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ISOKINETIC STRENGTH AND LOWER LIMB COOLING

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Many studies have shown that heating or cooling of the lower limbs will, respectively, increase or decrease anaerobic power production and will similarly influence muscle isometric force-velocity relationships. However, in normal situations muscle or joint movement will involve isometric and dynamic work. In the operation of foot pedals termination of motion will be largely isometric whereas initiation of motion will be largely dynamic and isokinetic. We have, therefore, set out to examine the effects of foot and lower leg cooling on isokinetic ankle flexion and angular distance travelled using the Cybex II system.

Twelve subjects took part in the study which followed a balanced crossover design. Cooling was effected by immersing the limb in water at 10°C to a depth of 16 or 36 cm. The control condition for each depth was immersion in water at 25°C. Measurements were made of plantar strength and angular distance travelled by the right ankle pre-immersion and after 20, 25, 30, 35 and *40* minutes of immersion. Measurements were also made of foot, calf and thigh skin temperatures. The results were analysed using a *4* factor analysis of variance and Neuman-Kuels post hoc tests of significant main effects.

Immersion in water at 25°C, irrespective of depth, had no effect upon either plantar strength or angular distance travelled. Similarly immersion of the foot to a depth of 12 cm in water at 10°C had no significant effect upon either parameter. However, immersion to a depth of 36 cm resulted, by the 20th minute, in a significant reduction in plantar strength from 105 Nm to 89 Nm ($p<0.05$). Thereafter there was no further significant change in plantar strength. Angular distance travelled did not significantly change.

Given that ankle flexion requires the action of the soleus and gastrocnemius muscles plus knee flexors and extensors and that the gastrocnemius is the more superficial muscle group it would appear likely that the reduction in plantar strength is due to cooling of this muscle. This study also shows that if significant cooling of the foot alone occurs there will be no loss of ankle flexion strength.