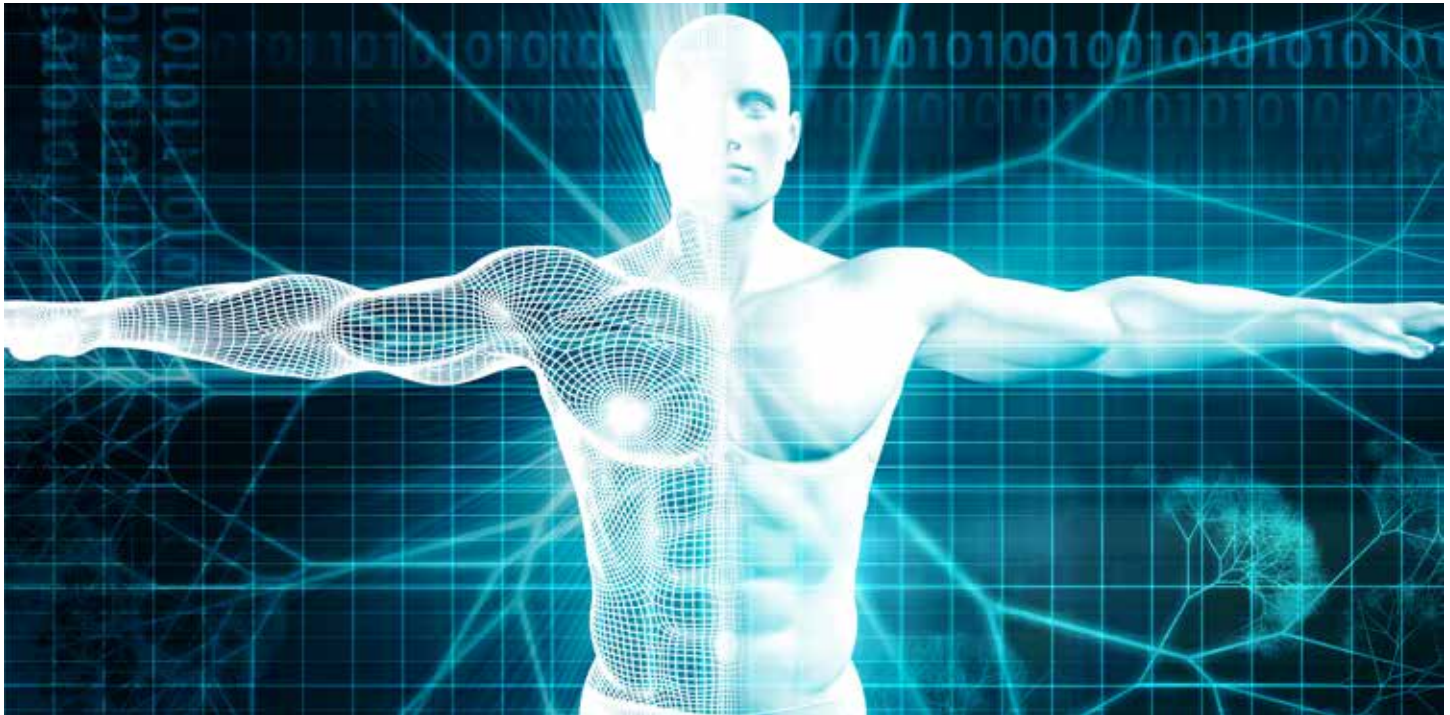


The Expanding Field of Orthobiologics

Harry Stafford MD, Jason Booth MD, and Christopher Felton DO



What are Orthobiologics?

Many patients have received “steroid” or “cortisone” injections for their injuries. These injections can help with inflammation in many areas of the body, and they are often used with relative rest and physical therapy to help with a multitude of injuries.

But a new and expanding field of injections use many different types of substances to help with injury, chronic pain and arthritis, just to name a few. There’s still more research to be done in

this field, and some of the injections are not covered by insurance. But they can provide an alternative to other therapies or possibly prevent surgery. We will discuss some of the more common injections here, including platelet rich plasma, prolotherapy and stem cell injections.

What Is Platelet Rich Plasma (PRP)?

Definitions:

A.) Platelets are small, cell-like bodies that come from a type of white blood cell that’s formed in bone marrow. They promote blood clotting and wound healing. Platelets are the smallest of all the blood cells, yet are rich in granules and growth factors that are involved in tissue healing.

B.) Plasma is the fluid component of blood that contains red and white blood cells, as well as clotting factors and other proteins. It’s made mostly of water (90%) and is responsible for transporting cells around the body.

C.) Platelet rich plasma is a concentrate from blood that contains

approximately three to five times more platelets than the normal concentration of platelets in human blood.

PRP promotes cell activities, including inflammation, growth and remodeling, all of which are necessary in healing wounds.

How is Platelet Rich Plasma Prepared?

Blood is first drawn from a patient with a syringe. Then, it’s centrifuged (spun) and separated out into three layers.

The bottom layer is made up of red blood cells, the middle layer consists of platelets and white blood cells and the top layer is plasma.

Most PRP preparations use the middle layer of platelets. The PRP is then delivered directly to the injured area. For precise delivery, this should be done with the assistance of an ultrasound machine.

What is PRP Used For?

PRP was originally studied for its use in general and facial surgery. Yet, it has *continued on next page...*

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now been shown to be highly effective for the treatment of musculoskeletal injuries in the fields of orthopedics and sports medicine. It is used for injuries of tendons, muscles and ligaments.

Common injuries that can be treated with PRP include tennis elbow (lateral epicondylitis), Achilles tendonitis, plantar fasciitis and patellar tendonitis.

Currently, studies are being conducted to determine its effectiveness for rotator cuff injuries and osteoarthritis.

What Should I Expect Before a PRP Treatment?

Before the procedure, you should not take any anti-inflammatory medications such as Motrin (ibuprofen), or Aleve (naproxen) for at least 5 days prior to the procedure, as these medications could alter the effectiveness of the procedure.

Blood is drawn and then transferred to the centrifuge to be separated out into the necessary layers.

Before delivering the PRP, an ultrasound will be used to locate the injured area and a local anesthetic (Lidocaine) is placed over the area before the PRP is injected.

After the procedure

After the procedure, ice should not be applied to the area, as this can decrease the effectiveness of the PRP. Activity should be limited for the first 1-2 days. Medications such as Motrin (ibuprofen) and Aleve (naproxen) should not be taken within the first two weeks, since it can stop the healing effects of the PRP.

Based on the injury and location, more than one PRP treatment may be needed. Since the PRP promotes inflammation, there will be moderate discomfort after the treatment. This will subside, however, with time, and acetaminophen (Tylenol) may be used for pain control.

All patients will perform some type of rehabilitation after the procedure, and this step will be guided by your physician and physical therapist.

The cost of the procedure can range anywhere between \$500 to \$1,500 dollars or more.

What is Prolotherapy?

Prolotherapy (or proliferative therapy) is an injection-based treatment for chronic musculoskeletal pain that originated in the 1930s. Prolotherapy involves the injection of concentrated sugar water (dextrose) and salt water

(saline) into musculoskeletal tissues, such as ligaments or tendons. Testing has demonstrated ligament thickening and an enlargement at the insertion of tendons. While the exact mechanism of action is not known, it is believed that prolotherapy causes temporary, low-grade inflammation at the injection site, activating cells that can produce collagen. Collagen makes connective tissue like ligaments and tendons stronger. The inflammation also creates an increase in growth factors. Prolotherapy works as a stimulant to increase the levels of growth factors that can help to resume healing of injured structures.

How is Prolotherapy Prepared?

Prolotherapy is prepared by mixing a dextrose solution with saline in a syringe. The concentration of dextrose can be varied based on the amount of saline added to the solution. Higher concentrations of dextrose may lead to more local, injection site irritation because, in theory, higher concentrations may lead to more inflammation.

What is Prolotherapy Used For?

Prolotherapy is used for chronic conditions or conditions that have persisted for greater than 8 weeks despite the use of anti-inflammatory medication, treatment such as ice or heat and/or physical therapy exercises. Common conditions treated with prolotherapy include: tennis elbow (lateral epicondylitis), golfer's elbow (medial epicondylitis), ligament sprains, back and neck injuries, SI (sacroiliac) joint dysfunction, ankle sprains, plantar fasciitis and knee osteoarthritis.

What Should I Expect Before a Prolotherapy Treatment?

Treatment generally involves the injection of the dextrose solution at the site of tendon and/or ligament attachment with small volumes of the solution. Treatments may vary by condition, but usually involve 3-5 treatments conducted at monthly intervals. Ultrasound may also be used to increase injection accuracy.

After the Procedure

After the procedure, ice should be avoided, as this may decrease the initial inflammation stimulated by the prolotherapy injection. Anti-inflammatory medications should also

be avoided. These are medications such as Aleve, Motrin, Ibuprofen and other so-called NSAIDs. Steroid use, such as prednisone may also decrease the effectiveness of prolotherapy. After the procedure, the area of injection may be slightly sore or uncomfortable. This is expected and should resolve during the first several days. Tylenol may also be taken. Rehabilitative exercises can be initiated slowly and gradually after 48 hours. Prolotherapy treatments are typically paid through insurance providers, similar to steroid injections.

Stem Cells

Another emerging topic of interest is the use of stem cells to repair tissues after musculoskeletal injury and degradation. Stem cells have the ability to change into many different types of cells. Therefore, they have the potential to become a promising treatment in musculoskeletal injury.

Stem cells can be isolated from several tissues, including the fat pad of the knee, bone marrow and fat (adipose) tissue. Several studies have shown stem cells have the ability to migrate and attach to multiple musculoskeletal tissues and undergo transformation into the injured tissue. Given these properties, stem cells have increasingly been used to treat osteoarthritis.

How are the stem cells prepared?

The stem cells can be taken from bone marrow through a bone marrow biopsy. In this case, your physician will draw bone marrow and stem cells from your bone using a needle. This is drawn from the hip in most cases.

The cells can also be taken from fat. In this case, your physician will do a liposuction of adipose (fat) from your abdomen or hip.

What should I expect before the procedure?

Before the procedure, you should not take any anti-inflammatory medications such as Motrin (ibuprofen), or Aleve (naproxen) for at least 5 days prior to the procedure. These medications could alter the effectiveness of the procedure.

The site of cell collection will be cleaned and sterilized, and the area will be numbed with lidocaine. A small incision will be made, and a needle will be inserted to remove the cells. After the cells are removed, they are separated
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using a centrifuge to spin and separate the cells. In some cases, the cells will be mixed with platelet rich plasma (PRP).

Once isolated, the cells can be injected into the damaged tissue with ultrasound guidance.

After the procedure

After the procedure, ice should not be applied to the area that was treated, as this can decrease the effectiveness of the stem cells and PRP. Ice can be applied

to the harvest site (hip or abdomen), and activity should be limited for the first few days. Medications such as Motrin (ibuprofen), or Aleve (naproxen) should also not be taken within the first two weeks since it can stop the healing effects of the treatment.

Like PRP, stem cells promote inflammation, there will be moderate discomfort after the treatment. This will subside with time, and acetaminophen (Tylenol) may be used for pain control.

As with PRP, physical therapy is

encouraged for all patients in the weeks following the procedure.

The cost of the procedure can range from \$3,500 to \$10,000 or more.

The Future

More research is needed to determine the best musculoskeletal injuries to treat with stem cells, as well as what are the best protocols and formulations to use. But the future is bright as we learn more about new ways to treat musculoskeletal pain with this procedure.

What is “Tennis Elbow?”

Jeremy Johnson, MD

Lateral elbow tendinopathy, also known as “tennis elbow” or “lateral epicondylitis” is characterized by pain at the outside of the elbow where the muscles that extend the wrist and hand anchor. Symptoms occur with activities like lifting groceries or even just turning a door knob. It was initially thought to be an inflammatory process, hence the name “epicondylitis,” but the tendon structure shows signs of breakdown (degeneration) rather than inflammation.

Why did I get it?

This degenerative process is a result of chronic overuse. Risk factors include performing repetitive tasks with the wrist and hands more than 2 hours per day and/or lifting greater than 45 pounds more than 10 times per day. Examples include: wheelchair use, computer work or hitting backhand shots in tennis, especially using only one hand. Interestingly only 10 percent of new cases are found in tennis players, but around 50 percent of regular tennis players will experience it sometime during their playing career.

Which treatments work and which ones don't?

- **Rest and Exercises:** Rest is frequently prescribed, but the evidence of its effectiveness is lacking. This is likely because tendinopathy does not respond to rest alone. Rather, it responds to optimally exercising (loading) the muscle/tendon to stimulate healing. The goal is to “load the tendon as close to pain as possible,” but not to overload it. In particular, eccentric exercises (lengthening the muscle under a

load) has been shown to improve pain, function and grip strength. Physical therapy is effective and can better individualize and monitor a recovery compared to home exercise programs. A short period of limiting work or practice hours and/or changing equipment (such as using a lighter tennis racket or improving work ergonomics) may be needed to avoid worsening or prolonging symptoms.

- **Splinting:** Using a wrist cock-up (volar) splint has been shown to be more effective than a counterforce forearm strap
- **Medications:** Both Tylenol and NSAIDs (i.e. Ibuprofen, Naproxen) can be effective for pain control. Given that tendinopathy is not an inflammatory process and the risk of heart and stomach side effects,

however, Tylenol is a better first choice. A topical nitroglycerin patch (glyceryl trinitrate) may provide faster pain relief when combined with physical therapy.

- **Injections:** Steroid injections can provide relief, but they are associated with more severe symptoms and longer-lasting symptoms after the initial improvements. Injection procedures using platelet rich plasma (PRP) or prolotherapy also show promise in treating tendinopathy, and they are associated with improved pain and function. These can be considered if symptoms persist after trying the conservative therapy described above.

Many other treatments exist, including soft-tissue massage, chiropractic, *continued on next page...*



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acupuncture, laser and ultrasound, but their effectiveness is inconsistent.

Do I need imaging?

X-rays are normal in lateral elbow tendinopathy and are not needed for the diagnosis unless there is a concern for other causes. Bone spurs and calcification of the tendon can be seen on x-rays

and are associated with tendinopathy. MRIs are sensitive to the changes seen in tendinopathy. In chronic cases, an MRI can be considered to assess the extent of injury, but it is not needed for the diagnosis initially. In addition, tendon abnormalities found on MRIs do not correlate with the severity of symptoms. MRI changes can exist after symptoms resolve, so they should not be

used to monitoring healing. Ultrasound is appropriate in chronic cases and can be used to assess the extent of injury at the time of the visit among ultrasound physicians.

Will I need surgery?

Surgery is rarely needed unless symptoms are persistent despite the above treatment.

COACH'S CORNER

Developing healthy relationships with parents

By Donella Herman, MD

Whether coaching is a career or a vocation, coaches face numerous challenges in today's society, the least of which is dealing with difficult parents. While many parents are easy to work with, you need be deliberate in the interactions you have with parents to ensure a good working relationship. Just as you coach your athletes to perform at a high level — with respect and integrity — your actions and words help prepare parents for their role with the team and make clear your expectations for their behavior. Below are three strategies you can use to build healthy relationships with the parents of your athletes.

Communicate: Put your personal philosophy into writing, and do the same with any goals for yourself, your athletes and parents. Defining the role and expectations of coach, athlete and parent will help lay the groundwork for healthy interactions among all three groups. Focusing on development of skills, work ethic and being a good teammate can take the focus off of the “win/loss” column and put it where it should be — on the kids and the lessons they can learn from athletics. It can also help to redefine competition so athletes can be more focused on improving themselves, rather than the aspects of the game they can't control. Be sure to include your policies on practice attendance/performance and behavior of athletes on and off the field of play. Also address the behaviors of parents, specifically the consequences of violating these policies. This will allow you to act definitively should a problem arise, minimizing distractions and allowing everyone to remain focused on the goals of the team.



Be Proactive: Communicating your expectations is a good place to start, but keeping open lines of communication with parents (regarding both good and bad behavior) will allow you to address changes early and often. Keep in mind that you may be one of the first to see a change in an athlete's behavior or performance, and addressing it early will help to build trust with both athletes and parents. Encourage parents to come to you early, as well, should they have concerns. By being approachable, parents will have the chance to be heard and will give you the opportunity to proactively address interactions of parents with their athletes and with one another.

Be Professional: Just as you want your athletes to prepare for competition, you need to prepare to be a good coach. Regardless of your

coaching experience, keep yourself up to date with changes in training, nutrition and game strategies. If a parent challenges you on your methods, adequate preparation will allow you to be equipped to discuss your approach to coaching in a non-defensive way. Also, keep in mind that with competition comes emotion. Doing everything you can to keep your emotions in check sets the stage for similar parent behavior, as well as providing a positive role model for your athletes. If you do lose control of your emotions, hold yourself accountable, just as you would parents and players.

By implementing these strategies, we hope you will be able to establish a good relationship with the parents of your athletes, creating a positive environment for your athletes to learn and grow.

Choosing Wisely®: Is Bed Rest Good for Low Back Pain?

By Stephen Shaheen, MD

Over the last several years, there has been a push from medical teams and patients alike to help curb unnecessary testing. So in 2012, with assistance of more than 70 specialty societies, the American Board of Internal Medicine (ABIM) created the Choosing Wisely campaign to help identify “Things that Providers and Patients should question.” This month’s article focuses on the North American Spine Society’s fifth recommendation: “Don’t recommend bed rest for more than 48 hours when treating low back pain.”

Low back pain is a common problem for patients. Recent reviews show that the lifetime prevalence in the general population is high at 85-90 percent. For competitive athletes, low back pain rates are between 1-30 percent (making up 10-15 percent of all injuries) with increased incidence in wrestlers and gymnasts.

Recognizing concerning features, or “red flags,” helps a provider determine the need for urgent follow-up or imaging. Although they vary slightly by specialty, most agree on the following factors: history of cancer or immunosuppression, steroid use, intravenous (IV) drug use, significant trauma, otherwise unexplained fever, bladder or bowel changes, decrease in rectal tone, and saddle anesthesia (numbness in the groin area). These should prompt an immediate referral to a spine specialist or the emergency department.

A large percentage of the remaining visits are likely to fall in the category of strains and sprains. Most will resolve on their own, improving with anti-inflammatory medication and by applying ice and heat. The final treatment, rest, is the question that this recommendation attempts to reverse. Until the mid-1990s, it was commonplace for anyone suffering from this complaint to receive encouragement to perform

“bed rest,” likely stemming from the relief of symptoms many get when lying down. Although the prescription varies, it often means remaining in a comfortable position and moving only to perform necessary activities like using the restroom. The length of time would often extend past several days. This has been questioned over the past decade, resulting in multiple studies and reviews that try to address the value of rest versus targeted exercises, compared to full activity.

The literature that forms the basis for this reversal of prior practice is summed up in a 2009 Cochrane review, stating “advice to rest in bed versus advice to stay active for low-back pain and sciatica.” Sciatica is numbness or burning going down the back of the leg and is associated with nerve irritation from the low back. They found that bed rest did not show any improvements in pain intensity in any group (acute low back pain with or without sciatica) and caused a decline in the way patients could function with daily activity. Their

final recommendation does not claim activity or back-specific exercises for low back pain are better, but does state that there is no evidence for bed rest in most groups, while mentioning multiple other noted negative effects with prolonged rest or immobility.

Based upon current guidelines and evidence, there is no good data to support treatment with bed rest, especially when prolonged for over 48 hours. Providers should practice good medicine by monitoring for “red flags” that indicate a more significant cause. If none are found, patients and athletes should continue movement and take an active role in their return to good health.

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