

Understanding Back Pain

Nerve Root Pain (Radicular Pain)

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The spinal nerve is a bundle of many nerve fibers exiting from the spine at every vertebral level from the top of the neck to the bottom of the spine. The spinal nerve is short in length and made up of sensory nerve fibers and motor nerve fibers that range in size and function. Pain fibers are sensory nerves carried within the spinal nerves that have the smallest diameter of all the nerves in the spinal nerve. Motor nerves in the spinal nerve are large fibers surrounded by a protective lining called a myelin sheath. Additionally, there are small blood vessels, specialized cells and array of connective tissues found within spinal nerve.

Sometimes the exact cause for the pain is not clear. Potential causes of spinal nerve pain include compression of the spinal nerve, a lack of blood supply to the nerve, swelling or edema within the nerve, the loss of normal nerve membrane properties, inflammation and biochemical changes. Nerves outside the spine (peripheral nerves) have a well-developed blood-nerve barrier, which helps to prevent damaging chemicals from getting into the inside of the nerve. Spinal nerves lack this type of protection making them more vulnerable to the adverse effects of compression and the presence of certain chemicals. The most common causes for spinal nerve compression include disc herniations and arthritic bone spurs. Pain which arises directly from a spinal nerve is classified as neuropathic pain.

When a spinal nerve is compressed it results in reduced blood flow into the nerve. This causes a chain of chemical events which leads to inflammation, swelling (edema) and increased pressure within the nerve. With more severe and chronic involvement this process can set the stage for the development of scar tissue (fibrosis) within the spinal nerve. The scar tissue can impede the normal movement of signals across the injured portions of the nerve fiber within a spinal nerve. Spinal nerves that become inflamed are made more vulnerable to additional injury. The inflammation makes nerve membranes unstable and capable of evoking a signal to a lesser degree of stimuli. This results conditions such as hyperesthesia or enhanced pain sensation or spontaneous firing of the spinal nerve causing pain to radiate into the extremity.

Research has revealed many different causes of spinal nerve (nerve root) inflammation and/or irritation. The most common causes are nerve compression and or the presence of chemicals which induce inflammation or change the chemical properties of the spinal nerve membranes. Animal studies have shown that herniated (nuclear) disc material near a spinal nerve can cause inflammation secondary to the release of chemicals which promote inflammation. The disc does not even have to compress the spinal nerve. Various pro-inflammatory chemicals have been identified. Some of these include Phospholipase A2, prostaglandinâ€"E2, metalloprotease (collagenase, gelatinase), tumor necrosis factor (TNF) and interleukin-6 (IL-6)