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## **Proprioception: Where are my feet?**

### **Proprioception: What is it?**

Proprioception is the awareness of where your limbs are in space. All joints, tendons and muscles have proprioceptive receptors that send signals to the spinal cord and then from the spinal cord to the brain about where they are in space. This is how you can close your eyes and still be able to point to your shoulder, knee, ankle, and even your toe.

### **Proprioception: How is it lost?**

Spinal cord and nerve root compression cause denervation and subsequent slowing of proprioceptive connections. Conditions that may cause such compression include but are not limited to intervertebral disc disease (protrusion or extrusion of disc into the spinal canal), lumbosacral stenosis (narrowing of the canal that protects the spinal cord), and osteophyte formation (bone build-up that causes nerve root impingement). Signs of proprioceptive loss include uncoordinated movement of the limbs, dragging of the toes, and muscle atrophy from the denervation.

### **The Role of Physical Therapy**

In many cases, proprioceptive connections can become stronger with repetition and practice, so physical therapy can play an important role in strengthening those neural connections and reminding the dog where her limbs are in space.

Proprioception retraining exercises include stepping over cavaletti poles, weaving through cones, balancing on a wobble board and walking in tight circles. Such exercises require your pet to constantly be thinking about where her limbs are in space in order to maintain balance and to avoid knocking into or tripping over the equipment. Once your pet can do the previously described tasks with ease, the exercises can be progressed to become more challenging. For example, placing the cavaletti poles askew instead of parallel to each other, weaving through more tightly spaced cones, pairing unstable surfaces with the wobble board, or circle walking while stepping over cavaletti poles of varying heights.

Unfortunately, there are cases where proprioceptive delay cannot be reduced or functional gains have plateaued prior to full resolution. In such cases, rehabilitation therapists can fit your pup for assistive devices such as toe-up booties to reduce toe drag, paw advance bands to assist with uncoordinated gait and special harnesses to help you stabilize your pup's movements while on a walk.

### **Conclusion**

There are many options to address proprioceptive deficits, but it is important to realize that signs of proprioceptive loss are an indication of an underlying condition of the spinal cord or nerve roots. So, if you are noticing uncoordinated movements, dragging of the toes or atrophy of the limbs, it is important to speak with your veterinarian about the deficits you are seeing before starting any of the aforementioned exercises at home in order to fully address the cause of the dysfunction. Then make an appointment with a certified canine rehabilitation therapist to get an individualized rehabilitation plan to help your pup! Have no fear, veterinarians and physical therapists are here!