

## ISRP 2000 abstract

Presenter/author	Title	Abstract
D.Caretti, David  Research physiologist, US Army Edgewood CB Center, Aberdeen Proving Ground, MD, USA  (Presented by Paul Gardner)	<b>Quantifying the Heat Stress Attributable to Respirator Wear</b>	<p>There are many possible criteria to use for respirator design. For the U.S. military, recent development efforts advocate, among others, designing for a reduced respirator thermal load. However, quantitative data that defines the thermal load attributable to a respirator in and of itself is limited. Respirator designers need to know the amount of heat load due to a respirator under various conditions of work and environmental exposures before the issue can be addressed in the development of next generation respirator systems, whether they be for military or commercial applications. Therefore, a study was performed to quantify the effects of respirator wear on the physiological responses during heat stress. Five subjects aged <math>36.0 \pm 2.9</math> years completed 120 min trials consisting of treadmill walking, flight simulation, and performance of cognitive tasks in a warm environment (<math>33.9 \pm 0.2</math> °C dry bulb and <math>24.3 \pm 3.4</math> °C wet bulb temperatures) under one condition of respirator wear and one condition without a respirator. The respirator trial involved wear of a tight-fitting, powered air-purifying respirator (PAPR). Subjects wore one-piece cotton coveralls over shorts and a T-shirt for both test trials. In general, core temperatures (<math>T_C</math>) increased throughout heat exposure trials. However, both <math>T_C</math> and mean weighted skin temperatures (mean <math>T_{SK}</math>) were statistically similar between the masked and unmasked conditions at each minute for the entire measurement period. At the end of heat exposure sessions, no differences in average core temperatures, heart rates, mean <math>T_{SK}</math>, sweat rates, or heat storage rates were observed between the unmasked and masked conditions. Self-reported subjective scores for thermal sensation of the face and overall body comfort differed significantly between conditions, indicating that subjects' faces felt warmer and they experienced greater discomfort during respirator wear. Collectively, these findings suggest that there is no measurable thermal load attributable to a respirator alone other than subjective feelings of warmth and comfort.</p>