HEALTH

Is Platelet-Rich Plasma an Effective Healing Therapy?

Athletes such as Tiger Woods and the Pittsburgh Steelers's Hines Ward have undergone platelet-rich plasma therapy, but is there evidence that the treatment really speeds the healing of injuries?

By Carina Storrs on December 18, 2009

Torn tendons, muscles and ligaments plague athletes in many types of sports. In attempts to help heal the wounded tissue, some athletes, both amateur and professional, have turned to platelet-rich plasma (PRP) therapy. For the treatment, doctors take a small vial of a patient's blood, about 30 milliliters, and spin it in a centrifuge to separate the platelet-rich plasma from the other components. Then they inject the concentrated platelets at the site of the patient's injury. In theory, the growth factors that platelets secrete (not including human growth hormone) spur tissue recovery.

Before playing in all four professional golf majors this year, Tiger Woods received four injections of PRP in his left knee following surgery. PRP injections in his elbow may have been the reason that Los Angeles Dodgers's pitcher Takashi Saito was able to return to the mound for the 2008 Major League Baseball playoffs.

Whereas doctors have used PRP therapy since the mid-1990s to aid bone healing after spinal injury and soft tissue recovery following plastic surgery, it has only been in the past year that the treatment has caught on for treatment of sports-related injuries. "PRP treatment really gained speed last January. It got press that two of the Pittsburgh Steelers [Hines Ward and Troy Polamalu] used it before [winning] the Super Bowl. More and more patients started to ask about it," says Dennis A. Cardone, a doctor of osteopathic medicine at the New York University (N.Y.U.) Hospital for Joint Diseases. Cardone has treated 30 amateur athletes with PRP therapy over the past year.

Despite its use among athletes, the effectiveness of PRP therapy in sports medicine remains in question. Canadian doctor Anthony Galea, one of the pioneers in using PRP for athletes, was arrested in Canada for allegedly smuggling human growth hormone (HGH) and Actovegin into the U.S., *The New York Times* reported on Tuesday, where these potentially performance enhancing drugs are illegal. Galea had treated Woods and several other athletes, including Olympic gold medalist and sprinter Donovan Bailey, with PRP. Galea's arrest raised suspicion that he might have combined HGH with his PRP therapy.

ScientificAmerican.com spoke with N.Y.U.'s Cardone about what we know and don't know about PRP therapy.

[*An edited transcript of the interview follows.*]

What kinds of athletes have you treated over the last year with platelet-rich plasma (PRP) therapy?

They've been runners to basketball players to football players to collegiate competitive cheerleaders, a lacrosse player and a soccer player.

How could concentrating the platelets that are at the site of injury help healing?

Theoretically, many of the athletes may have a type of tendonitis, [such as] Achilles tendonitis or, say, patellar tendonitis in the knee or tennis elbow. Many of these tendon injuries become chronic, and involve microscopic tearing of the tendon and formation of scar tissue. A reason why it's difficult to heal these tendon injuries is

related to poor blood supply to the region. The perfect example would be the Achilles. It's a tendon with, in general, a poor blood supply, so when there are these microscopic tears or chronic scarring, the body has a difficult time healing it. The theory is that the body can't on its own get enough of these healing or growth factors to the area, but now this concentrated platelet injected there just enhances the nutrients and growth factors to allow the body to heal it.

You use the word "theory". What kind of evidence is there that PRP helps heal tendonitis?

We all would like to see more evidence for this therapy. While there is some evidence, we still do not have the type of randomized, blinded, placebo-controlled studies that we would like to see. Most of the early literature has been poorly designed studies so we need better evidence about this treatment going forward. Ultimately we'd all like to see a study where we had 100 people with an Achilles tendonitis, 50 of them were injected with placebo and 50 of them were injected with PRP to really see if there was a difference.

The studies that have been performed have been, "Okay, let's take 30 people with tennis elbow and let's inject these 30 people with PRP therapy, and let's follow them for a month and let's see how they do." So you're just looking at this one population, you're not comparing it to a control population [that receives an injection with placebo]. The thing about doing PRP therapy is that there are potentially other healers going on. Number one is there's always potential for some type of placebo effect any time you put a needle in anyway. Number two is when you put a needle into a tendon, like you do for PRP therapy, you are likely to cause some bleeding and this is known to help healing [by bringing in more platelets]. So even by sticking a needle in a tendon and aggravating the tendon, you actually are helping the healing response.

Everyone looks at this one study that came out more than a year ago on tennis elbow but the problem is, it was a cohort study. Some people come in, they already know they want it, or there are patients that have failed other treatments. Any time we talk to anyone about PRP treatment, one of the first things that needs to be said is that, right now, there's not good evidence to support the treatment.

Are any clinical trials currently going on?

Absolutely. In the next six months to a year, we should really start seeing results from many clinical trials, and hopefully good ones, ranging in everything from rotator cuff problems [in the shoulder] to tennis elbow to Achilles and patellar tendonitis.

It seems like there's been many studies done on tissue grown in the lab and in lab animals [mice and rats]. Could you give me an idea of what those studies have told you about how well PRP therapy works?
Many of the studies early on are animal studies and lab studies. Many of those have been very positive for PRP in terms of tendon-healing effects. That's part of that lack of evidence. It's great that the animal studies look good but you need human studies.

If there isn't good evidence yet, why do you give PRP therapy to your patients?
There is some evidence from cohort studies, and anecdotally we've had some good experiences where we still think it's worthwhile to offer it to some patients. The ones that we offer it to have failed other types of conservative therapy.

How have your patients done on PRP therapy?
I would say, anecdotally, the whole population overall has done fairly well. There are a number that haven't noticed much response and then there's a good number that have done well. I think that's why we continue [to use it].

A good example is a patient that I have with an Achilles problem and he tried everything, everything, everything—went to other docs and he was all ready for surgery [to remove the scar tissue] and we did PRP therapy on him. He ended up with two sessions of therapy and he's had a great cure that seems to be related to PRP. And then I've had some people, runners with chronic hamstring injury, and they will tell me they haven't noticed a difference.

I'd probably say that maybe 60 percent of my patients do better.

What are the alternative therapies?
Rest, modification of activity and then ultimately some type of rehabilitation program with stretching and strengthening.

How long would patients have to try these other things before you think PRP therapy is a good option?

A good general rule would probably be at least two to three months of failing other therapies. And many people that we use PRP for, it's longer than that. It is a big out-of-pocket expense for patients. Insurance doesn't cover it. The price ranges anywhere from $500 to $2,000. I don't think it's in the patients' best interest to do it early on.

I've seen reports of people saying that it started to hurt at the site of injection. Have you had any patients telling you about pain following the treatment?

Definitely. A good example would be that gentleman I was talking to you about with the Achilles problem. After his first injection he was calling me almost daily saying that it was much worse than it was before the injection. So there's no doubt that they can be very sore for upwards of even a couple of weeks. It's already a very sensitive tendon and now all of sudden you're taking a needle and you're sticking it into that tendon and pushing this extra fluid in there. You're increasing pressure and irritating the tissue which can lead to worsening pain early on. But the pain goes away after a couple of weeks.

Tiger Woods had several injections for his patella tendon. Can one injection have a healing effect or are multiple injections usually needed?

There is a study out there where, for patellar tendonitis, they've done one injection a week for three weeks. And the study says that they had good response but we don't even know how that compares to just one injection. Theoretically, if I'm truly enhancing the body's healing response, if I do the injection once and I give the body four to 12 weeks, then maybe it could heal with just the one injection. We know that [the condition] is chronic, it's degenerative. The body certainly can't heal such a condition in one week.

Have you done multiple injections for your patients?

I have [for] a few patients with Achilles tendon and patella tendon problems. I've never done more than two injections. The second injections have helped. Anyone that I've done a second injection for, it's been at least two to three months [after the first injection].

Are you involved in any of the clinical studies going on now?
We are. At the N.Y.U. Hospital for Joint Diseases orthopedic department we are in the middle of some studies, especially on the rotator cuff. For the rotator cuff we're comparing placebo, corticosteroid [anti-inflammatory] and platelet-rich plasma. We're probably at least one year away from having results.

Why is PRP not restricted for athletes in a way that human growth hormone (HGH) is?
Athletes use HGH as a performance enhancer even though there's no good evidence that it does anything to enhance performance or improve strength or endurance, etcetera. And there's nothing that says that HGH enhances healing. Now PRP is certainly not in any way a performance enhancer. It's more about enhancing the body's own healing response. Soneone who's had PRP therapy is not at some kind of competitive advantage over someone who hasn't had it. The platelets secrete completely different growth factors than HGH.

Do you think the results of the clinical trials that are coming out over the next year could change how PRP is used or how much it is used?
One way or the other, I think over the next six to 12 months it'll significantly change the way we use PRP. That could be either in a positive way or in a negative way. Maybe that study is going to come out that says, yes, you do need a second injection or a third injection. Right now it's very subjective how we all use it. Ongoing studies will determine proper usage, including timing and dosage.

The bottom line is that we don't know enough about PRP therapy. It is safe. We're using it. Anecdotally it certainly seems to have some positive effects. How much we'll be using it in the future or what we'll be using it for, those are all questions that really remain to be answered.

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