service operates out of a renovated boat warehouse/sign-painting shop south of Seattle. VTS supplies freeze-dried or frozen bone, soft tissue and cornea grafts to approximately 400 veterinarians around the country, as well as in Japan, Finland, the UK, South America and Australia. About 80 percent are for dogs. By the end of the year, Newman expects to begin supplying equine tissue as well.

VTS products include chips and powder that can be used to fill voids caused by bone loss, gunshot wounds and tumors, and to aid in the repair of fractures. Soft tissue grafts can be used in tendon repair and patching. Whole bone or sections of bone are used in spinal surgeries and in limb-sparing procedures. The latter can be lifesaving in the case of large dogs who can't carry their weight on only three legs, or dogs with problems in their other legs. Juaquin, a five-pound Chihuahua, had had a foreleg amputated, then broke her other foreleg. Greenwood used a rib allograft to repair the break and preserve Juaquin's three-legged stance.

"I don't have to go knocking on doors and saying you need this new kind of Fuller brush," Newman says. "This is something that veterinarians need."

At the center of VTS is a high-ceilinged, HEPA-filtered clean room, equipped with a sterile shower, centrifuges and demineralizing equipment. This is where all the work of harvesting, processing and preserving the transplant material is completed by Newman and two lab technicians. It's also the setting for research.

VTS was the only US lab to collect samples for an ambitious British project to create genetic maps of purebred dogs. Newman also worked with Tufts on a study to repair cruciate ligament tears in animals. In addition, she hopes her ongoing work processing blood marrow for research on human leukemia and blood cancers will someday have an application for animals.

"I didn't ever sit down and do a five-year business plan," she says. "But if I take the time to turn around and look back, I think, wow, we really have grown a lot from our pretty humble beginnings in my basement."

It's still a lean and efficient operation, but the protocols are elaborate, based on human tissue standards that Newman learned at places like Red Cross Tissue Services. Every step of the processing history for each graft is recorded and double-checked all the way from donor to recipient.

Among these records is a complete history for Penny, a six-year-old Wheaton Terrier mix, whose body was donated to VTS. Penny had been adopted from a Seattle shelter by Diane Spaulding and named for a lucky penny Spaulding had found on the sidewalk earlier that day. She had hoped Penny would be her "retirement/lifetime dog." Unfortunately, after only nine months with Spaulding, the dog was struck and killed instantly by a truck.

The vet techs at the animal hospital where Spaulding brought Penny's blanket-wrapped body told her about VTS. "I heard about this about 45 minutes after Penny died," Spaulding says. "I thought, she was so perfect, for god's sake, help any other animal. If she's a good candidate, do it."

VTS usually finds donor animals through shelters or veterinarians. A single dog can help as many as 150 others. Ideal donors are generally young to middle-aged adults who have been vaccinated and were in good health at the time of their deaths. That means these are often animals euthanized for irreparable trauma, intractable aggression or chronic pain. Sometimes they are healthy animals killed by a car, as was the case with Penny.

Almost immediately after the accident, Penny's corneas went to save the sight of a dog in Sherman Oaks, California. In May, her femur was used to fix an intractable leg break in a one-year-old Sheltie in North Carolina.

"It doesn't change the amount of grief," Spaulding says, "but there's just a small bit of happiness. You feel that out of this terrible tragedy with this perfect dog at least some good came."

To learn more about Veterinary Transplant Services, visit www.vtsonline.com.

WATCHING JACK

I love the way Jack watches me
with a look that says, "Now what?"
while smiling.
And why I so love
this look is that whatever my body's
non-verbals at anytime tell Jack my
answer is, his look always says he
could not be readier.

—Reid Bush