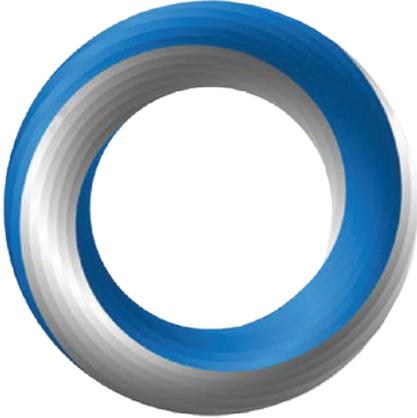


**Bi  logic**

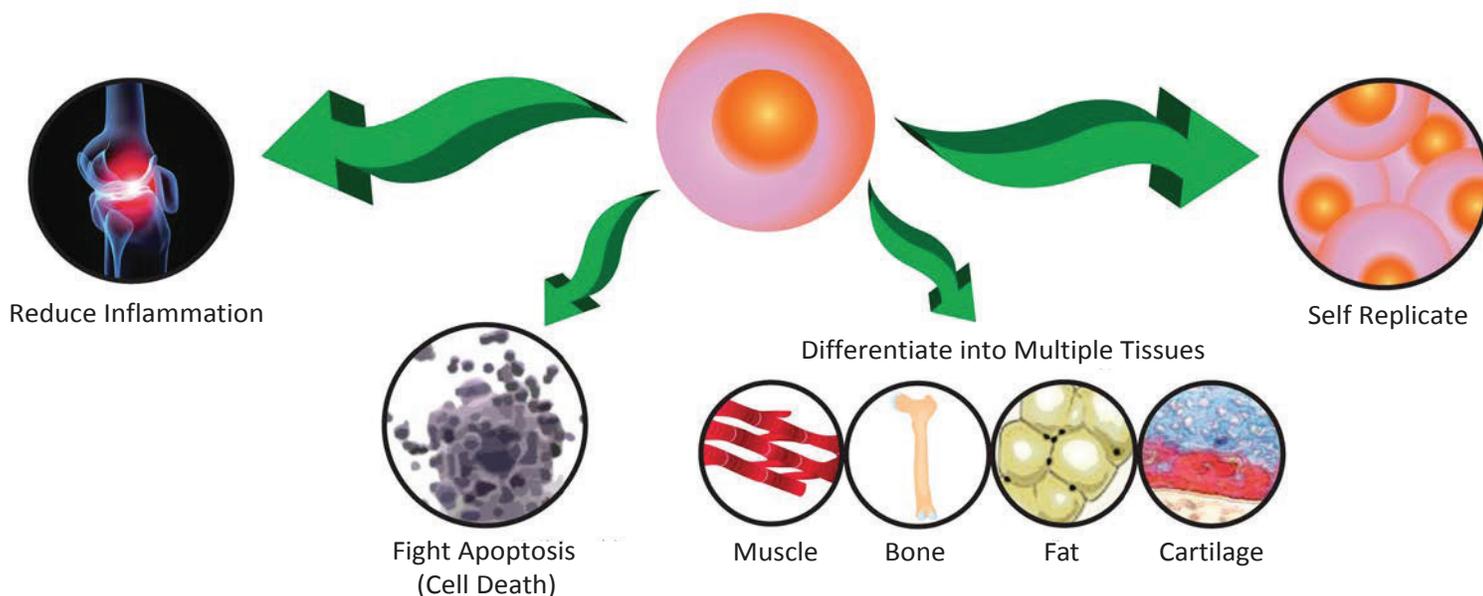
**Restorative Therapies**

***SUMMIT***   
ORTHOPEDIC SPECIALISTS

## Orthobiologics and Joint Preservation

The biologic treatment of Musculoskeletal injuries and diseases is a relatively new and exciting area of orthopedics. Musculoskeletal injuries and diseases are affected and regulated by your body's natural healing processes. There is a complex "dance" of cellular and chemical activity that occurs in your body to promote healing and repair of damaged tissues, including muscles, tendons, ligaments, bone, and cartilage. When tissues are damaged or become aged, their reparative mechanisms are often no longer as effective.

There are naturally occurring cells in your body that have the capability to differentiate and promote the repair and regeneration of a variety of damaged tissues. These cells produce a variety of chemicals (growth factors and cytokines) that signal other cells to repair, decrease inflammation, and inhibit the breakdown of tissues. These cells are in high concentration in certain parts of your body including adipose (fat) tissue and bone marrow.



## Alternative Treatment Options

Most diseases and injuries can be treated by a variety of methods depending on the individual circumstances of the patient. For example, arthritis of the knee might be treated first with modification of activities, weight loss, over the counter anti-inflammatory medications, physical therapy, bracing, corticosteroid injections, and hyaluronic (lubricant) injections. In some cases, knee arthroscopy may be helpful and in the most advanced stage of knee arthritis, total knee replacement is the most reliable method for decreasing pain and improving function. It's important to weigh the pros and cons of your various treatment options before deciding which approach is best for you.

## Precautions and Risks

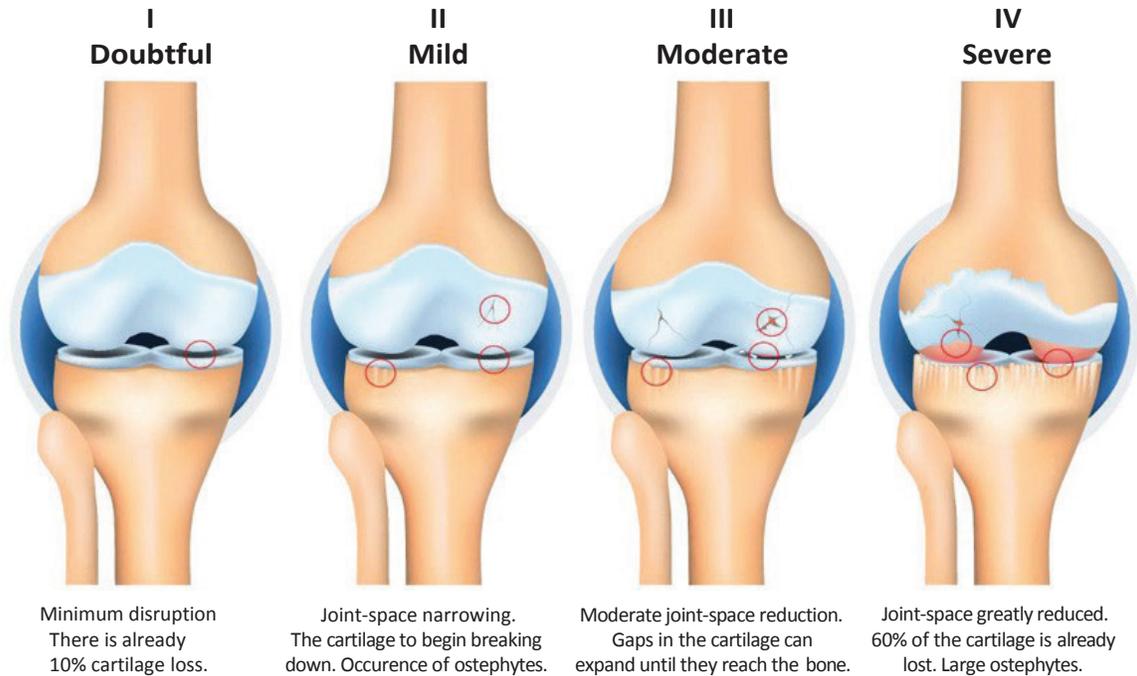
The risks related to restorative therapy as practiced in this facility and by our medical professional are very low. There may be some mild discomfort associated with any procedure. However, there is a very small risk of infection whenever aspirations and injections are performed. Nerve damage, vessel damage, and injury to other important structures are exceedingly rare. As orthopedic subspecialists, we use our detailed knowledge of normal anatomy as well as imaging techniques to assure your procedure is done as safely and effectively as possible. You will be given some important

pre-procedure and post-procedure instructions that help reduce the risk of complications. Patients with a history of bone marrow disease, cancers of the blood system (leukemia, lymphoma, etc.), and active infections are not normally candidates for this type of cell therapy. Patients with bleeding disorders and other chronic medical problems may not be suitable candidates.

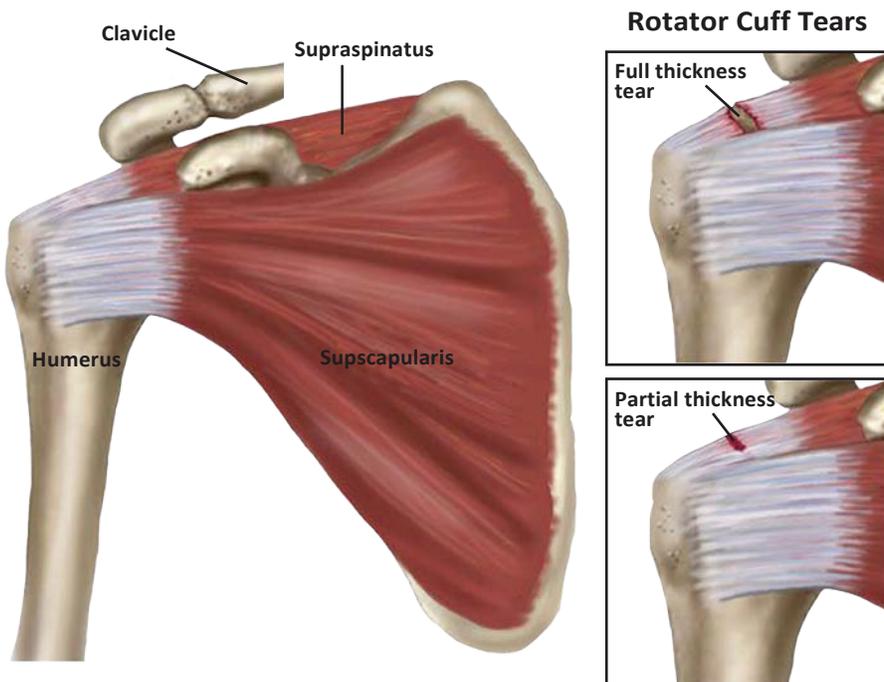
## Orthopedic Diseases Treated with PRP, AMNIO, or FAT

A variety of diseases and injuries can be treated with orthobiologic therapy. Orthopedic conditions that have been treated and studied using PRP, AMNIO, and FAT include acute and chronic injuries of muscle, tendon, ligaments, bone, and cartilage. Some specific conditions that can be treated include:

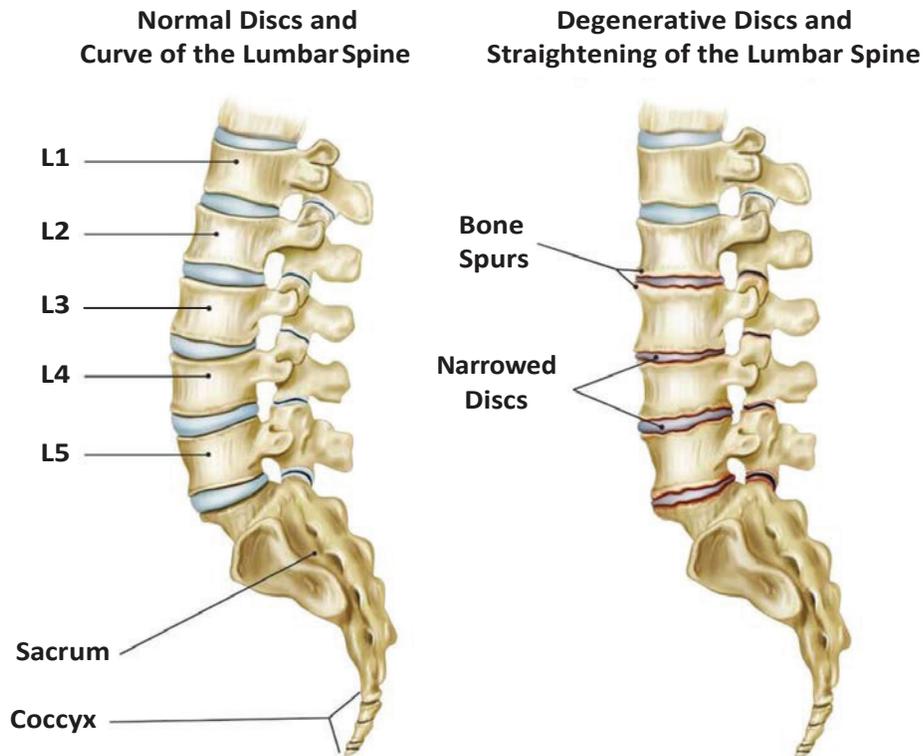
- Mild to severe osteoarthritis/degenerative arthritis of joints, especially the hip and knee



- Tendon injuries, including partial tears of the rotator cuff of the shoulder



- Back pain related to degenerative disc and facet joint



## PRP

A commonly used “orthobiologic” is **Platelet Rich Plasma (PRP)**. This material is usually isolated after a routine blood draw. A centrifuge is used to isolate the portion of your blood that contains a variety of chemicals (growth factors, enzyme inhibitors, and cytokines) that assist the healing processes. It can be used alone, or along with other restorative treatment procedures, to supplement and stimulate healing of damaged or diseased tissues. PRP preparation systems have been designed to produce a plasma solution rich in platelets and proteins. Processes used to concentrate platelets may result in different recovery level of platelets from whole blood, depletion levels of red blood cells, amounts of leukocytes (white blood cells), and different viability and potency platelets.

Platelets (Thrombocytes) are the main component of PRPs and play a central role in hemostasis and tissue healing. Platelets are the architects of tissue healing as their presence to an injury site initiates and guides the healing process. When activated, platelets change shape and exhibit stickiness, while increasing their surface area to attach and spread over the injury site. Clot formation then occurs, providing a fibrin-based bioscaffold which sustains a healing environment. During the clot formation process, platelets degranulate and release growth factors which participate in and enhance the healing process. In addition to releasing growth factors, platelet degranulation also produces a multitude of bioadhesive proteins and of bioactive factors, such as fibrinogen, fibronectin and vitronectin, which are all critical to the healing process and the recruitment of cells.

Plasma contains biological factors and proteins involved in healing, including growth factors. Leukocytes (white blood cells) are responsible primarily for defending the body against infection, but also serve other functions during tissue healing. These cells, when present in suitable concentration, are key players during the initial inflammation phase of tissue healing, protect the body against infection, remove undesired organisms produce antibodies, and/or are involved in allergic response.

Leukocytes are nucleated cells and therefore can release growth factors which in turn may be beneficial to the healing process.

PRP can be taken safely and rapidly from a small sample of blood at the patient’s point of care. PRP can be used for injured tendons, ligaments, muscles, and joints.

## Repairs and Relieves Pain From the Following Injuries:

- Spinal – neck, mid or lower back and sacroiliac joints
- Joint – knees, hips, shoulders, elbow, ankles, wrists, finger, and toes
- Soft tissue – tennis elbow, plantar fasciitis, rotator cuff, and achilles tendonitis
- Osteoarthritis

## Procedure

### Step 1

#### Collect the patient's own blood.

- Less than two ounces (between 15 to 50 milliliters) are required for the procedure. The collection is virtually identical to giving blood for a blood test, with a collection needle inserted into a vein in the arm and the blood captured in a small vial.

### Step 2

#### Centrifuge the blood.

- A centrifuge is a device that spins at high speeds. This action physically separates the solid and liquid parts of the blood - red blood cells (erythrocytes), white blood cells (leukocytes), platelets (thrombocytes), and plasma (liquid).

### Step 3

#### Process and collect the platelets.

- Regular blood contains about 200,000 platelets per milliliter, while platelet-rich plasma contains as much as five times that amount. The resulting three to seven milliliters of platelet-rich plasma will be collected in a syringe, to be administered immediately.

### Step 4

#### Inject the PRP into the desired site.

- The final syringe of platelet-rich plasma will contain approximately 1-2 teaspoons of fluid. With the guidance of an ultrasound probe, the PRP will be guided into the proper location, based on the nature of the injury being treated.

## Expected Results

Initial improvement may be seen within a few hours of the amniotic fluid injection. However, healing is unique to your injury and your body's recovery. The complete reparative process can take up to 12 weeks.

PRP can be used for injured tendons, ligaments, muscles, and joints.

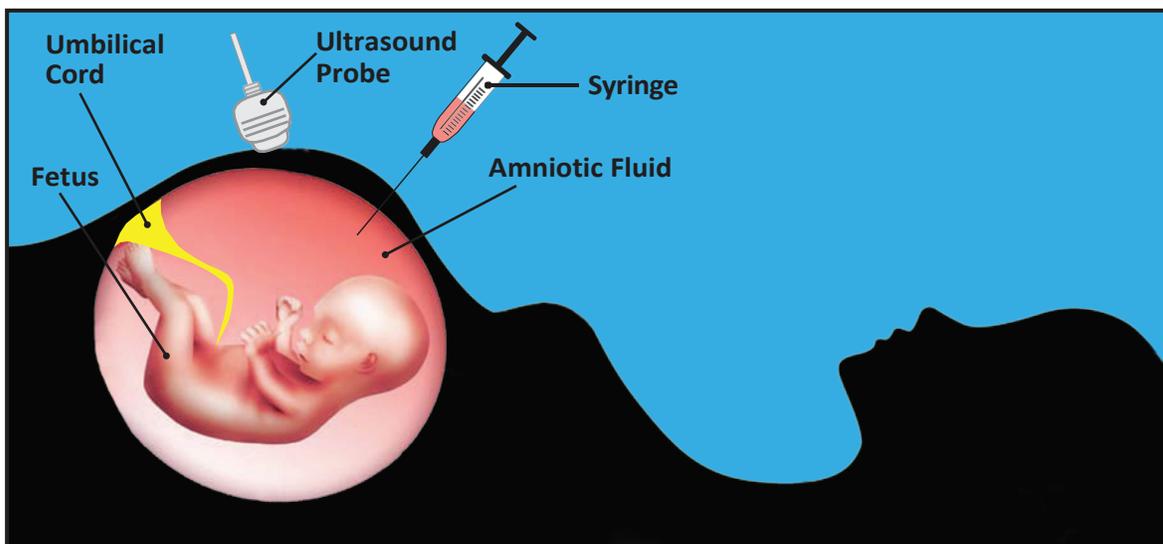
# Amniotic Fluid Injections

If you have stubborn pain or a non-healing injury, **Amniotic fluid** may be right for you and may be used in the first line of treatment, or in conjunction with other treatments such as PRP injections. Amniotic fluid is a “orthobiologic” that surrounds a developing baby inside the mother’s womb. It plays a vital role in the fetal development and contains an abundant source of proteins, cytokines, and growth factors. The fluid is obtained from donations made by mothers during full-term, healthy caesarean deliveries. Amniotic fluid’s inherent cushioning surrounds and protects your injury, allowing your body time and space to engage in active healing. Because it is also considered immune privileged, amniotic fluid treatments are unlikely to produce an inflammatory response, making it a safer alternative than other modalities. Research has also been shown to illustrate possible secondary benefits of treatment amniotic fluid, such as reducing inflammation and scarring, decreasing pain and supporting healthy tissue regeneration.

An amniotic fluid injection can be administered during a standard office visit and requires no preparation or down time. Amniotic fluid donations are thoroughly tested for potential pathogens through comprehensive laboratory testing and extensive medical history analysis. Once deemed safe, donated amniotic fluid is aseptically processed and terminally sterilized, ensuring a clean and safe product for clinical delivery.

Amniotic fluid injections enhance and enable your body to repair itself by recruiting your own cells to do the work. Amniotic fluid is noted for its abundance of constructive collagens, cytokines and elastins. The injection substance is derived from live willing donors and does not involve any fetal tissue. In addition, the **amniotic fluid material is FDA regulated and processed in an ISO certified lab, so all major diseases are ruled out.**

Human amniotic membrane is derived of the same nutrients and growth factors that facilitate fetal growth, and when injected AF injections provide a non-steroidal mechanism to alleviate pain by helping repair your tissues and reducing inflammation. This promotes healing while completely removing cellular material that may cause pain and localize swelling from immune response.



## Benefits of Amniotic Fluid Injections

- Pain-free, nonsurgical, anti-inflammatory treatment
- Easy, convenient procedure that takes less than 10 minutes
- Full of potent nutrients and over 200 different growth factors
- All natural and Drug Free

## Repairs and Relieves Pain From the Following Injuries

- Spinal – neck, mid or lower back and sacroiliac joints
- Joint – knees, hips, shoulders, elbow, ankles, wrists, fingers, and toes
- Soft tissue – tennis elbow, plantar fasciitis, rotator cuff, and achilles tendonitis
- Osteoarthritis

## Expected Results

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## Wharton's Jelly

GeneXStem is a minimally manipulated tissue based product derived from Wharton's Jelly of the umbilical cord for homologous use. Wharton's Jelly has a greater amount of essential regenerative components than other tissue-types, making an excellent option for regeneration and to help reduce inflammation. Wharton's Jelly contains an abundance of Cytokines, Growth Factors, High Molecular weight, Hyaluronic Acid, and Extracellular Matrix.

## Common Treatment Areas

- Knee, hip, shoulder, and ankle
- Chronic partial rotator cuff tears
- Tennis Elbow
- Plantar fasciitis/bone spurs
- Quadriceps and patellar tendon tears
- Muscular tears
- Meniscus and cartilage tears
- Intervertebral disc and spinal facet joints
- Radicular and sacroiliac nerves
- Osteoarthritis

## Advantages of Wharton's Jelly

- Less invasive when compared to platelet rich plasma (PRP) procedures, and bone marrow aspiration
- Cryopreserved without DMSO, digestive enzymes, or the use of preservative agents
- The immunologically privileged status of Wharton's Jelly provides the ability to modulate the immunological responses in the allogenic settings
- Wharton's Jelly is processed from donated non-embryonic human tissue from full term, c-section deliveries in accordance with the FDA
- Wharton's Jelly is processed by using the highest safety measures, which exceed those required by the AATB and FDA

# Lipogems

Microfragmented adipose tissue processed by the LIPOGEMS System is used to provide cushion and support to help the natural healing process by supporting the repair, replacement, reconstruction of damaged or injured tissue. The LIPOGEMS minimally invasive procedure is performed in a physician's office or a surgical setting and can be completed in less than an hour. The fat is first harvested. It's then gently processed and/or cleaned with the LIPOGEMS device and then delivered into areas in the body to promote healing.

**LIPOGEMS** is ideal for patients that have an orthopaedic condition and would like an alternative to a major, invasive surgery; or would like to use it in addition to your surgery to promote faster healing.

## Advantages of Lipogems

- **FAT** is minimally invasive to harvest
- Most people have a lot of extra **FAT**
- **FAT** is the highest quality tissue
- **FAT** has **100-500 times more reparative cells** than other similar tissue
- **FAT** provides cushion and support
- For patients that suffer from orthopaedic conditions in multiple areas of their body, Fat cells can be delivered to multiple areas in just one visit
- Research has shown that as a person ages, their **FAT** maintains its reparative properties unlike other similar tissue, such as bone marrow, which may lose healing capacity with age
- **FAT** contains many supportive and reparative cells that help to promote a healing environment throughout the body



## Goals and Success Rate

The goal of restorative therapy is to reduce pain and improve function without the need for surgery. In some cases, the condition being treated is too severe to achieve these goals and other treatments may be necessary. Studies in humans have indicated that the treatments are very safe and low risk. Studies regarding the effectiveness therapy compared to "no treatment" or other accepted treatments are still in the early phases and are complicated by the fact that it is difficult to design good controlled and randomized studies in humans. Furthermore, different investigators often use different techniques and have different definitions of success. Nevertheless, many independent investigators have shown evidence of effectiveness in treating orthopedic injuries and diseases by reducing pain and improving quality of life. Some studies have shown MRI evidence of healing and even regeneration of tissue (including cartilage) that would not have been expected without the treatment. Reported success rates are as high as 70- 90% in some studies. When treatment is successful, pain relief and improvement in function typically begin to occur about 5-6 weeks after treatment. The exact mechanism by which restorative cell therapy may decrease pain and improve function is still in the process of being understood. In this center, we are committed to following the results of our patients using an "outcomes" system that monitors the success rate of the treatments.

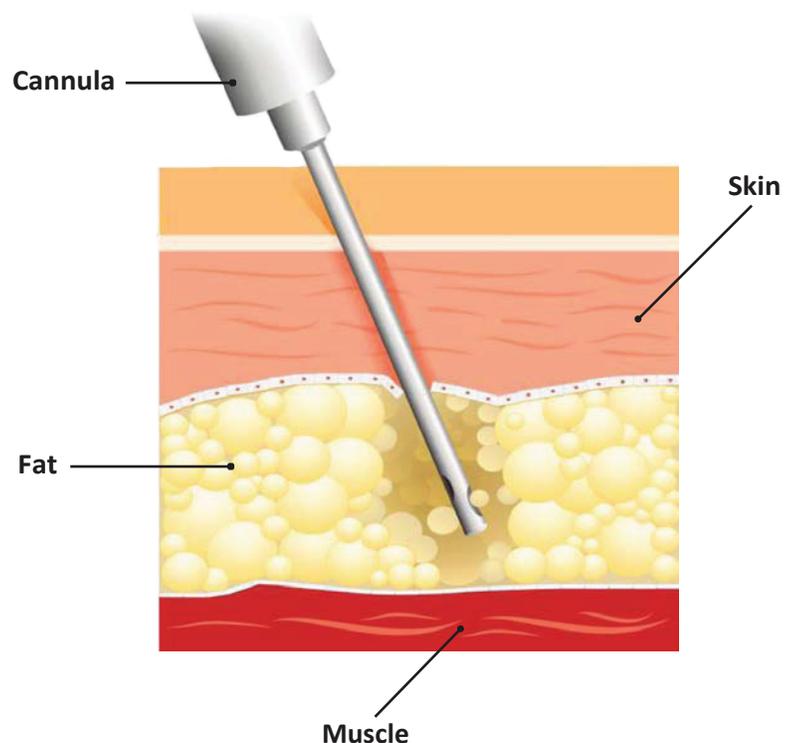
## Pre-Procedure and Protocols/Preparation

- Before a decision is made to proceed with restorative therapy, you will have an orthopedic evaluation that will help determine if you are candidate for this treatment. This often includes obtaining x-rays and sometimes an MRI. If you are otherwise healthy, then you will not normally need any other special laboratory testing.
- You will be contacted by our schedulers to begin the scheduling process. Although we may attempt to obtain pre-authorization from your insurance for this treatment, it is routinely denied by all carriers. You can expect that the costs of this procedure will be an out-of-pocket expense. The scheduler will inform you of the charge for the procedure that is due on the day of the procedure.
- You will be asked to register for "Healthloop". This software system allows us to track the results of our patients who undergo this therapy and we believe it is very important to maintaining quality control and tracking the progress of our patients.
- **1 week prior** to your procedure you should **stop all NSAID's (anti-inflammatory medications)** such as Advil (ibuprofen) and Aleve (naproxen). You should stop taking any aspirin or other medications/supplements that are known to "thin" the blood. If you are taking medications to prevent blood clots, then make sure we have given you specific instructions as to when to stop and when to resume those medications.

## Day of Procedure

- On the morning of the procedure please take a shower and pay close attention to bathing your abdominal region-this region is where adipose cells will be harvested. Also pay special attention to cleansing the location that is going to be treated
- Wear loose fitting/comfortable clothing and shoes (no high heels)
- **We will prescribe a very mild sedative that you should take 30 minutes prior to your procedure. You should have a driver on the day of your procedure**

- Check into the front desk of your physician's office. You will then be directed to the location for the procedure. The procedure involves several coordinated steps - please allow for approximately 2 hours of time in the clinic
- The medical assistant/technician will provide you with disposable shorts or gown if necessary and will finish preparations for the procedure
- The physician or physician assistant will see you and review the procedure and answer any last minute questions
- The collection of adipose cells (lipoaspiration):
  - We make every effort to make this comfortable and most patients feel only minor discomfort
  - You will be asked to lie on your back
  - Your skin will be cleansed and draped
  - The harvest site will be carefully located to include both sides of your abdomen
  - The site will be injected with an anesthetic to numb the skin
  - A specialized needle will then be introduced into the abdominal fat to numb and decrease bleeding within the adipose tissue
  - During the removal of the adipose tissue, you may feel a sensation of fullness. This normally only last a few seconds
  - A small dressing is applied to the harvest site
- The lipoaspiration is then mechanically processed for 2 - 4 minutes in a special Lipogems system that allows us to "wash" out inflammatory blood and oils, and allows us to micro fragment adipose tissue
- The final step is injection into the treatment site:
  - The site is cleansed
  - In some circumstances ultrasound or fluoroscopic imaging is utilized
  - The superficial tissues may be numbed with a cold spray and/or anesthetic agent
  - The injection is performed and usually lasts only a few seconds
  - Band-aids are applied
- You will be given a prescription for pain medication to use for the first couple of days after the procedure to manage any pain you might experience



## Post-Procedure Instructions

- You will be given an instruction sheet that describes post-procedures protocols specific for your treatment site. It will include a reminder for your post-procedure appointments (typically this involves a telephone call approximately 1 week after the procedure and an office visit approximately 6 - 8 weeks after the procedure)
- In some cases, physical therapy will be prescribed. Occasionally, a brace may be prescribed for certain knee conditions
- If you have problems or questions before the post-procedure appointment, please contact the physician's office
- Most patients will not require any special precautions or restrictions in activity
- Two days after the procedure, you may remove any dressing and band-aids from the harvest or treatment sites
- Please **use the abdominal binder for 7-10 days post-procedure**
- You may shower and get the harvest/treatment sites wet, but avoid soaking (bath/pool/spa) the adipose aspiration site for 1 week
- Avoid taking any anti-inflammatory medications (aspirin, ibuprofen (Advil), naproxen (Aleve), Celebrex, etc.) until 3 weeks after the procedure

## Educational Resources

### Lipogems

- Carelli, et al. "Characteristics and Properties of Mesenchymal Stem Cells Derived From Microfragmented Adipose Tissue" Cell Transplantation. 2015;24:1233-1352
- Pietro Randelli, et al. "Lipogems Product Treatment Increases the Proliferation Rate of Human Tendon Stem Cells without Affecting Their Stemness and Differentiation Capability" Stem Cells International. Volume 2016, Article ID 4373410, 11 pages. <http://dx.doi.org/10.1155/2016/4373410>
- Cattaneo et al. "Micro-fragmented adipose tissue injection associated with arthroscopic procedures in patients with symptomatic knee osteoarthritis" BMC Musculoskelet Disord. 2018 May 30;19(1):176. doi: 10.1186/s12891-018-2105-8; <https://doi.org/10.1186/s12891-018-2105-8>
- Zeira, et al. "Intra-Articular Administration of Autologous Micro-Fragmented Adipose Tissue in Dogs with Spontaneous Osteoarthritis: Safety, Feasibility, and Clinical Outcomes" Stem Cells Transl Med. 2018 Nov; 7(11): 819–828.

### PRP

- Study Report – Regen™ THT Tube Performance Testing, USFDA 510(k) BK090048, May 2010, Data on file at RegenLab, Switzerland;
- M. Hall et al., "Platelet-rich Plasma: Current Concepts and Application in Sports Medicine", J. AAOS 17 (10), p. 602 (2009);
- T. Foster et al., "Platelet-Rich Plasma - From Basic Science to Clinical Applications", AJSM 37 (11), p. 2259 (2009);
- Crane and Evert, "Platelet Rich Plasma (PRP) Matrix Graft", Practical Pain Management 8 (1), p. 12 (2008);
- S. Arnoczky, "What is Platelet- rich Plasma (PRP)", AAOS Now 2001 PRP Forum - Agenda and Background Materials, February 14, 2011;
- Cieslik-Bielecka et al., "Autologous platelets and leukocytes can improve healing of infected high-energy soft tissue injury", Transfusion and Apheresis Science 41, p. 9 (2009);
- Intra-articular Injection of Platelet-Rich Plasma Is Superior to Hyaluronic Acid or Saline Solution in the Treatment of Mild to Moderate Knee Osteoarthritis: A Randomized, Double-Blind, Triple-Parallel, Placebo-Controlled Clinical Trial. Arthroscopy. 2019 Jan;35(1):106-117. doi: 10.1016/j.arthro.2018.06.035. Lin KY1, Yang CC2, Hsu CJ3, Yeh ML4, Renn JH5.

### Amnio

- Amniotic Fluid May be Safe and Effective Alternative to Hyaluronic Acid for Osteoarthritis Pain: Interim Results. The American Academy of Pain Medicine, March 19, 2015
- Badylak SG, Freytes DO, Gilbert TW, Extracellular matrix as a biological scaffold material: Structure and function. Acta Biomaterialia 5 (2009) 1-13.

### Wharton's Jelly

- Wharton's jelly mesenchymal stem cells promote wound healing and tissue regeneration Lars-Peter Kamolz1\*, Maike Keck2 and Cornelia Kasper3 <https://stemcellres.biomedcentral.com/articles/10.1186/scrt451>

