

Annotated Rehabilitation Evidence Assignment  
AT 614: Foundations of Sports Injury Rehabilitation

Dolan MG, Mychaskiw AM, Mendel FC. Cool-water immersion and high-voltage electric stimulation curb edema formation in rats. *J Ath Train*. 2003; 38(3):225-230.

Cryotherapy and electrical stimulation have long been advocated to curb edema formation after injury. Cryotherapy has become universally accepted by many health care professionals because it is thought to curb edema formation by decreasing blood flow to the injured area, decreasing metabolic activity, and decreasing permeability of postcapillary venules. Clinicians often use modalities, such as electric stimulation to curb edema formation. This modality remains clinically unsupported by valid research. Therefore, the purpose of this study is to reexamine the effects of cool-water immersion and electrical stimulation individually, and to determine the effects of combining cool-water immersion and electric stimulation on acute edema formation after blunt trauma to rats. Thirty-four rats were randomly assigned to either a cool-water immersion group (CWI, n=10), a cathodal high-voltage pulsed current group (CHVPC, n=10), or a combination of CWI and CHVPC (CWI + CHVPC, n=14). Pre-trauma limb volumes were determined by the amount of water displacement from an immersion vessel. Both hind limbs of each rat were then injured by dropping a steel rod onto them. Volumes were then measured again within 5 minutes after injury. The limbs were then immersed in separate beakers and the contralateral limbs served as a control. Rats in the CHVPC group and all control limbs were placed in water at 73.4°F. Rats in the CWI group and the CWI + CHVPC group were placed in water at 55°F. Each rat received four 30 minute treatments interspersed with 30 minute rests. Limb volumes were taken immediately after treatment or rest period. The results of this study found that volumes of treated limbs were less than those of untreated limbs over all times (p=.001). However, no one treatment was more effective than another (p=.325).

Level of evidence was determined with the *AAOS Levels of Evidence for Primary Research Question*. This study is a high quality randomized trial with statistically significant difference (p=.001). Levels of evidence are as follows: AAOS: Therapeutic Level 1. The strength of evidence recommendations was determined using the SORT. The strength of the study has been given an A based on the good evidenced based recommendations given in the discussion.

This study has obvious clinical relevance to the profession of athletic training because as clinicians we used cryotherapy and sometimes electrical stimulation on a daily basis. Understanding why we use these interventions is very important to the practice because we should choose an intervention based on what it does to the vascular and cellular responses in our bodies. This study may not be clinically relevant to the profession because the treatment time lasted for 4 hours and therefore exceeds our typical clinical practice. This study is also irrelevant because the study design used rats instead of humans. We are unable to see the effects on athletes with an acute athletic injury. Cryotherapy should be used to decrease blood flow, metabolic activity, and permeability of postcapillary venules.

Patients may be interested in the educational aspects in this study because they want the most effective treatment that will return them to normal activity. They may be interested in the various therapeutic interventions available to them in the inflammatory phase and how the treatments have affected animals, which may be correlated with human responses.