



## **Novel transcranial pulse stimulation (TPS) in football-related concussion: A pilot case series**

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### **Introduction**

Concussion has been evolved as a crucial factor especially in collision high-impact sports like Soccer, American Football, Rugby, and Ice hockey. The UEFA Elite Club Injury Study reports an 8.7days (6,6-10,8) time loss following a concussion in professional soccer. Transcranial pulse stimulation (TPS) is a novel MRI-navigated application of focused electromagnetic extracorporeal shockwave therapy (ESWT) to the brain. In mild to moderate Alzheimer dementia TPS has been shown to significantly improve function and decrease depression symptoms in a clinically significant way. It can improve neuroplasticity in healthy volunteers. Hypothesis: TPS is feasible and safe in football-related concussion.

### **Material & Methods**

Seven male amateur soccer players (25±6yrs) with football-related concussion were included in this pilot trial. TPS treatment with Neurolith (Storz Medical Tägerwil, Suisse) was done on average 48±12 hours after the injury with 6000 shots 0,2mJ/mm<sup>2</sup> and in total three TPS sessions every second day. Multiparametric SCAT6 evaluation was done immediately after concussion and

at day 7 according to the concussion consensus recommendations.



## Results

All seven male amateur soccer players tolerated the three TPS session well without any adverse effect. Initial SCAT6 revealed  $13 \pm 2$  symptoms (out of 22) with  $24 \pm 8$  symptom severity (out of 132), orientation 5/5, immediate memory 29/30, concentration 5/5, delayed recall 10/10. Day 7 SCAT6 revealed with  $4 \pm 3$  less symptoms (out of 22) with  $9 \pm 4$  lighter symptom severity (out of 132), orientation 5/5, immediate memory 30/30, concentration 5/5, delayed recall 10/10.

Return to play was  $7 \pm 3$  days.

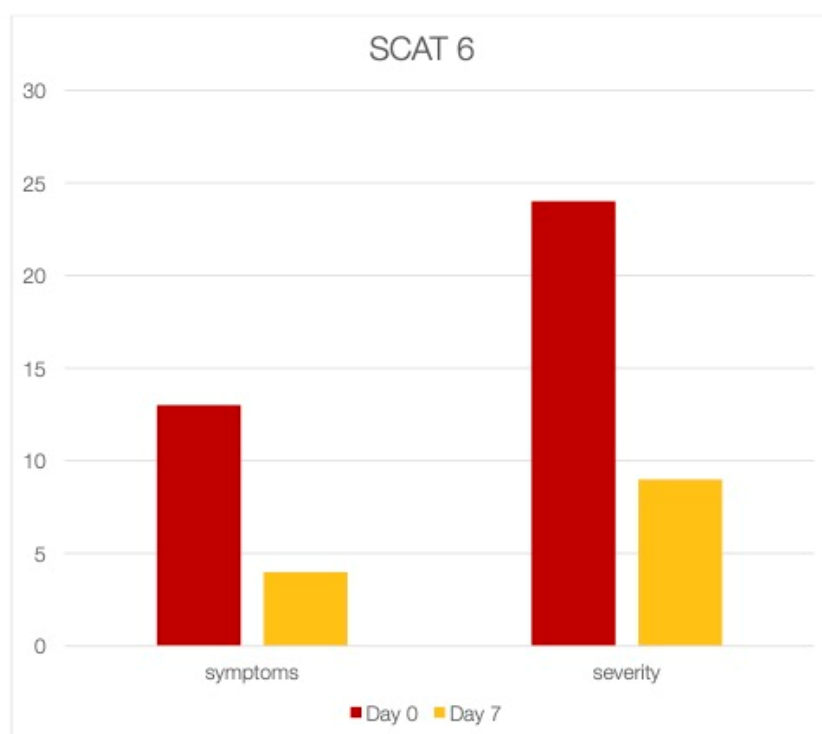


Figure 4.

### Discussion

In this pilot trial, TPS in football-related concussion was well tolerated and without adverse effects. Return to play was short with 7 days on average. SCAT6 testing revealed a rapid symptom improvement within a week in amateur football players. This pilot observation warrants future larger-scale clinical controlled trials on TPS in football-related concussion.