Regeneration game

Stem cell therapy is putting a spring in the steps of arthritic dogs

BY GAY ROBERTSON

While this research is very interesting, and appears to be helpful in some cases (but not all), it should be regarded as still being in the research phase of development. It is strongly recommended that dog owners consider their options carefully before undertaking treatments that are still in development, or unproven. While exciting to consider, the evidence for the benefits of stem cells is still sparse, and the scientific community is still awaiting a placebo-controlled blinded trial (the gold standard) to assess the benefits of stem cell therapy.

Cheaper and less invasive than the hip replacement he sorely needed, stem cell therapy has been a resounding success for nine-year-old Newfoundland Kai. In pain and barely able to walk when he came into the care of Northern Newfoundland Club Welfare, Kai was fortunate that the vet he was taken to, Andrew Armitage BSc BVM&S MRCVS of Greenside Veterinary Centre[1] was an expert in regenerative medicine. Stem cells cultured from Kai's own body fat (unlike embryonic cell culture, there are no moral uncertainties with canine therapies as the adult cells come from the dog's own body) were injected into the hip joints and within a very short time the painful inflammation was reduced. A few months later, the previously crippled dog was running across the fields on the farm where he now lives permanently.

What is canine regenerative medicine?

Regenerative medicine works by stimulating the body's own repair mechanism to heal damaged tissues by changing, replacing, or regenerating cells. Stem cells are the stuff of life. Able to replicate themselves many times by division, they adapt to their environment. They can become different cells depending on the surrounding physical and chemical cues: in a tendon, they will become elastic; they can become bone, skin, cartilage or vital organs, releasing different growth factors according to what is going on around them. That is the theory. There are as yet, no peer-reviewed case studies in this country showing that treatment will effect a regeneration of tissue in a diseased joint.

Stem cell therapy is not a cure; in osteoarthritis, the most commonly treated condition, the goal is to restore the affected joint to as near to pain-free normality as possible. Treatment may vary according to the progression of the disease and more than one treatment may be necessary, over time. Different vets may use different procedures or combinations of procedures; it is a fairly new technology for dogs in this country although it has been used for horses for many years, mainly for tendon and ligament injuries, and in America, it has been routinely used in tens of thousands of dogs for more than 10 years. Stem cells may be cultured in a laboratory over a period of weeks or taken, processed, and administered "patient side" in a single day, according to the vet's preference.

In Kai's case, the stem cells were cultured by Cell Therapy Sciences[2], (CTS), owned by Dr Jo Miller BSc (Hons) PhD and Dr Christine Parker BSc (Hons) PhD and the Veterinary Pathology Group.

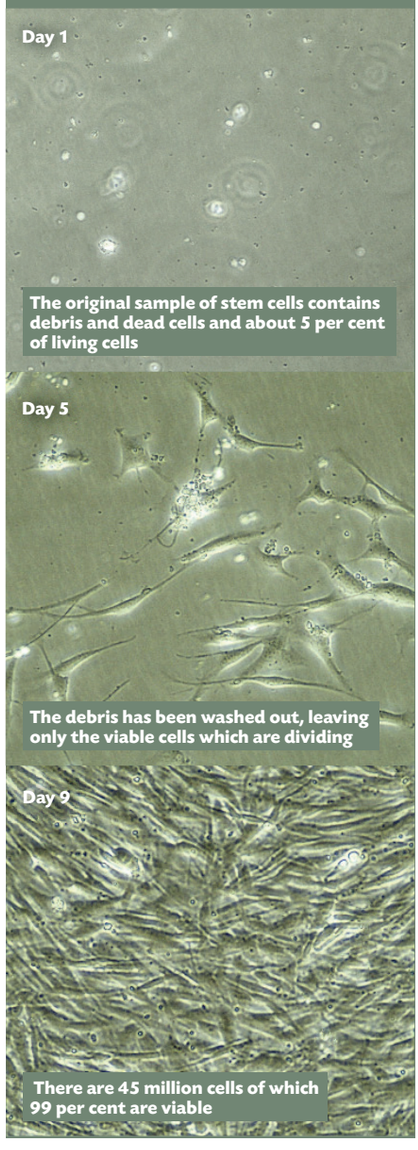
"Christine and I wanted to provide cultured cells right from the start," says Jo, "because we can ensure high numbers of cells, we know how many are in each injection, we know they are alive and we can conduct a full sterility test on every therapy. It is difficult to get the idea that what we are providing is a living therapy, not a drug. The first cells we provided were for the worst possible cases and in fact they were even being considered by their owners for euthanasia. We thought this was a big ask of any treatment but the dogs did really well. They went from being in a very bad state to actually bouncing around. Some of these first dogs were the ones treated in Scotland. We can't say exactly what happened but the dogs were better for more than six months. A few of them have had another treatment of stem cells and they got better again."

Once they have cultured a dog's cells, CTS keep a reserve frozen in case more are needed later. Stem cells can also be taken from aspirated bone marrow, known as BMAC, and used in the same way as those from body fat.

PRP and IRAP

Another regenerative option involves taking blood, from which platelets, containing growth cells that will encourage new cells or tissue growth, are harvested. Concentrating these cells produces platelet rich plasma, PRP, which can be used not only for orthopaedic conditions but also as an aid to wound healing because it stimulates the

Canine MSCs in culture — a living therapy, not a drug



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blood supply and encourages new tissue and skin to form. Also blood based is autologous conditioned serum - ACS/IRAP in which the blood is incubated for 24 hours to release a protein which can be injected back into the joint.

Who does it?

Greg McGarrell, who has been involved in equine regenerative medicine for many years, leads a company called Nupsala[3] that not only supplies equipment for vets to process their own stem cells, PRP and IRAP but will also support them with advice, technicians and even a mobile lab so that they can do "patient side" therapies which are completed in a single day without sending cells away for culture. Vets in this country are notoriously reluctant to inject into joints so the company does demonstrations and training days for those who may not be confident in this area. The Nupsala website also offers clinicians a guide to treatment of osteoarthritis using conventional therapies as well as regeneratives, in five graded stages, based on X-rays showing how far the disease has progressed. While confident that many dogs can be helped by stem cell therapies, Greg stresses that they are not a magic bullet and for some, an implant or even surgery may be a better option.

Rachel Mowbray BVSc MRCVS has been using stem cells at Vale Vets and Vale Referrals[4] since last September for a variety of cases of which, so far, only one has needed a second treatment. The therapy has proved very popular with clients whose dogs' pain can no longer be managed with other treatments but she has also used it for lumbosacral (lower spine) disease, following Andrew Armitage's success in this area, and other conditions. As the vet for the KC Agility Team GB, Rachel has treated younger dogs with less advanced joint degeneration and has found CST particularly helpful in mending torn tendons and ligaments.

In 2012 Dr Stewart Halperin BVMS MRCVS[5] became one of the first vets in the UK to carry out adipose derived stem cell transplants in a dog with osteoarthritis. Since then, he has done many more but says that about half the dogs he sees do not in the end have stem cell therapy, either because it is not appropriate or not necessary. Like most vets, he tends to see each case as a management strategy, starting with weight loss, a range of supplements, dietary change, physio, laser therapy, "and by the time we have done that and given PRP treatments where appropriate and then stem cells, the dogs generally will have made a marked improvement. Most of the work we do is in assessment of the cases, rather than give stem cells and off you go. In the States, however, it is now looked at as first line therapy."

Dr Miller's spaniel, Freddie, is probably unique in this country as having had just that. His problems started when he launched himself off a first floor balcony in pursuit of a squirrel although the basic problem was probably congenital. His vet took some convincing to skip conventional arthritis treatment and go straight to a transplant of stem cells but Freddie improved dramatically and the effect lasted for nearly two years. He has rarely needed any pain medication and has only recently had another dose of stem cells. ▶

After being treated with stem cells for spinal disease, Bru goes through rehab at Vale Vets

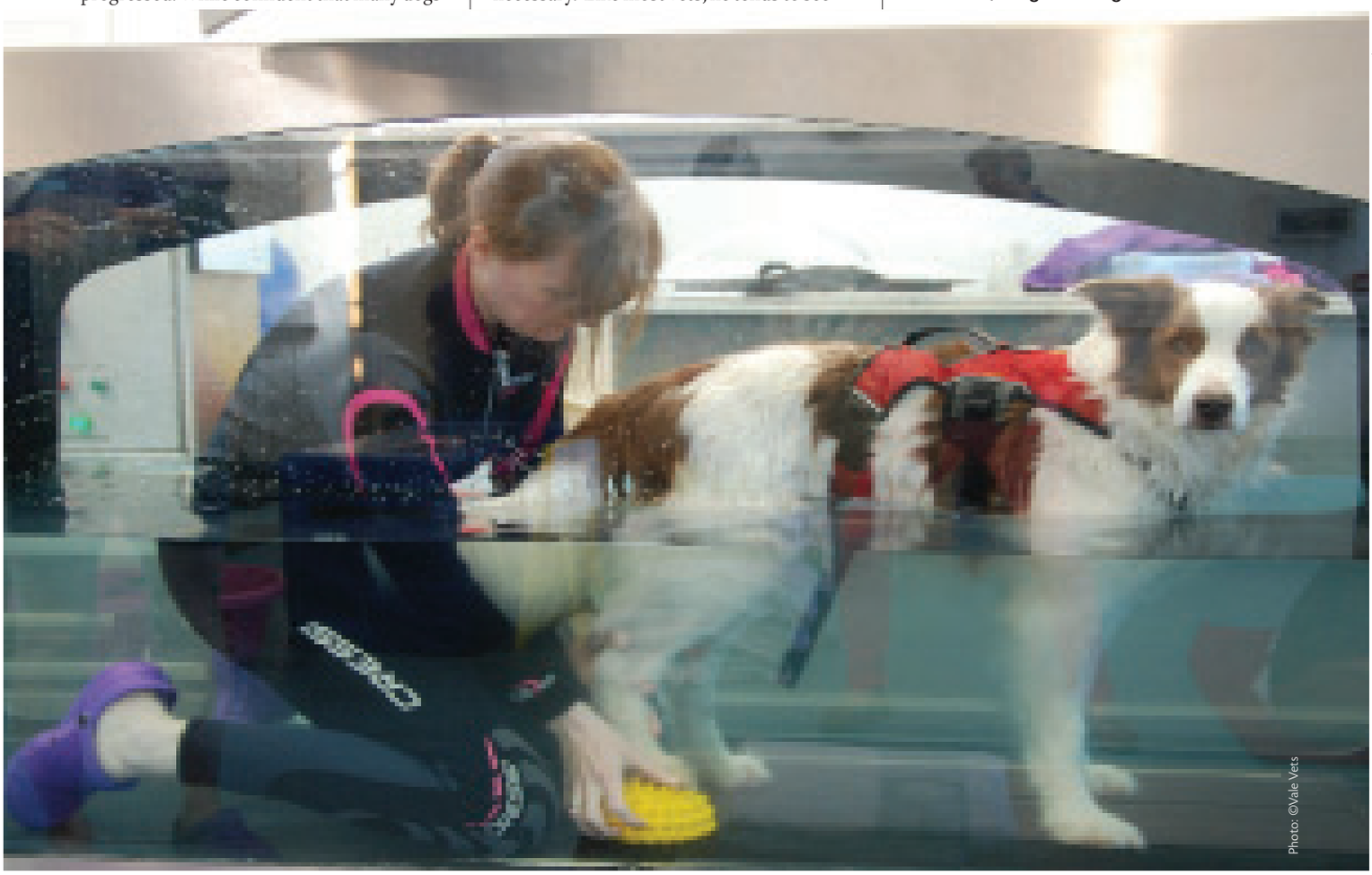

Photo: ©Vale Vets

Does it work?

There is plenty of evidence that regenerative medicine works, both in animals and humans. After training with American vet Mike Hutchinson DVM, Stewart Halperin went to acquire further knowledge from Dr Ramón Cujat[6], an internationally recognised sports injury specialist and expert in regenerative medicine who has many publications on the subject - but how long the effect lasts is not so clear.

Writing in the Vet Times[7] earlier this year, Professor Karen Perry concludes that while there is enough evidence to support the use of stem cell therapies for dogs for whom conventional therapies have proved inadequate, more research is required to discover exactly how they work and how long the effect will last. Andrew Armitage's clinical abstract[8] on treating six dogs with lumbosacral disease with stem cell therapy and laser treatment was published at the BSAVA Congress this year and as data is gathered in this country, it is hoped that more papers will follow.

Momentum for the wider use and availability of regenerative medicine is, however, more likely to come from pressure from dog owners. A video on the Nupsala website showing the before and after effect of treatment of a German Pointer by KC member Keith Butt MA VetMB(Cantab) MRCVS, in his words, "went viral" and he was inundated with enquiries. Dr Jo Miller says that her husband, delighted to be able to run with Freddie again after his first treatment, started asking when he could have more stem cells as soon as Freddie's long distance running began to diminish again. Kai's enthusiastic new owner says she would recommend it to anyone. ●

Photo: ©Dr Jo Miller

Before: arthritis in Freddie's elbows made him reluctant to walk

Photo: ©Dr Jo Miller

After: stem cell therapy restored his mobility, Freddie's jubilant run round the garden landed him in the flower bed but his owners aren't complaining!

Photo: ©Gay Robertson

Jo Miller and Freddie

1. www.stemcellsscotland.co.uk/home.html
2. www.celltherapysciences.co.uk/
3. www.nupsala.com/
4. www.valereferrals.co.uk/
5. www.stemcellvet.co.uk/
6. www.artroscopiagc.es/en/stem-cells/adipose-derived-cells/
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