

Platelet-Rich Plasma & Prolozone Therapies

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Regenerative medicine is a hot topic at medical conferences lately. It spans a broad spectrum of technologies and techniques: from stem cell therapies, nanomedicine and biomaterials, to gene-based methods and molecular medicines. Generally, regenerative medicine focuses on the application of "pluripotent" human cells to heal and regrow damaged tissue.

Platelet-rich plasma (PRP) has been studied since the 1970s, but it's only recently been applied in regenerative medicine. Let's dissect the term: *Plasma* is the liquid portion of blood, holding the cellular portions (red blood cells, white blood cells, platelets, etc.) of the blood in suspension. *Platelets* (aka, thrombocytes) are disc-shaped cells that are pieces of larger cells in the bone marrow called megakaryocytes. Platelets not only function to slow or stop bleeding, but also help wounds heal, which is key to the regenerative value of PRP therapy.

PRP Procedure and Mechanism of Action

First, the patient's blood is spun in a centrifuge to separate the various components and concentrate the platelets. This fluid is then injected (typically using ultrasound guidance) into the damaged tissue, whether it be a muscle, tendon, ligament, intervertebral disc, or joint capsule. Interestingly, the patient is advised not to use any anti-inflammatory medications or supplements during the therapy. The reason for this edict is to keep from blocking the action of the PRP. One of the key elements is eliciting a local inflammatory response.

When the PRP is injected into the body, it casts a fibrinogen "net" across the damaged tissue, triggering collagen synthesis and growth factors that help heal the tissue. For example, when applied to damaged cartilage (whether it be a meniscal tear or osteoarthritis), PRP has been found to have a "scaffolding" effect in the cartilage, stimulating cell proliferation, chondrocyte and adult mesenchymal stem cell production; and enhancing matrix secretion by synoviocytes and mitigating IL-1 β -induced inflammation. It has been found to be more effective than hyaluronan injections for osteoarthritis, but is currently not FDA approved, so insurance coverage is rare.

Scientific Support for PRP

PRP has level 1a evidence supporting its application for knee osteoarthritis, plantar fasciitis, lateral epicondylitis and rotator-cuff tears; and level 1b evidence for patellar tendonitis and hip osteoarthritis. When pitted against acupuncture for plantar fasciitis, it was found to have long-lasting effects similar to acupuncture, and typically better results than corticosteroid injections.¹

Keep in mind that corticosteroid injections have *"multiple potential adverse effects including toxicity to articular cartilage and numerous systemic side effects such as increases in blood glucose levels, a reduction in immune function, and an increased risk of infections."*² In a 2020 paper in the medical journal *Radiology*, the authors found that intra-articular corticosteroid injections can cause accelerated osteoarthritis progression, subchondral insufficiency fracture, rapid joint destruction

(including bone loss) and complications of pre-existing osteonecrosis.³

It's important to communicate with your patients that corticosteroid injections will reduce inflammation and pain, but won't actually heal the tissue or improve the underlying pathology.

Prolozone Therapy and Mechanism of Action

Prolozone, gaining popularity since the mid-1980s, combines concepts from prolotherapy, ozone therapy and neural therapy. The procedure involves infusing ozone gas (O₃) in a liquid containing any combination of procaine, homeopathics, vitamins, minerals, proliferatives, and anti-inflammatory medications, and injecting it into damaged tissue or joint spaces. Some practitioners will inject straight ozone gas without any fluid involved.

Ozone is naturally produced during a lightning storm or when oxygen is exposed to UV light, causing the oxygen molecule to temporarily split into single oxygen atoms, and, when reforming into O₂ molecules, a few O₃ molecules form as well. Since ozone is an unstable molecule, it ends up spewing out a single oxygen atom, which will lead to stealing an electron from the cellular environment from lipids and amino acids, when injected into the body. This, in turn, will produce peroxides that exert an oxidizing effect on NADH, changing it to NAD.

Not only does NAD help convert food to energy in the mitochondria, but it also plays a crucial role in anti-aging and DNA integrity. Decreased oxygen utilization is thought to be the root of all chronic disease including pain and tissue degeneration, which is why breathing is integral to *tai qi* and *qigong* self-cultivation practices.

Pain specialists recognize that as we age, there's reduced circulation in our tendons, ligaments and joints (liver *yin* deficiency in TCM terminology). When trauma occurs, it makes the situation worse by causing edema and inflammation, further reducing oxygen utilization, increasing lactic acid production, free-radical damage, and even necrosis ... all of which results in chronic pain. Although we have circulating stem and blast cells, they can't be used effectively due to lack of oxygen utilization. Prolozone breaks that cycle, re-establishing cellular membrane potentials, decreasing edema and inflammation, and promoting various growth factors.

Clinical Takeaway

Similar to PRP, prolozone therapy has not been FDA approved and is not currently covered by insurance. There are only two studies in the NIH PubMed database evaluating the clinical effects of prolozone (both treating knee osteoarthritis) with positive outcomes. Since the evidence base is greater for PRP than prolozone, it would be appropriate to recommend PRP to your patients as an adjunctive therapy or for those who don't respond to acupuncture treatment.

References

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