

## PROLOTHERAPY

Prolotherapy (sometimes called ligament reconstructive therapy) is known to have been in existence for more than 2500 years when Hippocrates used a somewhat crude but successful technique to treat the injured shoulder capsule of a javelin thrower. The more modern techniques were developed by Osteopaths (DO) and Allopaths (MD) beginning in the 1930's.

### What is Prolotherapy?

Dr. George S. Hackett, M.D. coined this word in the 1950's from the Latin "*proli-*" meaning *offspring*, and from which we get the word, "*proliferate*", i.e. to grow or spread rapidly. Medically, Dr. Hacker defined the term as "the rehabilitation of an incompetent structure by the generation of new cellular tissue." To understand what this means, we have to know something about the function of ligaments and tendons.

The collagen fibers of ligaments and tendons are flexible but they do not stretch very far. In certain instances, they are frayed or even torn by injuries. Pain is perceived when otherwise normal tension on these collagenous structures stretches them beyond their normal limits of motion. This in turn results in abnormal tension and stimulation of pain transmitting sensory nerves, because these nerve fibers are not meant to stretch. Therefore, the chief symptom of ligament and tendon relaxation is pain. The pain is aggravated by activity, when tension is placed upon the injured ligament and tendon, and usually subsides when they are not under tension. This painful stimulation can result in muscle spasm, loss of range of motion or joint movement, and a myriad of sensations and feelings that radiate from the site of the injury into the arms or legs. Many times, the symptoms can lead to an erroneous diagnosis of a "nerve injury."

When the ligament or tendon does not heal itself, prolotherapy is used to assist the healing process. The treatment consists of the injection of a proliferant solution within the relaxed ligament or tendon near their attachments to bone. The solutions cause a controlled inflammation at the site of injury to stimulate cells called *fibroblasts* to make more collagen fibers. This in turn "strengthens" the "weld" of the ligament or tendon to the bone, and stabilizes the formerly loose and painful connection.

The more common solutions used are:

1. P2G: This consists of Glucose, Glycerin, Phenol, Lidocaine and Water
2. Concentrated Glucose with Lidocaine
3. Sodium Morrhuate with Lidocaine

**Glucose:** A sugar that when used in concentrated form produces an inflammatory response. It is safe to use even in diabetics because the total amount used is small.

**Glycerin:** This substance is found naturally in the body as a component of some fats. It causes the tissues injected to temporarily swell, helps coagulate blood and provides a framework or matrix on which new fibroblast cells can grow.

**Phenol:** Used in most injectable medications as a preservative since it prevents the growth of bacteria. It also induces the growth of new collagen in connective tissue and has the properties of a long lasting anesthetic.

**Lidocaine:** Used in this treatment as a local anesthetic to reduce pain, but is also known to be an antirhythmic agent.

**Sodium Morrhuate:** A cod liver oil extract that produces an inflammatory response.

As with many treatments, prolotherapy is not without risks or side effects. Since the intent of the technique is to create a specifically localized inflammation, pain, swelling, redness, soreness, temporary stiffness and bruising at the injection site are normal. Often there is a numbness, tingling or itching over the injection site which is temporary. Piercing the skin with a needle always allows for the possibility of an infection, although very few have even been reported. Serious complications, although rare, are known to have occurred. In the 1960's, there were five serious complications from intraspinal injections of proliferates. For this reason, needle placement technique is important. Four times the concentration of phenol and glycerin used in the proliferant solution P2G has been intentionally placed into the spinal canal of cancer patients in order to relieve the pain, without dangerous effects. Fortunately, in trained hands, prolotherapy is a safe, effective and highly successful technique when utilized appropriately, to give the long sought relief from pain arising from over-stretched ligaments and tendons.