

## SUGGESTED REGENERATIVE THERAPY REHABILITATION PROTOCOLS FOR VETERINARIANS

The optimal protocol for rehabilitation following intraarticular injection of adipose-derived stem cells is unknown. However, basic rehabilitation principles may be applied to help enhance the recovery of the patient. Several factors should be considered when designing the rehabilitation program; including severity of the condition, the number of joints involved any surgery that was performed and other current medical conditions of the patient. It is important to adapt the following guidelines for each animal as needed. Patients may be categorized as *mildly to moderately* affected or *severely* affected.

Dogs with ***mild to moderate*** clinical signs of OA:

- May have some difficulty ambulating
- May have reduced activity
- Lameness
- Usually willing to exercise, but at a reduced level
- Able to rise from a sitting position with little difficulty
- Negotiate stairs adequately
- Participate in some play activity.

Dogs with ***severe*** clinical signs of OA:

- Are typically overweight
- Have multiple joints affected
- Very noticeable lameness
- Struggle to rise
- Have great difficulty ascending or descending a flight of stairs
- Participate minimally in play activities.

### Suggested rehabilitation protocol for patients with ***mild to moderate*** osteoarthritis following intraarticular injection of stem and regenerative cells

**Passive range of motion and stretching:** For the first week, the affected joint should be placed through a comfortable range of motion beginning one day after stem cell injection. The bones above and below the affected joint are supported to prevent unwanted stresses on the joint. The joint is slowly flexed until the point of initial discomfort is reached. Initial discomfort may be recognized as tensing of the affected limb, mild resistance, or turning the head in recognition of manipulation. Flexion should not create pain to the point of vocalization or struggling. The joint is then slowly extended until the point of initial discomfort. Passive range of motion should be performed for 5-10 repetitions, 2 to 3 times per day. In addition, stretching may also be incorporated into the range of motion exercises. With stretching, when the end range of either flexion or extension is reached, the joint is held in this position for 5-10 seconds while gently continuing to stretch to achieve a greater range. It is important not to place too much force on the joint and create pain.

***Please see D. Millis rehabilitation book below for more information.***

**Slow leash walks:** Slow leash walks may be instituted beginning the day after stem cell injection. For the first week, leash walks should be limited to 5 minutes per session, 2 to 3 times per day. If pain, lameness and swelling are beginning to improve at the end of the first week, leash walks may be increased to 10 minutes per session, 2 times per day. If continued improvement, sessions can be increased by 5 minutes each week. If lameness or pain are evident, the amount of exercise should be adjusted to the dog's comfort level. Other treatments should be considered, such as NSAIDS or other analgesic medications. **Running, jumping or playing is not recommended for the first four weeks.** Controlled leash activity only.

**Aquatic therapy:** If an underwater treadmill is available and if the dog is not afraid of water, walking may be instituted at the end of the fourth week. Slow walking with the water level at the level of the hip joint is recommended to provide buoyancy and slow joint motion. The speed of the treadmill should be adjusted so that the dog has a steady gait pattern at a slow walk. Dogs may be exercised for 2 to 3 minutes, with a 1 minute rest period for 10 to 15 minutes initially, 1 to 2 times per day. Exercise may be increased gradually as condition improves. ***Swimming is not recommended for the first 30 days because of the need for rapid joint motion which may exacerbate the arthritic condition.***

**Cryotherapy:** Following exercise, an ice pack may be applied to the affected joint for 20 to 30 minutes. A thin towel or pillowcase may be placed between the cold pack and the patient's skin to increase comfort.

**Heat Therapy:** After the acute phase of healing, heat may be applied for 15 to 20 minutes 2 to 3 times per day for its hemodynamic, neuromuscular, metabolic and connective-tissue effects. Heating is often used in conjunction with stretching to increase collagen extensibility.

**Exercise Restriction:** Exercise should be restricted and controlled as described above for the first **four weeks**. ***There should be no running, jumping, or playing.*** After one month, the length of the leash walks may be increased to a level that the dog tolerates without showing increased stiffness or lameness after exercise. If progressing well after one month, light jogging may be initiated beginning with 2 to 5 minutes per session, twice per day. At this point, if the dog is experiencing minimal lameness or pain, swimming may also be initiated. After 6 to 8 weeks, light ball playing or other play activity may be initiated in a small enclosed area such as a run.

**Suggested rehabilitation protocol for patients with severe osteoarthritis following intraarticular injection of stem and regenerative cells**

**Passive range of motion and stretching:** Same as for mild to moderate.

**Standing exercises:** Many dogs that are afflicted with severe OA are very weak and cannot stand for more than one or two minutes before collapsing. While standing, such dogs may demonstrate shaking and weakness of the limbs. It is important to increase strength and endurance of postural muscles. The animal is gently supported with a sling or towel in a standing position. The feet should be in a square standing posture. The dog is allowed to stand for as long as it can, and when it begins to weaken and attempts to lay down or sit down, using the sling or towel as a support, the therapist gently pulls the animal back into a square standing position. Standing exercises should be done 5 minutes per session, 2 to 3 times per day until the animal is able to maintain a standing position for five minutes unassisted.

**Slow leash walks:** Slow leash walks may be instituted beginning the day after stem cell injection. For the first week, leash walks should be limited to 2 to 5 minutes per session, 2 to 3 times per day. If pain, lameness, and swelling are beginning to improve at the end of the first week, leash walks may be increased 5 to 10 minutes per session, 2 times per day. If continued improvement, the sessions can be increased by 5 minutes each week. ***Running, jumping or playing is not recommended for the first four weeks.*** Controlled leash activity only.

12860 Danielson Court, Suite B ■ Poway, California 92064

TEL: 858-748-2004 ■ FAX: 858-748-2005 ■ TOLL FREE: 1-88-VETSTEM1 ■ WEB: [www.vet-stem.com](http://www.vet-stem.com)

**Aquatic therapy:** If an underwater treadmill is available and if the dog is not afraid of water, standing in water may be instituted at the end of the fourth week. Animal should be encouraged to move about the water on their own. Initially this activity should last no longer than 5 to 7 minutes to avoid fatigue. Slow walking on the treadmill, at end of week 5 with the water level at the level of the hip joint is recommended to provide buoyancy and slow joint motion. The speed of the treadmill should be adjusted so that the dog has a steady gait pattern at a slow walk. Dogs may be exercised for 1 to 3 minutes, with a 1 to 2 minute rest period for 5 to 10 minutes initially, 1 to 2 times per day. Exercise may be increased gradually as condition improves.

**Swimming is not recommended for patients with severe osteoarthritis and less profound improvement is noted.**

**Encouraging muscle and cardiovascular endurance** as well as muscle strengthening are encouraged after the first 2 to 4 weeks. These activities include:

- Walking on a ground treadmill, soft soils such as sand or iceplant 5 minutes 2 times per day
- Walking up incline or decline ramps, 5 repetitions 2 times per day
- Negotiating 5 to 7 steps, 3 to 5 repetitions 2 times per day
- Performing sit to stand activity, 5 repetitions 2 times per day

**Cryotherapy:** Following exercise, an ice pack may be applied to the affected joint for 20 to 30 minutes. A thin towel or pillowcase may be placed between the cold pack and the patient's skin to increase comfort.

**Heat Therapy:** After the acute phase of healing, heat may be applied for 15 to 20 minutes 2 to 3 times per day for its hemodynamic, neuromuscular, metabolic and connective-tissue effects. Heating is often used in conjunction with stretching to increase collagen extensibility.

**Exercise Restriction:** Exercise should be restricted and controlled as described above for the first **four weeks**. There should be no running, jumping, or playing. After one month, the length of the leash walks may be increased to a level that the dog tolerates without showing increased stiffness or lameness after exercise. If progressing well after one month, light jogging may be initiated beginning with 2 to 5 minutes per session, twice per day. After 6 to 8 weeks, light ball playing or other play activity may be initiated in a small enclosed area such as a run.

### Additional Information

**Contraindicated concurrent therapy:** Anecdotal or theoretical evidence suggests that the use of the following medications or therapies is contraindicated as concurrent therapy with stem cell therapy

- Intraarticular steroids - 45 days before and after stem cell therapy
- Systemic corticosteroid use - unless needed for other disease support
- Shockwave therapy - wait 60 days after stem cell therapy; before is okay
- Power plate - wait 60 days after stem cell therapy; before is okay

### **Acceptable medications or treatments administered concurrently with stem cell**

**therapy:** Anecdotal or theoretical evidence suggests that the use of the following medications or therapies is acceptable with stem cell therapy.

- Non-Steroidal Anti-Inflammatories (NSAIDs)

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- Hyaluronic Acid (HA)
- Glucosamine and/or chondroitin sulfate, avocado – soybean unsaponifiables, omega-3 fatty acids
- Acupuncture
- Systemic antibiotics
- TENS (Transcutaneous Electrical Nerve Stimulation)
- PSGAG (Polysulfated glycosaminoglycans) - Adequan

**DO NOT MIX INJECTIBLE PRODUCTS IN THE SAME SYRINGE AS THE REGENERATIVE CELLS.**

**Darryl L. Millis, DVM, MS, DACVS, CCRP**

Associate Professor of Orthopedic Surgery  
Director of Surgical Service  
Department of Small Animal Clinical Sciences

**Linda Black, DVM, PhD**

Director of Clinical Development  
Vet-Stem, Inc

For additional information please refer to:  
Millis D, Levine D, Taylor RA.  
*Canine Rehabilitation and Physical Therapy.*  
St Louis, MO: Elsevier; 2004

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