

# US-guided Prolotherapy for the Joint Pain

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## 1. What is prolotherapy?

Prolotherapy (a portmanteau of “proliferative” and “therapy”) is a type of regenerative injection technique introducing an irritant solution to the damaged tendons, ligaments, or joints. Prolotherapy was named by Dr. Hackett, who formalized the technique in the 1950s.<sup>1</sup> While various solutions have been used, hypertonic dextrose is the most commonly used. It is safe and easily available favoring outcomes in clinical trials.<sup>2</sup>

Other regenerative injections such as platelet-rich plasma or cell therapy as orthobiologics are different from dextrose prolotherapy by the existence of biologic agents.<sup>3</sup> Some physicians view orthobiologic injections as prolotherapy such as stem cell prolotherapy in a broad sense of regenerative injection therapy.<sup>4</sup>

## 2. Theoretical healing mechanisms

Hypertonic dextrose is hypothesized to stimulate native healing of damaged intraarticular and peri-articular soft tissue, including cartilage, ligaments, tendons, and fascial structures. Hyperosmolar solutions like dextrose induce low-grade inflammation by leading to the release of water and lipids from nearby cells at the site of injection. This inflammation is the first step of the healing cascade relating to cell growth and repair.<sup>5</sup>

## 3. Solution preparation

The concentration of dextrose used in prolotherapy ranges from 10% to 25%.<sup>6</sup>

## 4. Guidance

Prolotherapy can be guided by palpation or ultrasound. Ultrasound-guided prolotherapy has become more popular to improve the accuracy and visualization of the needle during the procedure.<sup>5</sup>

## 5. Injection techniques<sup>5</sup>

The ABCs of prolotherapy technique:

A: Anatomy (know your enthesis, vasculature, and nerves)

B: Bony endpoint (make sure to always touch bone with the needle tip before injecting)

C: Compression (compress the superficial tissues while injecting to maximize the accuracy of injection)

Table 1 Common prolotherapy complaints and injection sites <sup>a</sup>			
Joint	Common Pathologies Treated with Prolotherapy	Needle Size	Common Injection Sites
Shoulder	Rotator cuff tendinopathy	27 gauge	Supraspinatus insertion sites Infraspinatus/teres minor insertion sites Insertions on coracoid process Biceps long head Subscapularis insertion Interior glenohumeral ligament Teres minor origin Teres major origin Posterior inferior glenohumeral ligament
Elbow	Lateral epicondylitis	25 gauge	Common extensor tendon insertion sites Annular ligament and lateral collateral ligament Radial collateral ligament Radial head Supracondylar ridge Joint capsule Medial and lateral condyle
Knee	Knee osteoarthritis Collateral ligament strain	25 gauge, 22 gauge spinal needle	Thigh adductor insertions Vastus medialis insertion Collateral ligament origin and insertions Knee capsule Distal hamstring Anterior tibialis Peroneal muscles
Ankle/Foot	Achilles tendinopathy Plantar fasciitis	25 gauge, 27 gauge 22 gauge spinal needle	Achilles tendon Calcaneonavicular ligament Calcaneocuboid ligament Long plantar ligament Tarsometatarsal ligaments Tibionavicular ligament Tibiotalar ligament Tibiocalcaneal ligament
Low back/ Posterior Hip	SI joint pain Lumbar back pain	25 gauge, 22 gauge spinal needle	Facet ligaments Lumbar intertransverse ligaments Sacroiliac ligament/joint Iliolumbar ligaments Gluteal insertions Sacrospinous ligament Deep articular ligaments External rotator/abductor muscle insertion

<sup>a</sup> Common injection sites are not comprehensive, other tender areas along entheses and adjacent to the joint may also be injected.

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