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**Disclosures:**

Financial disclosure statements have been obtained.  
None of the following individuals or entities have  
had any financial interest in the products or  
services mentioned in this article.

DOI: 10.1097/BOR.0b013e3181f894  
*American Journal of Physical Medicine & Rehabilitation*  
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ISSN: 0891-6720

DOI:

**ORIGINAL RESEARCH ARTICLE**

# Injection of Platelet-Rich Plasma in Patients with Primary and Secondary Knee Osteoarthritis

## A Pilot Study

**ABSTRACT**

Sampson S, Reed M, Silvers H, Meng M, Mandelbaum B: Injection of platelet-rich plasma in patients with primary and secondary knee osteoarthritis: A pilot study. *Am J Phys Med Rehabil* 2010;89:961–969.

**Objective:** To evaluate the clinical effects of intraarticular platelet-rich plasma (PRP) injections in a small group of patients with primary and secondary osteoarthritis. Most of the current treatments for osteoarthritis are palliative and attack the symptoms rather than influencing the biochemical environment of the joint. Autologous platelet-rich plasma has emerged as a treatment option for tendinopathies and chronic wounds. In addition to release of growth factors, platelet-rich plasma also promotes concentrated anti-inflammatory signals including interleukin-1ra, which has been a focus of emerging treatments for osteoarthritis.

**Design:** In this single-center, uncontrolled, prospective preliminary study, 14 patients with primary and secondary knee osteoarthritis who met the study criteria received three platelet-rich plasma injections in the affected knee at ~4-wk intervals. Outcome measures included the Brittberg-Peterson Visual Pain (Visual Analog Scale [VAS]), Activities, and Expectations score and the Knee Injury and Osteoarthritis Outcome Scores at preinjection visit at 2-, 5-, 11-, 18-, and 52-wk follow-up visits. Musculoskeletal ultrasound was used to measure cartilage thickness.

**Results:** There were no adverse events reported. The study demonstrated significant and almost linear improvements in Knee Injury and Osteoarthritis Outcome Scores, including pain and symptom relief. Brittberg-Peterson VAS showed many improvements including reduced pain after knee movement and at rest. Cartilage assessment was limited because of the small sample size. The majority of the patients expressed a favorable outcome at 12 mos after treatment.

**Conclusions:** The positive trends and safety profile demonstrated could potentially be used to inspire a larger, blinded, and randomized clinical trial to determine whether platelet-rich plasma is safe and effective for the treatment of knee osteoarthritis.

**Key Words:** Platelet-Rich Plasma, Knee, Osteoarthritis, Injection

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## METHODS

### Setting

The study was performed at Santa Monica Medical Center.

### Subjects

Patients were included if they had OA >3 years and were between the ages of 18 and 65. Patients had to be standard and able to walk without assistance. They were excluded if they had been taking corticosteroids or had a creatinine concentration above 1.5 mg/dL. Patients meeting all of the above criteria were included.

Patients meeting all of the above criteria were included. Patients were excluded if they had a creatinine concentration above 1.5 mg/dL.

Contraindications included coagulopathy, bleeding tendency, and drugs, including aspirin.

Patients were excluded if they had a history of anticoagulation, bleeding tendency, coagulopathy, or drugs, including aspirin. Patients were excluded if they had a history of anticoagulation, bleeding tendency, coagulopathy, or drugs, including aspirin.

### Procedures

The procedure was performed using GPS I (Knee) f. Blood was obtained and centrifuged at 6 min f. Aseptic technique was used to obtain 15 mL of 1700 g of a dedicated centrifuge (755VES).

15 mL of 1700 g of a dedicated centrifuge (755VES),

After centrifugation, ~6 mL of

platelet-rich plasma (PRP)

was combined with a 10% calcium gluconate solution.

The injection was made just to the side of the joint.

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### Outcome Measures

The Visual Analog Scale (VAS)

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Visual Analog Scale (VAS)

and the knee pain rating scale (KPS)

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**TABLE 1** Knee Injury and Osteoarthritis Outcome Scores

Week	Pain Relief		Symptom Relief		Activities of Daily Living		Sports		Quality-of-Life	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Baseline	35.									
2	38.									
5	41.									
11	44.									
18	45.									
52	48.									
Total P a.e	0.									
Within group change, P = 0.			Total effect				P = 0.			

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**TABLE 2** Brittberg-Peterson VAS

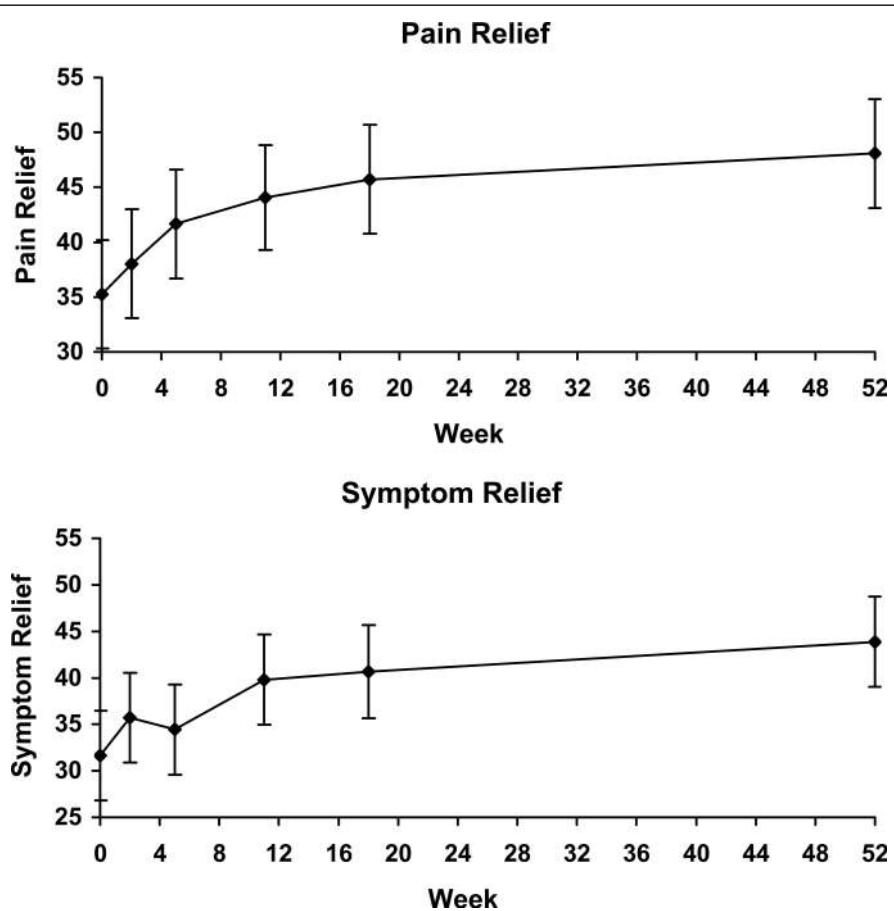
Week	Minimum	Median	Mean	Maximum	P (
Pa n e t ng					
Baseline	0	2	2.		
2	0	2	2.		
5	0	2	1.		
11	0	2	1.		
18	0	1	1.		0.0135
52	0	0	0.		0.0011
O ea					= 0.0005
Pa n m ng					
Baseline	1	5	4.		
2	1	4	4.		
5	0	3	3.		
11	0	3	3.		0.0323
18	0	3	2.		0.0006
52	0	2	2.		0.0003
O ea					= 0.0004
Pa n be kt nee					
Baseline	0	2	2.		
2	0	3	2.		
5	0	2	2.		
11	0	2	2.		
18	0	2	1.		
52	0	0	1.		0.0037
O ea					= 0.0349
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**TABLE 3** Ultrasound measured cartilage thickness

Cartilage Thickness in mm ( $n = 13$ )					
	Mean	Median	SD	SEM	P
Late a					
Pe	2.				
6 m <sup>+</sup> t	2.				
Pe t- e	0.				0.2292
Cet a					
Pe	3.				
6 m <sup>+</sup> t	3.				
Pe t- e	0.				0.4698
Med a					
Pe	2.				
6 m <sup>+</sup> t	2.				
Pe t- e	0.				1.0000

# Data Analysis

## Statistical Methods



**FIGURE 2** *Knee Injury and Osteoarthritis Outcome Score results.*

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## RESULTS

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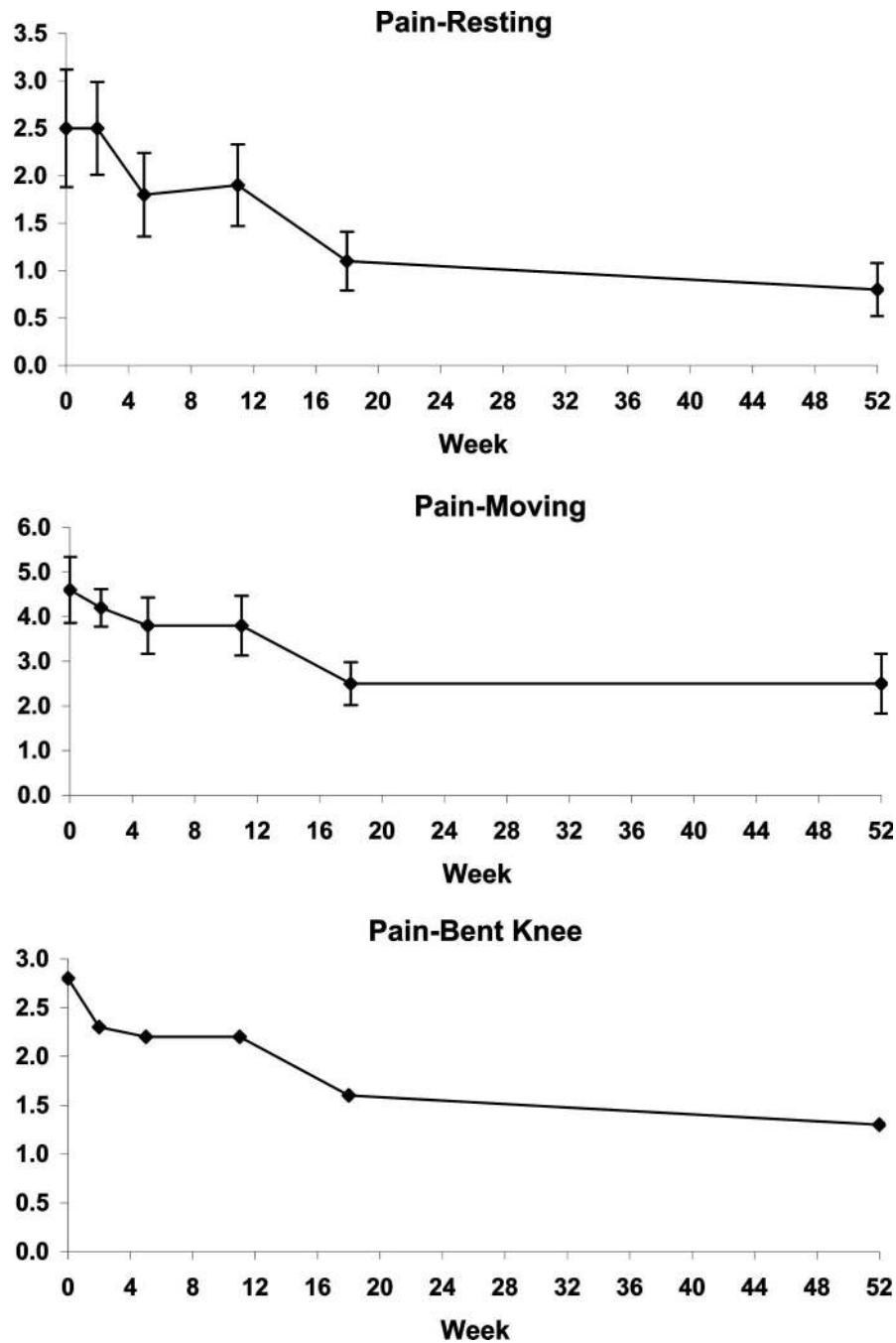
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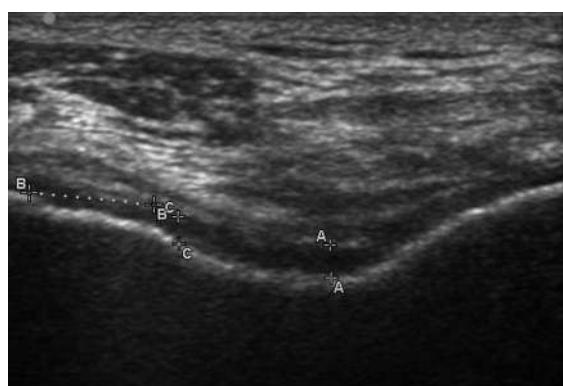
**FIGURE 3** Brittberg-Peterson Pain VAS results.

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## DISCUSSION

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**FIGURE 4** Knee cartilage measurement with ultrasound preinjection in an 87-yr-old man.



**FIGURE 5** Knee cartilage measurement with ultrasound 6-mos postinjection in an 87-yr-old man.

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## ACKNOWLEDGMENTS

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