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Title: Prolonged whole body immersion in cold water: hormonal and metabolic changes

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Abstract: To characterize metabolic and hormonal responses during prolonged whole body immersion, 16 divers wearing dry suits completed four immersions in 5 degrees C water during each of two 5-day air saturation dives at 6.1 meters of sea water. One immersion began in the AM (1000 h) and one began in the PM (2200 h) to evaluate diurnal variations. Venous blood samples were obtained before and after completion of each immersion. Cortisol and ACTH levels demonstrated diurnal variation, with larger increases occurring after PM immersions. A greater than three-fold postimmersion increase occurred in norepinephrine (NE). There were significant increases in triiodothyronine (T3) uptake and epinephrine, but no change in T3, thyroxine, thyrotrophic hormone, and dopamine. Postimmersion free fatty acid levels increased 409% from preimmersion levels; glucose levels declined, and lactate increased significantly. Only changes in NE correlated significantly with changes in rectal temperature. In summary, when subjects are immersed in cold water for prolonged periods, with a slow rate of body cooling afforded by thermal protection and intermittent exercise, hormonal and metabolic changes occur that are similar in direction and magnitude to short-

duration unprotected exposures. Except for cortisol and ACTH, none of the other measured variables exhibited diurnal alterations.

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