



Finding Better Options for Joint Repair with Regenerative Medicine



Arthritis and other forms of joint degeneration aren't only problems for humans. Dogs suffer from joint problems as well, with damage that is often progressive and difficult to repair. Furthermore, just as humans are susceptible to injuries of the knee, dogs have similar problems with injuries of the stifle – the canine equivalent.

One of the most common injuries of the stifle is rupture of the cranial cruciate ligament (CCL). Such ruptures often also damage the tissues surrounding the CCL inside the joint, which can lead long term pain and functional problems, including arthritis. Surgery can repair the ligament, but it does not necessarily help restore other damaged joint tissues. Fortunately, the emerging field of regenerative medicine gives hope that it might be possible to generate such replacement tissues in the lab. Regenerative medicine techniques and the use of stem cells to treat joint problems in both humans and dogs is an area of explosive growth, but little evidence is in place to use stem cells safely and effectively.

In order to investigate that possibility, researchers from the School of Veterinary Medicine at Louisiana State University set out to investigate whether it might be possible to isolate the cells necessary for such an engineering project from the stifle joint itself. Their goal was to find the best source of multipotent stromal cells (MSCs), stem cell-like cells which have the potential to become a number of different types of tissue. Ideally, they hoped to locate a source of cells that was easy to access, easy to grow, and that would thrive when introduced into a damaged joint.

With the help of the AKC Canine Health Foundation, the scientists did just that. They discovered that infrapatellar adipose tissue, i.e. fatty tissue, from within the stifle joint was an excellent source of MSCs. The isolated cells not only grew extremely well in culture, they were capable of differentiating into all of the types of joint tissue they might need to replace. Furthermore, they maintained that ability through more generations than MSCs grown from other types of tissue, although they still lost potency over time.

In their Veterinary Surgery article, the researchers also identified several other potential advantages for using infrapatellar adipose cells as a source of MSCs. The cells are easily accessible. They can potentially be harvested during surgery and reintroduced before the end of the procedure. Furthermore, infrapatellar cells are somewhat isolated from other areas of the joint. That means they are likely to be found in a more primitive state than other MSCs, and that is something which can only enhance their utility.

It's too soon to say whether or when veterinarians will be ready to use tissue grown from harvested MSCs to repair the joints of dogs with damaged stiles. However, this research provides a strong foundation for other doctors and tissue engineers to expand on. One day soon, perhaps dogs with complicated CCL ruptures will have a stronger foundation to stand on.

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Publication:

Canine Intra-Articular Multipotent Stromal Cells (MSC) From Adipose Tissue Have the Highest In Vitro Expansion Rates, Multipotentiality, and MSC Immunophenotypes

See more at: <http://www.akcchf.org/research/success-stories/joint-repair.html#sthash.FwUAfi5c.dpuf>

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