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ABSTRACT

This study examined the effects of 3 different types of post-activation potentiation (PAP) protocols [dynamic back squats (DS), maximum voluntary isometric knee extension (IKE) and maximum voluntary isometric back squat (IS)] on subsequent 10-, 20- and 30-metre sprint performance in 12 well-trained track athletes. Before the 30-metre sprint assessment, the subjects performed one of the four randomized PAP protocol; Control (4 minutes of passive rest), DS protocol (3 repetitions of back squats at 90% 1 repetition maximum), IKE protocol (3 repetitions of 3-seconds isometric knee extension) and IS protocol (3 repetitions of 3-seconds isometric squat). A further 4-minute recovery period separated the PAP protocols and three trials of 30-metre sprint assessment.

A general linear model with repeated measures ANOVA was used to separately detect differences in 10-, 20-, and 30-metre sprint performance among the PAP protocols. Pairwise comparisons were applied post hoc where appropriate. The primary results revealed that there were no significant differences in sprint performance among the control, IKE, IS and DS protocols, regardless of the 1st, 2nd, 3rd, average or best trials. Since the best 30-metre sprint time approached significance ($F = 2.57$; $p = .099$), these data were further looked into to examine individual trends.

The follow-up investigation revealed two “Non-responders” and 10 “Responders” to the PAP intervention. Subjects were categorised as “Responders” when their best 30-metre sprint time improved in response to at

least one of the PAP protocols. For the two “Non-responders”, the sprint performance did not improve after any PAP protocols. The sprint times of the 10 “Responders” showed a significant difference among the PAP protocols in 20-metre sprint time ($F = 3.97$, $p = .043$) and 30-metre sprint time ($F = 5.30$, $p = .016$). Post hoc analysis reported that only the 30-metre sprint time after the IS protocol (3.98 ± 0.08 seconds) was also significantly faster than the DS protocol (4.03 ± 0.06 ; 1.26%; $p = .004$).

The main finding of this study reported that the PAP protocols did not enhance subsequent sprint performance. However, the 30-metre sprint times after the IS protocol improved after the IS protocol, compared to after the DS protocol. This was only observed in subjects that responded to the IS protocol. Further investigation is required to warrant the utilisation of PAP protocols to augment subsequent acute sprint performance.