THERMOGENESIS AND OXIDATIVE FUEL SELECTION DURING A 24H ARCTIC SURVIVAL SIMULATION

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Objective. This study examines changes in thermogenic rate and fuel selection during a 24h Arctic survival simulation in men (34±10 yr, 98.2±18.4 kg, 178.2±2.5 cm, 2.16±0.18 m^2, VO_2max = 49.5±11.4 $ml \cdot kg^{-1} \cdot min^{-1}$). **Methods.** Six lightly dressed volunteers were exposed to ~7.5°C air in a restricted area for 24 continuous hours. Throughout the trial, they ingested ~7777.8 kJ (~55% CHO, ~38% lipids, ~7% proteins) and 500mL of water over 24h. Whole-body thermogenic rate as well as the respective contribution of each fuel to total heat production was measured at baseline (~22°C) and after 6, 12, 18 and 24h in the cold. **Results.** Skin temperature decreased steadily before reaching a plateau at ~27.9°C after ~4.5h. Core temperature decreased progressively from 37.5±0.2°C at baseline to 36.7±0.1°C after 24h in the cold. Thermogenic rate increased 1.6 fold from baseline values and remained constant throughout the 24h cold exposure. Carbohydrate (CHOox) and lipid (FATox) oxidation rates were similar at baseline (26.1±6.7% and 56.2±4.3%) and after 6h (27.1±6.7% and 56.2±4.3%) of cold exposure. However, between 6h and 12h in the cold, lipid utilization increased to contributing 75% of all the heat produced. In contrast, CHOox decreased to ~12% and protein oxidation remained constant at ~13%. **Discussion.** Together these results show that even though subjects were not able to maintain their core temperature at basal levels, they sustained constant thermogenesis over 24h of cold exposure, relying mainly on lipids for fuel after 12h in the cold. *Funded by a SAR-NIF grant from Transport Canada.*