

Orthobiologic Procedures



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What Are Orthobiologic Injection Therapies?

Orthobiologic injection therapies offer conservative, nonoperative treatment options for patients with musculoskeletal injuries. They are a viable alternative for patients wishing to avoid or postpone major surgical interventions including tendon repair and joint replacement. Orthobiologic therapies are injections of naturally-occurring biological substances that help heal acute and chronic injuries or painful conditions. These therapies provide natural healing to bone, muscle, tendons, ligaments, and cartilage.

What Orthobiologic Therapies Are Offered at Flagstaff Bone & Joint?

1. Prolotherapy
2. Platelet-Rich Plasma (PRP)
3. Stem Cell Procedures
 - a) Bone Marrow Aspirate Concentrate (BMAC)
 - b) Microfragmented Adipose Tissue (MFAT)

Prolotherapy

What Is Prolotherapy?

Prolotherapy facilitates the body's own healing ability to repair damaged tendons, ligaments, and joints. Ligaments are strong, flexible connective tissues that support the joints and bind our bones together. When you injure a ligament or tendon, your body naturally heals with inflammation, which results in the formation of new collagen and subsequent strengthening and stabilization of the joint. But sometimes, that process is unable to complete itself which can cause pain, numbness, joint instability, and muscle spasms. Prolotherapy is a safe and effective way to induce inflammation, stimulating the body to begin healing. In addition, it is believed that prolotherapy also acts to "reset" painful nerves that have become abnormally overactive. Experiments in animals and humans have shown that ligaments and tendons are strengthened and thickened by prolotherapy. Studies support the use of prolotherapy in relieving chronic joint pain and osteoarthritis.

The Procedure

The prolotherapy procedure involves carefully placed injections of a mixture of lidocaine (which temporarily numbs the tissues to relieve pain) and dextrose (sugar water) in strengths sufficient to irritate the tissue and stimulate repair. The injection of the irritant solution acts to create a local inflammatory response, which triggers the body to start the repair process. The procedure is performed with ultrasound guidance to ensure injection accuracy.

Prolotherapy Frequently Asked Questions

What Conditions Can Be Treated With Prolotherapy?

Prolotherapy is an excellent option for chronic soft-tissue and ligament injuries. It is also used for mild osteoarthritis. Sometimes, prolotherapy is used to “prime” or calm down a joint before other orthobiologic procedures, such as bone marrow aspirate concentrate (BMAC) or microfragmented adipose tissue (MFAT). In this instance, the prolotherapy can effectively and cheaply temper the harsh environment of an inflamed joint so the BMAC or MFAT are not overwhelmed and can have a greater and more potent effect. It can also be used for “booster” treatments between BMAC, MFAT, or PRP procedures.

Are Prolotherapy Injections Painful?

Depending upon the site and size of the area involved, a treatment may necessitate many injections during one office visit. For example, an arthritic knee may require injections into the joint as well as supporting ligaments and tendons. Because dextrose is an irritant and the procedure may require multiple needle sticks, the procedure can be uncomfortable. Tiny injections of numbing medicine are given first to reduce or eliminate much of the discomfort. Most patients will have lingering mild pain for up to a week, but each set of injections usually gets more tolerable over time.

After the injection procedure, most patients feel fullness and numbness in the areas injected. Most post-prolotherapy patients fall into one of the following three groups:

Are Prolotherapy Injections Painful? (Cont.)

1. The pain is immediately relieved due to the injection of numbing medicine into the area of pain. Then, during the next 24 to 48 hours, their pain may return and may be more severe. The pain will gradually decrease in intensity as healing and strengthening occur.
2. The second group of patients have little or no pain post-injection, and the pain stays relieved permanently.
3. Another group of patients find that their pain is relieved initially but returns after 2 – 3 weeks.

How Many Prolotherapy Treatments Will I Need?

Prolotherapy induces inflammation in a gradual fashion. Typically, prolotherapy requires 3 – 6 treatments every 2 – 4 weeks. The number of injections to obtain relief varies considerably from patient to patient and injury to injury. We discontinue treatment after 3 sessions if there is no improvement. Fortunately, this is unusual. Provided the injections are working, we continue with additional sessions until satisfactory healing has occurred or the treatment response plateaus.

How Often Will I Need to Repeat Prolotherapy?

Prolotherapy is meant to be curative for soft-tissue injuries. Osteoarthritis is managed nicely by prolotherapy, but there is no “cure” for osteoarthritis. Therefore, a booster injection once or twice yearly may be required.

Prolotherapy Frequently Asked Questions (Cont.)

What Are the Risks of Prolotherapy?

Prolotherapy is well-tolerated, and complications are rare. A list of possible risks will be included in your patient consent form.

How Long Until I See Results?

Prolotherapy is a gradual process that may take several weeks to show improvement. Remember, we are stimulating the body to heal an injury, and this process normally requires weeks to months. We often do not see results until after the third treatment.

Is Prolotherapy Covered by Insurance?

Prolotherapy is not covered by insurance. Your physician will provide you with procedure pricing.

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Prolotherapy Post-Care Instructions

- Keep the injection site(s) clean and dry with a Band-Aid for 12 – 24 hours. You may shower at any time after prolotherapy.
- Use ice **only if needed**. While ice can reduce pain and swelling, it acts as an anti-inflammatory, which can counteract the healing process. That said, use ice sparingly if your pain medication alone is not helping.
- If you start getting very sore within a few hours after the injection, please begin using your pain medication. Some patients will experience a post-injection flare of pain due to their immune system being hyper-stimulated. This may make the first 24 – 48 hours after the injection painful. This is the reason to use the pain medicine that you have been given. It is much easier to stay ahead of the pain rather than trying to wait and catch up. In the long run, this approach allows you to use less pain medication.
- **Do not use any medication including: ibuprofen, naproxen, aspirin, or other prescription anti-inflammatory medicines, such as Motrin, Advil, Aleve, Voltaren, Mobic, Daypro, Feldene, Lodine, Orudis, and Ansaid, starting seven days prior to the procedure. In addition to these medications, we recommend stopping fish oil, garlic, Vitamin E, turmeric, and other supplements that fight inflammation.**
- **Seven days after your prolotherapy treatment you may resume medications and supplements.**
- **For patients on Coumadin, we advise stopping three days before the procedure and resuming three days after the procedure. Please consult with your prescribing physician before stopping. If you are not sure if a medication should be taken, please call the office at (928) 773-2280.**

- You may use Tylenol and physician-prescribed pain medication as needed.
- Call the physician if you develop drainage from the injection site, bleeding, or a fever.
- You may experience some localized swelling and bruising at the injection site that will take 3 – 7 days to resolve.
- You will be given instructions prior to leaving the procedure room regarding physical activity restrictions. Typically, we recommend starting motion to the affected area when tolerated. Light exercise, including walking or biking, is fine. Depending on the number of injections you receive, you will begin a more structured therapy and intensive exercise typically within a few weeks.
- In general, for upper extremity procedures, refrain from repetitive motion, pulling, tugging, grasping, gripping, or heavy lifting until re-evaluated at your next visit.
- For lower extremity procedures, such as injections into the hip, thigh, knee, ankle, and foot, you may require use of crutches or a cane for a day or so depending on your discomfort. Usually, taking it easy and resting on the couch will be sufficient.
- You may drive home from the procedure if you had an upper extremity injection without a nerve block and drive an automatic transmission.
- It is strongly recommended that if you have a lower extremity procedure, you have someone drive you home.

Platelet-Rich Plasma (PRP)

What is Platelet-Rich Plasma (PRP)

Platelet-rich plasma is a concentrated solution of platelets injected into a joint or damaged tissue. Platelets are blood components which contain healing proteins and growth factors that stimulate the repair of damaged tissue.

The Procedure

PRP is performed in the office. First, blood is drawn from a vein in the patient's arm. PRP is prepared by using a centrifuge, removing the red and white blood cells and much of the liquid portion of the blood. This process yields a high concentration of platelets that is about 5 – 7 times greater than whole blood.

Ultrasound is then used to identify the region(s) to be treated. The skin is cleansed, and an anesthetic/numbing agent is injected to reduce discomfort. The PRP is injected through a needle to the target region(s). By using ultrasound, we are able to deliver the PRP with pinpoint precision.



PRP Frequently Asked Questions

What Conditions Can Be Treated With PRP?

- Joint arthritis
- Rotator cuff injuries and tears
- Tennis and golfer's elbow
- Achilles tendonitis, patellar tendonitis, and plantar fasciitis
- Back and neck arthritis
- Chronic ligament and tendon injuries

Are PRP Injections Painful?

After PRP, patients will typically have mild to moderate discomfort. PRP works by stimulating a healing response, and the discomfort is a sign that the PRP is having an effect. Tylenol or a mild opioid medication will help keep you comfortable.

How Many PRP Injections Will I Need?

The number of treatments depends on the underlying issue. Most times, soft-tissue injuries respond to a single treatment. For osteoarthritis, the evidence suggests that a series of three injections given approximately one month apart will yield the best results.

Are the Results of PRP Permanent?

Unlike cortisone, PRP treatment is intended to fix or cure the problem. For chronic soft-tissue or ligament injuries, a cure should be the expectation. For arthritis, there is no "cure." In this case, PRP is an excellent treatment to improve pain and function. It works at the cellular level by enriching pro-growth factors and reducing the harmful inflammatory environment of an arthritic joint. In these cases, once the initial series of PRP is completed, you should expect to receive a single "booster" injection about once per year. Much like an automobile, routine maintenance will keep your joints operating at their best.

How Long Will It Take to See Results?

Because PRP is aimed to heal and not simply mask pain, the results are gradual. Typically, patients will feel the positive benefits within a few weeks to a few months.

Is PRP Covered by Insurance?

PRP is not covered by insurance. Your physician will provide you with procedure pricing.

PRP Post-Care Instructions

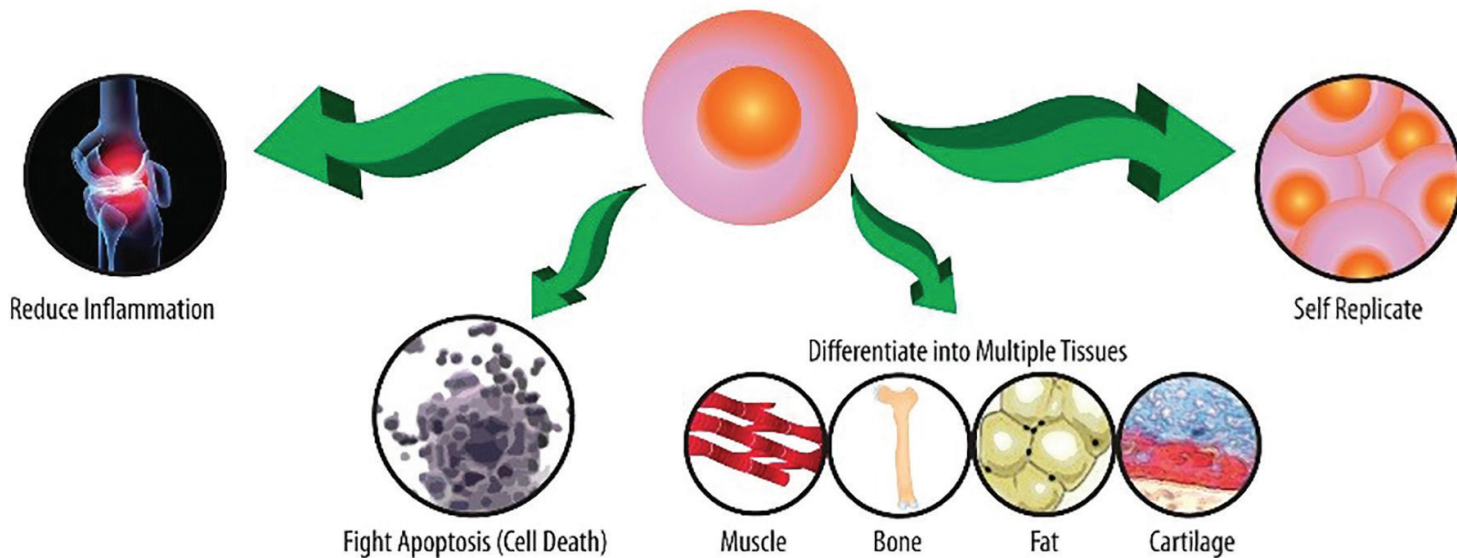
- Keep the injection site(s) clean and dry with a Band-Aid for 12 – 24 hours. You may shower at any time after PRP.
- Use ice **only if needed**. While ice can reduce pain and swelling, it acts as an anti-inflammatory, which can counteract the healing process. That said, use ice sparingly if your pain medication alone is not helping.
- If you start getting very sore within a few hours after the injection, please begin using your pain medication. Some patients will experience a post-injection flare of pain due to their immune system being hyper-stimulated. This may make the first 24 – 48 hours after the injection very painful. It is much easier to stay ahead of the pain rather than trying to wait and catch up. In the long run, this approach allows you to use less pain medication.
- **Do not use any medication including: ibuprofen, naproxen, aspirin, or other prescription anti-inflammatory medicines, such as Motrin, Advil, Aleve, Voltaren, Mobic, Daypro, Feldene, Lodine, Orudis, and Ansaid, starting seven days prior to the procedure. In addition to these medications, we recommend stopping fish oil, garlic, Vitamin E, turmeric, and other supplements that fight inflammation.**
- **Seven days after your PRP procedure, you may resume medications and supplements.**
- **For patients on Coumadin, we advise stopping three days before the procedure and resuming three days after the procedure. Please consult with your prescribing physician before stopping. If you are not sure if a medication should be taken, please call the office at (928) 773-2280.**
- You may use Tylenol and physician-prescribed pain medication as needed.
- Call the physician if you develop drainage from the injection site, bleeding, or a fever.
- You may experience some localized swelling and bruising at the injection site that will take 3 – 7 days to resolve.
- You will be given instructions prior to leaving the procedure room regarding physical activity restrictions. Typically, we recommend starting motion to the affected area when tolerated. Light exercise, including walking or biking, is fine. Depending on the number of injections you receive, you will begin a more structured therapy and intensive exercise typically within a few weeks.
- In general, for upper extremity procedures, refrain from repetitive motion, pulling, tugging, grasping, gripping, or heavy lifting until re-evaluated at your next visit.
- For lower extremity procedures, such as injections into the hip, thigh, knee, ankle, and foot, you may require the use of crutches or a cane for a day or so depending on the amount of discomfort. Usually, taking it easy and resting on the couch will be sufficient.
- You may drive home from the procedure if you had an upper extremity injection without a nerve block and drive an automatic transmission.
- It is strongly recommended that if you have a lower extremity procedure, you have someone drive you home.

What Are Stem Cells?

Mesenchymal stem cells (MSCs) are unique cells that can multiply, differentiate into another type of cell with a more specialized function, and are capable of self-renewal. For example, stem cells can become cartilage, bone, tendon, or ligaments. Stem cells also trigger other stem cells and repair cells living in the surrounding tissue to “turn on” or become activated in the healing process. In this instance, the MSC could stand for “medicinal signaling cell.” We believe stem cells work for orthopaedic conditions by reprogramming and restoring the healthy pro-growth and low inflammatory environment to a damaged area. In short, stem cells allow your body to self-heal. Although still considered experimental, we believe stem cells can revolutionize patient treatment. Currently, the only way to get live and viable stem cells is to harvest them from the patient’s own body.

What is a Stem Cell?

A mesenchymal stem cell is a primitive cell with the ability to:



Bone Marrow Aspirate Concentrate

Bone marrow aspirate concentrate (BMAC) is one form of stem cell harvesting in which the physician obtains cells from the back of the hip bone (iliac crest). The procedure is minimally invasive and is performed in the office using a local anesthetic. The BMAC is then injected into the damaged joint or tissue.

The Procedure

The patient lies facedown on the exam table and an anesthetic is injected to numb the hip area. A special needle is then placed through the bone of the iliac crest and into the marrow cavity. The marrow is then drawn out with a syringe. This procedure is very well-tolerated with only a deep pressure sensation as the marrow is drawn. The entire harvesting process only takes a few minutes.

To minimize discomfort, the skin near the target structure is injected with an anesthetic. Ultrasound guidance is used to precisely place the stem cell solution into the injured or degenerative body part.



BMAC Frequently Asked Questions

How Long Will the BMAC Procedure Take?

You are typically in the office for one hour which includes preparation, harvesting, and the ultrasound guided injection.

Does the BMAC Procedure Hurt?

Since there is local anesthetic administered, there is only slight discomfort. Most patients will experience a deep pressure sensation during the bone marrow draw.

What Conditions Can Be Treated with BMAC?

BMAC is an excellent treatment for osteoarthritis. We also see great results for chronic tendon injuries including:

- Trochanteric tendonitis
- Rotator cuff tears
- Patellar tendonitis
- Achilles tendonitis
- Plantar fasciitis

Who Is the Ideal Patient for BMAC?

Bone marrow is a rich source of stem cells and growth factors. As we age, the amount of these cells diminish. Therefore, we typically recommend BMAC for younger and healthier patients. BMAC can also be injected into bone for painful bone marrow edema. It is also the least expensive way to obtain stem cells.

Are There Risks or Complications to BMAC?

Mild to moderate swelling, soreness, and bruising at the harvest site may occur. Symptoms go away in a few days to a week. As with any surgical procedure, there are additional possible risks and complications. These, while rare, will be listed in the official consent form.

What Is the Recovery/Downtime Following the BMAC Procedure?

Typically, patients require 2 – 3 days of rest with possible immobilization or protected weight-bearing. There will also be small wounds, which may require bandage changes. During your recovery, your activity will be limited for a short period of time.

How Frequently Will I Need to Do the BMAC Procedure?

BMAC is meant to be curative for most conditions. Since there is no cure for arthritis, a repeat procedure may be required. We hope your treatment will last several years. The frequency of procedures is dependent on disease severity, patient lifestyle and health, and dedication to treating arthritis in a holistic manner. This approach should include regular exercise, optimal anti-inflammatory diet, bracing, and “booster” injections of hyaluronic acid, PRP, or prolotherapy. Each treatment protocol is individualized, and we will discuss what will best suit you.

Is BMAC Covered by My Insurance?

BMAC is not covered by insurance. Your physician will provide you with the procedure pricing.

BMAC Post-Care Instructions

- Remove Tegaderm (plastic bandage) covering after 72 hours. You may shower the day after the procedure, but do not submerge the area in a bath, pool, or hot tub until the covering is removed and the wounds appear healed. After the Tegaderm is removed, the wound can next be covered with a Band-Aid or Steri-Strips until completely healed.
- Use ice **only if needed**. While ice can reduce pain and swelling, it acts as an anti-inflammatory, which can counteract the healing process. That said, use ice sparingly if your pain medication alone is not helping.
- If you start getting very sore within a few hours after the injection, please begin using your pain medication. Some patients will experience a post-injection flare of pain due to their immune system being hyper-stimulated. This may make the first 24 – 48 hours after the injection very painful. This is the reason to use the pain medicine that you have been given. It is much easier to stay ahead of the pain, rather than trying to wait and catch up. In the long run, this approach allows you to use less pain medication.
- **Do not use any medication including: ibuprofen, naproxen, aspirin, or other prescription anti-inflammatory medicines, such as Motrin, Advil, Aleve, Voltaren, Mobic, Daypro, Feldene, Lodine, Orudis, and Ansaid, starting seven days prior to the procedure. In addition to these medications, we recommend stopping fish oil, garlic, Vitamin E, turmeric, and other supplements that fight inflammation.**
- **Seven days after your BMAC procedure, you may resume medication and supplements.**
- **For patients on Coumadin, we advise stopping three days before the procedure and resuming three days after the procedure. Please consult with your prescribing physician before stopping. If you are not sure if a medication should be taken, please call the office at (928) 773-2280.**
- You may use Tylenol and physician-prescribed pain medication as needed.
- Call the physician if you develop drainage from the injection site, bleeding, or a fever.
- You may experience some localized swelling and bruising at the injection site that will take 3 – 7 days to resolve.
- You will be given instructions prior to leaving the procedure room regarding physical activity restrictions. Typically, we recommend starting motion to the affected area when tolerated. Light exercise, including walking or biking, is fine. At your first follow-up visit at three weeks, you will begin a more structured therapy and intensive exercise.
- In general, for upper extremity procedures, refrain from repetitive motion, pulling, tugging, grasping, gripping, or heavy lifting with the upper extremity until re-evaluated at your next visit.
- For lower extremity procedures, such as injections into the hip, thigh, knee, ankle, and foot, you may require the use of crutches or a cane for a day or so depending on your discomfort. Usually, taking it easy and resting on the couch will be sufficient.
- You may drive home from the procedure if you had an upper extremity injection without a nerve block and drive an automatic transmission.
- It is strongly recommended that if you have a lower extremity procedure, you have someone drive you home.

Microfragmented Adipose Tissue (MFAT)

The microfragmented adipose tissue (MFAT) procedure is a cutting-edge technology that utilizes the natural and powerful reparative capability of your fat tissue. Fat has a high concentration of reparative stem cells. The fat also provides cushioning and support to the treated area. MFAT is harvested through a minimally invasive procedure from your abdominal fat. The cells are collected with a device that performs a “mini liposuction.”

The Procedure

MFAT is performed in the office. The harvesting procedure involves making two very small incisions through the skin of your belly, flank, or upper gluteal region. Your physician will collect a small volume of fat using a well-tolerated and minimally invasive technique.

Ultrasound is then used to identify the region(s) to be treated. The skin is cleansed, and an anesthetic/numbing agent is injected to reduce discomfort. Once processed, the MFAT solution is injected through a needle to the target region(s). By using ultrasound, we can deliver the growth factors with pinpoint precision.

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MFAT Frequently Asked Questions

How Long Will the MFAT Procedure Take?

You are typically in the office for 1 – 1.5 hours.

Does the MFAT Procedure Hurt?

We use a local anesthetic, or numbing medicine so there is little to no discomfort. Most patients only experience a pressure sensation during anesthetic infiltration and fat harvest.

What Conditions Can Be Treated with MFAT?

MFAT is an excellent treatment for osteoarthritis. We also see great results for chronic tendon injuries including:

- Trochanteric tendonitis
- Rotator cuff tears
- Patellar tendonitis
- Achilles tendonitis
- Plantar fasciitis

Who Is the Ideal Patient for MFAT?

Unlike bone marrow stem cells, adipose-derived stem cell counts stay relatively constant and do not diminish much over time. MFAT is an outstanding option for most people, especially patients over 60. We typically recommend MFAT for moderate to severe arthritis. In this case, fat can provide natural cushioning for painful and arthritic joints.

Are There Risks or Complications of MFAT?

You may experience mild swelling, soreness, and bruising at the harvest site. These symptoms typically go away in a few days to a week. As

with any surgical procedure, there are additional possible risks and complications. These, while rare, will be listed in the official consent form.

What Is the Recovery/Downtime Immediately Following the MFAT Procedure?

For most patients, the initial recovery is minimal, measured in a few days to one week. Your doctor will provide strategies to reduce your discomfort during this time. Your activities will be limited for a brief period before you can resume exercise.

How Frequently Will I Need to Do the MFAT Procedure?

MFAT is meant to be curative for most conditions. Since there is no cure for arthritis, a repeat procedure may be required. We hope your treatment will last several years. The frequency of procedures is dependent on disease severity, patient lifestyle and health, and dedication to treating arthritis in a holistic manner. This approach should include regular exercise, optimal anti-inflammatory diet, bracing, and “booster” injections of hyaluronic acid, PRP, or prolotherapy. Each treatment protocol is individualized, and we will discuss what will best suit you.

Is MFAT Covered by My Insurance?

MFAT is not covered by insurance. Your physician will provide you with procedure pricing.

MFAT Post-Care Instructions

- Wear the provided corset for 5 – 7 days after the procedure or until swelling stops. Remove Tegaderm (plastic bandage) covering after 72 hours. You may shower the day after the procedure, but do not submerge the area in a bath, pool, or hot tub until the covering is removed and the wounds appear healed. After the Tegaderm is removed, the wounds can next be covered with a Band-Aid or Steri-Strips until completely healed. Abdominal and groin bruising is normal and should go away in 1 – 2 weeks.
- Use ice **only if needed**. While ice can reduce pain and swelling, it acts as an anti-inflammatory, which can counteract the healing process. That said, use ice sparingly if your pain medication alone is not helping.
- If you start getting very sore within a few hours after the injection, please begin using your pain medication. Some patients will experience a post-injection flare of pain due to their immune system being hyper-stimulated. This may make the first 24 – 48 hours after the injection very painful. This is the reason to use the pain medicine that you have been given. It is much easier to stay ahead of the pain, rather than trying to wait and catch up. In the long run, this approach allows you to use less pain medication.
- **Do not use any medication including: ibuprofen, naproxen, aspirin, or other prescription anti-inflammatory medicines, such as Motrin, Advil, Aleve, Voltaren, Mobic, Daypro, Feldene, Lodine, Orudis, and Ansaid, starting seven days prior to the procedure. In addition to these medications, we recommend stopping fish oil, garlic, Vitamin E, turmeric, and other supplements that fight inflammation.**
- **Seven days after your MFAT procedure, you may resume medications and supplements.**
- **For patients on Coumadin, we advise stopping three days before the procedure and resuming three days after the procedure. Please consult with your prescribing physician before stopping. If you are not sure if a medication should be taken, please call the office at (928) 773-2280.**

- You may use Tylenol and physician-prescribed pain medication as needed.
- Call the physician if you develop drainage from the injection site, bleeding, or a fever.
- You may experience some localized swelling and bruising at the injection site that will take 3 – 7 days to resolve.
- You will be given instructions prior to leaving the procedure room regarding physical activity restrictions. Typically, we recommend starting motion to the affected area when tolerated. Light exercise, including walking or biking, is fine. At your first follow-up visit at three weeks, you will begin a more structured therapy and intensive exercise.
- In general, for upper extremity procedures, refrain from repetitive motion, pulling, tugging, grasping, gripping, or heavy lifting with the upper extremity until re-evaluated at your next visit.
- For lower extremity procedures, such as injections into the hip, thigh, knee, ankle, and foot, you may require the use of crutches or a cane for a day or so depending on your discomfort. Usually, taking it easy and resting on the couch will be sufficient.
- You may drive home from the procedure if you had an upper extremity injection without a nerve block and drive an automatic transmission.
- It is strongly recommended that if you have a lower extremity procedure, you have someone drive you home.

Preparing for Orthobiologics

- You are encouraged to have a driver to take you home after your orthobiologic procedure. You may be prescribed an anti-anxiety medication. If you take anti-anxiety medication, you MUST have a driver.
- You may eat or drink the night before and the day of the procedure, only local anesthetic is used.
- STOP all anti-inflammatory medications and supplements one week prior to the scheduled procedure. Do not take anti-inflammatory medications and supplements for at least one week following the procedure. Anti-inflammatory medications include:
 - NSAIDs
 - Ibuprofen (Advil, Motrin)
 - Aspirin (except if baby aspirin for the heart)
 - Naproxen (Aleve)
 - Celebrex
 - Meloxicam
 - Indomethacin
 - Fish oils
 - Turmeric
 - Ginger
- Prior to your procedure, you may take Tylenol (acetaminophen) for pain relief needs.
- If you are a current smoker, we encourage you to quit or cut down on smoking. Smoking can delay the healing response and decrease

the effectiveness of the procedure.

- Cut down or eliminate alcohol both before and after the procedure.
- Make sure that you are getting plenty of rest/sleep. Seven to Nine hours of sleep per night is essential for body healing.

Diet, exercise, and proper supplements are encouraged both prior to and following the orthobiologics procedure.

- Dieting: limit or eliminate added sugar and processed foods. Emphasize lean meats, fruits, and vegetables. Avoid bread, pasta, and grains.
- Anti-inflammatory diet:
 - For more information on anti-inflammatory diets: https://www.fammed.wisc.edu/files/webfm-uploads/documents/outreach/im/handout_ai_diet_patient.pdf
- Intermittent fasting:
 - Intermittent fasting induces cellular repair and removes waste material from cells. Participating in a fasting diet has been shown to shift stem cells from a dormant state to a state of self-regeneration.
 - Reduces inflammation and increases human growth hormone
 - Improves cognitive health
 - More information on intermittent fasting: www.healthline.com/nutrition/intermittent-fasting-guide

Preparing for Orthobiologics (Cont.)

- Exercise:
 - Get at least 30 minutes of moderate intensity exercise at least five days a week.
- Supplements may benefit your stem cells. You can consider taking some or all of these in the weeks or months leading up to your procedure. Since many of these also have an anti-inflammatory effect, you should discontinue all supplements one week prior to and one week following the procedure. Please consult your primary care physician regarding appropriateness, safety, and dosage.
- **Glucosamine**
 - Recommended daily dosage: 900 – 1,500 mg
- **Chondroitin**
 - Recommended daily dosage: 1,000 – 1,200 mg
- **Resveratrol**
 - Recommended daily dosage: 150 – 500 mg
- **Vitamin D3**
 - Recommended daily dosage: Variable. Recommend assessing Vitamin D levels before starting.
- **Vitamin C**
 - Recommended daily dosage: 500 mg
- **Turmeric**
 - Recommended daily dosage: 500 – 1,000 mg
- **Alpha-lipoic acid**
 - Recommended daily dosage: 300 – 600 mg
- **Fish oil**
 - Recommended daily dosage: 1 – 1.5 grams of omega-3s from EPA and DHA
- **Ginger**
 - Recommended daily dosage: 1 gram
- **Spirulina**
 - Recommended daily dosage: 1 – 8 grams





Kevin O'Donnell, D.O., is a member of the Orthobiologic Ethics Consortium (www.orthobioethics.com) and is committed to high ethical standards with these treatment options.

Kevin O'Donnell, D.O.

Dr. Kevin O'Donnell, part of The Sports & Injury Team, provides timely access to comprehensive orthopaedic care. He is an expert in the field of nonsurgical orthopaedics and ultrasound-guided regenerative and orthobiologic therapies (available at our Flagstaff location) such as prolotherapy, platelet-rich plasma (PRP) therapy, bone marrow aspirate concentrate (BMAC) therapy, and microfragmented adipose tissue (MFAT) therapy.

Dr. O'Donnell completed his medical school at Philadelphia College of Osteopathic Medicine and his residency training at Lehigh Valley Hospital in Allentown, Pennsylvania. After residency, Dr. O'Donnell completed specialty orthopaedic training at ProMedica Toledo Hospital in Toledo, Ohio, in the form of a primary care sports medicine fellowship.

Nonsurgical orthopaedic specialist Dr. Kevin O'Donnell is available to treat patients at the following Flagstaff Bone & Joint locations: Flagstaff and Cottonwood.

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