

Platelet-rich Plasma Content of Active Spinal Cord Injured Patients

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Background

Platelet-rich plasma (PRP) is an autologous solution of highly concentrated platelets that contains anabolic and anti-inflammatory growth factors (GF) with increasing data supporting its use for musculoskeletal pathology like osteoarthritis and tendinopathy. However, patient specific factors like age, sex and medical problems can impact the anabolic profile of PRP; therefore **PRP content should be defined for specific patient populations**. Platelet-rich plasma (PRP) has **potential uses for patients with spinal cord injuries (SCI) to treat chronic shoulder pain**.

Purpose and Aims of Study

This study aimed to analyze: 1) **PRP content of SCI subjects** compared to age + sex matched controls

We hypothesized that the anabolic profile of PRP from SCI patients would be lower than controls. Since exercise is known to increase platelet content of PRP, we also aimed to test the **effect of high intensity interval exercise (HIIE) on PRP in the SCI population**.

Methods and Study Design

10 SCI patients and 10 controls were enrolled. **At rest, PRP was created from both groups**. The **SCI group then performed HIIE** (Tabata protocol on an arm bike) and underwent a **second blood draw to create post-HIIE PRP**. Complete blood counts and GF analysis (via enzyme-linked immunosorbent assay) was performed on all PRP.

Results

Table 1a. Subject demographics

	SCI	Matched Control	Significance
Age (mean±SD)	39.9 ± 9.7	39.8 ± 9.6	0.982
Sex (n)	male=7 female=3	male=7 female=3	NA
Tegner Activity Level (mean±SD) [range]	6.0 ± 1.7 [4-9]	5.5 ± 1.3 [4-7]	0.466

Table 2. Baseline PRP content comparison

N=10	SCI	Control	Significance
Platelets / μ L	305,700.00 ± 85,697.21	380,800.00 ± 57,301.93	p = 0.015
TGF- β (ng/mL)	12.84 ± 1.58	14.33 ± 0.63	p = 0.023
PDGF (ng/mL)	7.54 ± 2.93	9.80 ± 2.60	p = 0.143

Table 1b. Neurologic Level of Injury and severity

NLI (n)	Injury Severity (n)
T1 (1)	Complete
T3 (1)	Complete
T5 (2)	Complete (2)
T7 (1)	Incomplete
T9 (2)	Complete (2)
T11 (2)	Complete (1), Incomplete (1)
T12 (1)	Complete

Table 3. PRP cell content for SCI group pre / post-exercise

N=10	Pre-exercise	Post-exercise	Significance
Platelets	305,700 ± 85697	399,200 ± 96251	p = 0.004
White Blood Cells	906 ± 930	2504 ± 3765	p = 0.002
Red Blood Cells	22100 ± 11140	66000 ± 121764	p = 0.052

Table 4. Growth factors for SCI group pre /post-exercise.

N=10	Pre-exercise	Post-exercise	p-value
TGF- β (ng/mL)	12.84 ± 1.58	14.28 ± 1.21	p = 0.020
PDGF (ng/mL)	7.54 ± 2.93	13.87 ± 16.53	p = 0.064

Conclusion and Significance

Conclusion: **SCI patients have fewer platelets and TGF- β in their PRP at baseline** compared to controls. **Exercise increased platelet, leukocyte and TGF- β yield, compensating for the baseline deficits**

These findings should be considered when using PRP in this population.

