The CoolShirt System™ Aids Thermoregulation During Exertion in a Hot Environment  

**Context:** The incidence of heat illness is greatest in athletes who begin training in late summer when ambient temperature and relative humidity are at their highest. The risk of heat illness is even greater in football, as the clothing and equipment present a significant challenge to thermoregulation. Manufacturers of the CoolShirt System™ claim it can help manage thermoregulation in extreme environments and prevent heat-related illnesses. However, research regarding the efficacy of this system is very limited.

**Objective:** The purpose of this study is to determine if the CoolShirt System™ will aid thermoregulation during exercise in a warm environment. **Design:** Randomized crossover design. **Setting:** Data was collected in a temperature controlled research laboratory. **Participants:** Nine healthy male varsity and recreational athletes (age=22.00 ±3.32 y, mass=85.78 ±11.09 kg, height=179.49 ±5.54 cm) who were acclimated to a warm environment volunteered to participate. **Interventions:** Each subject was assessed for body mass (BM), heart rate (HR) and core temperature ($T_{core}$) during a bout of exercise in a warm environment while wearing football equipment and clothing under two conditions, CoolShirt System™ ($C_{shirt}$) and cotton T-shirt ($T_{shirt}$), separated by a period of one week. The exercise protocol consisted of three sets of ten maximal effort 10-sec sprints with 30-sec of active recovery on a Monark 834E cycle ergometer in a room maintained at 35°C. The three sets were separated by 5-min of passive recovery in the same warm environment. **Main Outcome Measures:** $T_{core}$ was measured prior to and during exercise using a CorTemp Disposable Temperature Sensor and a CT2000 Miniaturized Ambulatory Recorder (HTI Technologies, Inc., Palmetto, FL). Sweat loss was determined as the change in BM from pre-exercise to immediate post exercise measured using a standard electronic scale. HR was monitored using a Polar T34 chest transmitter (Polar Electro, Inc. Lake Success, NY) which wirelessly transmits the heart rate data to a Polar WearLink compatible receiver. **Results:** ANOVA with repeated measures revealed a significant Time main effect ($F_{6,48}=63.51, p=.001$) for $T_{core}$, as a progressive increase was observed throughout the exercise protocol. $C_{shirt}$ had no effect however, as a significant Condition x Time interaction ($F_{4,48}=1.40, p=.235$) was not observed. A significant Time main effect ($F_{1,8}=198.02, p=.001$) was also observed for BM, as a significant decrease was observed. The $C_{shirt}$ did effect sweat loss, as a significant Condition x Time interaction ($F_{1,8}=8.26, p=.021$) was observed. $T_{shirt}$ resulted in a significant decrease in BM from pre (84.6 ±10.3 kg) to post (84.0 ±10.3 kg) exercise, while no change was observed when comparing the pre (84.2 ±10.5 kg) to post (83.8 ±10.5 kg) $C_{shirt}$ BM. **Conclusions:** The CoolShirt System™ enabled subjects to maintain a similar $T_{core}$ while sweating less. This might aid the body's thermoregulation when exercising in the heat. **Word Count:** 449.