



OrthoStemC™

Stem Cell Therapy for Canine Osteoarthritis

OrthoStemC™ delivers autologous, adipose-derived, culture-expanded mesenchymal stem cells (MSCs) for the management of canine osteoarthritis. OrthoStemC™ utilises the anti-inflammatory properties of stem cells to provide an effective therapy for canine osteoarthritis.



The OrthoStemC™ treatment plan is guided by the LOAD* score, which categorises the degree of lameness the dog exhibits. The LOAD questionnaire is validated, and classifies the lameness displayed by the dog into four groups, from Mild to Extreme. The pre-treatment LOAD questionnaire is completed by the vet in conjunction with the owner, whilst the post-treatment questionnaire is completed by the owner independently. Both copies are returned to Veterinary Tissue Bank.

Introducing the LOAD questionnaire

Understanding, administering, and incorporating LOAD into clinical practice

None of us perfectly assessing clinical pain due to osteoarthritis (OA) in dogs are few and far between – especially in general practice. Clinicians often have to rely on subjective assessments of mobility and quality of life, creating disparities in interpretation and making monitoring of the patient especially challenging.

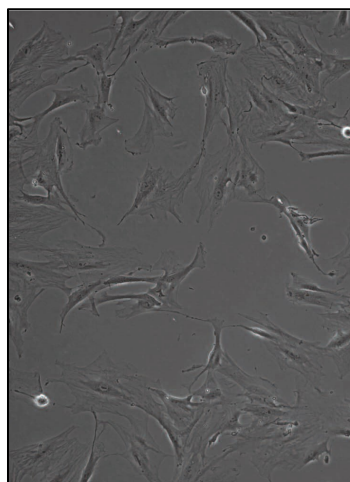
The LOAD questionnaire can be used to help in the assessment of a dog that has or is suspected of having osteoarthritis. LOAD is a convenient, cost-effective, validated, and reliable score system to help veterinarians determine the severity of OA in dogs, monitor disease progression, and assess the patient's response to treatment.



*Walton MB, Cowderoy E, Lascelle D, Innes JF. Evaluation of construct and criterion validity for the "Liverpool Osteoarthritis in Dogs" (LOAD) clinical metrology instrument and comparison to two other instruments. *PLOS ONE* 2013; **8** (3): e58125.

The advantages of using culture-expanded MSCs

Stem cells are isolated from a fat sample taken from the individual patient. The advantages of using culture-expanded stem cells in comparison to other methods include:



- **Cell selection** – only plastic-adherent cells in culture (a basic stem cell characteristic) are collected for injection into the patient, whilst other cell types including erythrocytes, leukocytes and adipocytes are discarded in the initial culture stages.
- **Cell expansion** – the culture process ensures the selected stem cells can multiply to tens of millions, allowing multiple joints to be treated and cells to be stored for the future.

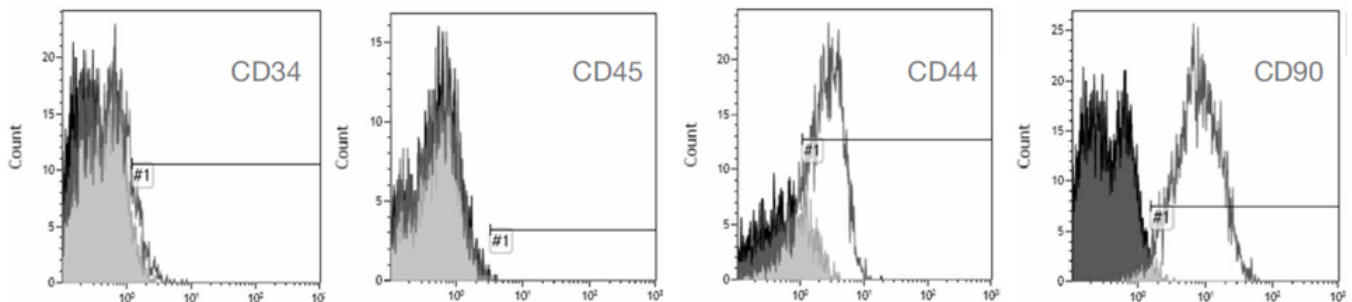
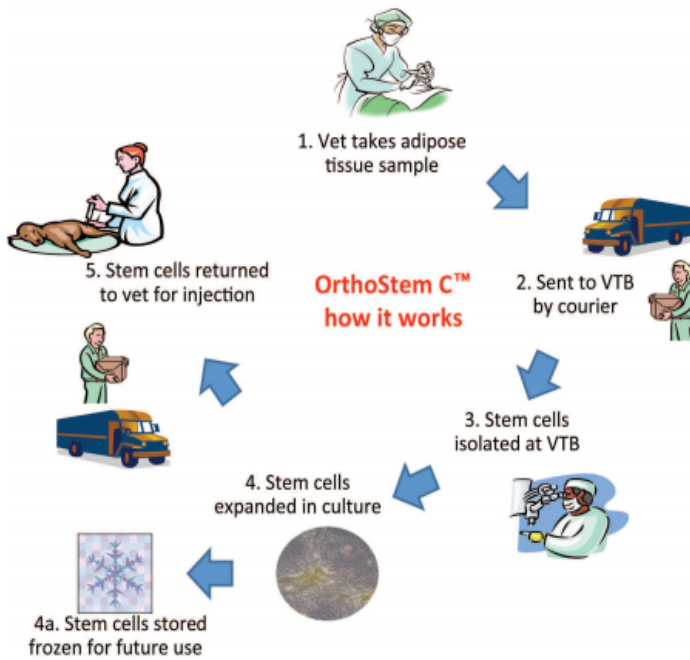
The Stromal Vascular Fraction, which is the pool of cells initially obtained from the fat sample, contains only a small number of MSCs, but many endothelial cells, and red and white blood cells.

OrthoStemC™: How does it work?

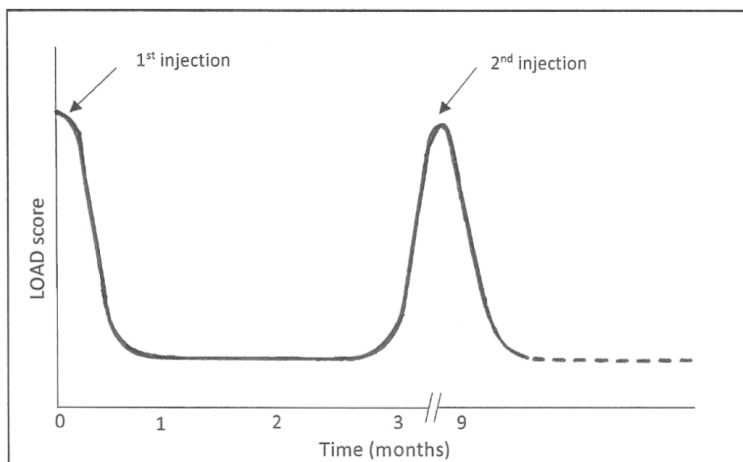
A fat harvest kit containing a bottle of adipose transport solution and a blood collection kit are sent to the practice prior to the surgery. A small fat sample (approximately 2x2x2 cm) and blood samples are taken from the patient. VTB arrange a courier to collect the sample on the same day.

At VTB facilities, stem cells are isolated and cultured. The cells are then returned to the practice in autologous serum for injection. The whole process takes around 10 to 14 days.

Additional cells are frozen at VTB in liquid nitrogen vapour, with enough cells stored for subsequent injections.



Canine MSCs cultured by VTB showed typical characteristics of stem cells by the presence or absence of specific cell surface antigen markers (CD), as shown above. They are largely negative for CD34 and CD45 (haematopoietic stem cell antigens), and positive for CD44 and CD90 (MSCs markers).



A reduction in LOAD lameness scores is observed within two weeks after the initial injection. In almost all cases, the first injection generally lasts from three to nine months before lameness returns. The second injection is then given, which is believed to last a lot longer. Patients are able to live pain-free on reduced medication, or off medication entirely after the stem cell injections, for a prolonged period of their lifespan.

In some rare cases, where the patient fails to respond to the first injection, they are found to respond to the second injection.

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