

Stem Cell & Platelet Rich Plasma Therapy

Stem cells and PRP treatments represent one of the major breakthroughs in medical science over the last 10-15 years offering those suffering from a variety of musculoskeletal injuries possible relief of their symptoms, with the ability to avoid more invasive, risky, and expensive open surgery. Some of the reported benefits include shorter recovery, lower risks, healing the body more naturally, maintenance of the body's normal biomechanics, and less time out of work.

Stem cells have been in the news the last several years, often brought up at the time of Presidential elections. Although stem cells might sound innovative and cutting edge, this therapy has been around for quite some time and the types of stem cells used are not the ones referred to be the politicians (those are embryonic stem cells and not adult stem cells used in our therapies). In the past, these cells were very difficult and expensive to procure. However, in today's world with modern advances in our techniques and equipment, stem cells can easily be obtained and concentrated by a simple office procedure.

Stem cells exist in our bodies from the very beginning. The earliest stem cells (embryonic) are extremely unspecialized and it isn't until they start to mature that their specific functions begin to form. They become the cells that make up things such as our muscles and nerves. Adult stem cells exist and the evidence of their existence is seen in the fact that we continue to grow skin and hair, and in the fact that our bodies are able to repair themselves after injury. The human body is naturally able to entirely reproduce (i.e. - replace/repair) itself every 6 years, but as we get older the absolute numbers of stem cells decrease. Stem cells are the "repairmen" of the body, the work horse cells which do the actually rebuilding. These cells usually travel to the injured areas via the blood stream and create the actually healing. If the injured area has a poor blood supply, this is called an area of hypoxia or low oxygen content. Areas of hypoxia (poor blood supply) include joints, meniscus tissue, rotator cuff, spinal discs, and other tendonous/ligamentous structures. These are areas that typically do not heal on their own; they need assistance getting "repairmen" to the job site.

Since the body is not able to naturally get enough of the repair cells to these types of injured areas we have found a way to assist the body in this process. PRP (Platelet Rich Plasma) helps create/improve blood and therefore stem cell supply to these injured areas, ensuring that the repair cells can get there in adequate numbers to repair the injury. PRP directs the stem cells to the proper area and supervises the repair process. Platelet rich plasma is used without stem cells for an injury that involves tendon, ligament or muscle injury and that is not too severe (PRP contains some limited number of stem cells and sends messages to the body to send more stem cells to repair the damaged structure.)

PRP

Platelet rich plasma is produced by drawing 2 oz. (60cc) of the patient's own blood and then placing it in a machine called a centrifuge. This machine spins the patient's blood at a rapid speed causing the platelets, growth factors and white blood cells to be separated from the rest of the blood products. The sample is then exposed to a special light source which activates the mesenchyme stem cells and modulates the cytokine release by white blood cells. This process reduces the pain the patient experiences when the concentration of platelets and growth factors is injected back into the injured area. Once introduced back into the injured site, the platelets then release more growth factors and signaling proteins that basically tell the body to send in the stem cells and create the healing process. The stem cells by themselves are not capable of repairing the area, they need to be directed, and the platelets are considered to be the directors in this cellular process. Allow us to use this analogy in respect to the procedure, think of the stem cells as the construction workers and the platelets as their supervisors. With PRP, your stem cells will then have a directed response to the site of injury and be able to repair damaged structures. When the conditions are not severe, the body is usually able to send enough stem cells to repair the area without the need for PRP injections (of course then you wouldn't be at the doctor now if that was the case for you).

This is a repair process and thus relief won't occur overnight as with steroid injections, rather this takes weeks to months to happen. Like planting a new lawn, the grass doesn't grow overnight. Unlike steroids which cause breakdown (or catabolism) of tissue, often leading to other and sometimes bigger problems, PRP helps to grow new normal tissue, healing damaged structures naturally.

Stem Cells

For more severe problems such as osteoarthritis of joints, we must create a bigger response and provide more assistance to the body by delivering larger numbers of stem cells into the affected area. This is accomplished by injecting stem cells from adipose tissue and/or bone marrow directly into the area. Typically PRP simply can't recruit enough stem cells to adequately repair this level of injury.

Stem cells are rudimentary cells that can differentiate into other cells of the body. The goal of stem cell injections into the arthritic joint is to resurface cartilaginous structures and repair other diseased elements of the joint.

Mesenchymal stem cells are the cells that repair and regenerate muscle, bone, cartilage, or tendons and the richest source of these types of cells in the body is found in adipose tissue, your fat! Current fat stem cell harvest procedures are very labor intensive and not practical for most practices although new techniques are being developed to accomplish this process with consistency and safety. Often a small fat graft is added with a Stem cell injection. The fat graft provides a source of additional stem cells, favorable chemical mediators and a substrate or template which will help keep the stem cell injectate localized. The fat graft is typically harvested from the lower abdomen or flank (love handles).

Bone marrow is also a rich source of stem cells and contains various types of stem cells; bone marrow aspirate concentrate, or commonly called BMAC, is typically done by taking 2 oz. (60cc) of bone marrow aspirate from the back of the pelvis (the iliac crest), using a simple technique to draw fluid from inside the bone. There is minimal discomfort with this procedure due to the technique used to well anesthetize the bone before placing the needle (although you will feel the local anesthetic injection). There are many other factors in BMAC that make it very important in the regenerative stem cell world; BMAC also contains many of the ingredients found in PRP. Bone marrow aspirate concentrate contains mesenchymal and hematopoietic stem cells, platelets, as well as a variety of other types of stem cells. After it is aspirated, these stem cells are centrifuged and separated out of the aspirate. The final product is then injected into the appropriate area. Other drugs or mediators may be included with your stem cell injection to stimulate and promote growth of new tissue.

The repair of the area can usually take 11-12 months but early improvement of the symptom is usually noted within 2-3 months. Approximately 4-6 weeks after the stem cell injection, a platelet rich plasma injection is performed on the treating site followed by a second injection 4-6 weeks later. These platelet injections allow the stem cells to continue growing and multiplying into cartilage tissue and also continue to recruit other cells to effectuate the repair.

Frequently Asked Questions

Are these stem cells the same as embryonic stem cells?

No. They are your own adult stem cells. Embryonic stem cells can transmit genetic diseases that an embryo may carry. These genes could turn on certain cancers. In a young person, this might not initially be a problem but as this person ages the cancer chances will increase. If we used your own stem cells, there is no increased risk of cancer. Adult stem cells are much safer.

Is it better to get stem cells from the bone marrow and then grow them in a lab to increase their numbers?

There are a number of studies that show taking the stem cells out of the body and growing them in a lab makes the stem cells much less effective. More importantly, there is speculation and evidence that growing these stem cells out of the body may cause mutations to the cells possible causing tumor lines. When taking the stem cells from the patient's very own marrow/fat and putting them right back into the body seems to eliminate these problems.

What is the downtime from a stem cell or platelet procedure?

Essentially, there is no downtime from either procedure. On the contrary, we encourage the patient to go out and use the extremity. This apparently helps the stem cells do their job better. Of course one should expect some post-procedure discomfort (the degree will vary based on the

area being treated and your own pain tolerance) but this is usually limited to a few days or a week. Stem cells will usually hurt for a bit longer than PRP.

How do we know that this is a safe procedure?

There have been no reports in the literature showing adverse reactions from stem cells or platelets when using the patient's own cells and putting them back into the same body the same day. It is hard to imagine something safer than re-injecting one's own body. In addition the risk of infection is extremely low as both PRP and BMAC are bactericidal (i.e. - contains white cells and other products that help the body fight infection).

Is this procedure covered by insurance?

We find that a few insurance companies are covering PRP injections, but the vast majority won't at this time. It is highly unlikely that your insurance carrier will cover stem cells at this time since this is a new cutting edge procedure that most would still consider investigational. We do offer payment plans.

How often does the procedure work?

We have performed many PRP procedures in our office with results usually equal to or surpassing more typical orthopedic procedures which involve surgery and sometimes substantial downtime and lost time from work. The results around the country (and the world) from stem cell injections have been good but this is an area that remains under investigation.

Can the procedure fail?

Like any other procedure there is no 100% guarantee that the procedure will work. In certain cases, it is possible that you may need additional treatments or your stem cells may not have enough repair potential relative to the severity of your disease. Very advanced disease, or tendons and ligaments with complete tears (i.e. – no longer attached at all), still may require conventional surgical treatment.

If the stem cells or platelets do not work can I still have surgery?

Yes, there is nothing about these procedures that would preclude you from having traditional surgery.