Book of Abstracts of the 16th Annual Congress of the European College of Sport Science in Liverpool, UK from 24-27 June 2011.

The severity of experimentally induced pain influences muscular performance during maximal voluntary isometric knee extensor contractions.

A.E. Wing, P.G.W. Jones, J.A. Campbell & A.D. Kay

Experimental pain has been shown to decrease maximal muscular performance (Ervilha et al., 2004) with evidence to suggest that motor unit firing rate is inversely correlated to perceived pain intensity when pain is induced via invasive hypertonic saline injections (Farina et al., 2004). The aims of the present study were to examine the influence of the severity of pain induced by a non-invasive gross pressure device (GPD) on muscular performance in the lower limb. Thirty-one healthy male participants (mean ± SD; age = 32.7 ± 12.3yr, height = 1.8 ± 0.1m, mass = 85.3 ±12.1kg) volunteered for the study after giving written, informed consent, with ethical approval granted by the University of Northampton's ethics committee. Isometric knee extensor joint moment and electromyographic (EMG) activity of the vastus lateralis (VL) and semitendinosus (ST) muscles were measured during maximum voluntary isometric contractions (MVC) within control and three experimental conditions (100%, 200% and 300% of pain perception threshold). A repeated measures ANOVA determined significance between conditions; post-hoc analysis with Bonferroni correction determined the location of any significant differences. Statistical significance was accepted at $p<0.05$ for all tests. Mean isometric knee extensor moment significantly declined ($p<0.05$) in all conditions compared with control and 100% pain perception threshold conditions, with greater mean reductions apparent as the severity of pain increased. However, no significant difference existed between 200-300% conditions ($p>0.05$). Similar significant reductions ($p<0.05$) were evident within EMG VL and ST data, reflective of the changes in force. Increasing levels of pain resulted in greater mean decreases in force and EMG data, however when pain perception threshold increased above 200%, no further significant reductions occurred. Unlike previous invasive methods using saline injections into the target muscle (Farina et al., 2004), the present study used a GPD to induce pain remote from the muscles responsible for force production and therefore, could not influence muscle mechanics or physiology. The present VL EMG data reveal a concomitant reduction in neuromuscular activity reflective of the changes in force. This data in conjunction with the methods employed, are suggestive of neurological impairment as the likely cause of reductions in force; however, the location (spinal or supra-spinal) remains unknown and should be investigated further.