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KEYNOTE ADDRESS

SURVIVAL BY SWIMMERS IN EXTREME LOW WATER TEMPERATURES

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Swimmers and divers, as well as victims of shipping accidents, are sometimes immersed in water at close to its freezing-point. Accounts of accidents, and experiments on volunteers, both indicate that thin people without protection or buoyancy aids are liable to drown within a minute or two in such conditions, long before lethal hypothermia could develop. This is a major cause of deaths in inland waters, and of many of the deaths at sea. It results from respiratory and cardiovascular reflexes to cold, combined with exhaustion due to the high viscosity of water near 0°C. Apart from this hazard, unprotected skin can freeze in seconds in seawater at -1.9°C and non-freezing local cold injury can be caused by several hours of cooling below 10°C. However, hypothermia remains the principal limiting factor to the time for which unprotected people who avoid early drowning can swim in very cold water.

Until recently, there has seemed to be a lower limit of water temperature of 8-10°C, below which cold vasodilatation developed in the limbs and caused rapid death from hypothermia, even in people who could keep swimming and had a good thickness of subcutaneous fat. Two recent events showed that some unprotected people can swim for long periods in substantially colder water. Gudlaugur Fridthorsson's survival swim for 5-6 hours in water at 5-6°C of Iceland, and Lynne Cox's deliberate swim in the Bering Straits from the American Little Diomede Island to the Soviet Union, in water at 7°C, were made without buoyancy aids and with minimal clothing. Studies so far indicate that adequate subcutaneous fat is an essential requirement for such feats, though probably not the only one.

Such long, cold swims are exceptional and normally disturbances of behaviour, memory and reasoning stop people who swim in very cold water long before hypothermia becomes a direct hazard to life. Reflex effects of severe cooling of the skin can confuse an untrained person within seconds and can combine with the high viscosity of cold water to produce rapid exhaustion and sudden drowning. This is, in practice, a much greater threat than hypothermia to the average survivor without a buoyancy aid in very cold water. Consciousness is lost at very variable levels of hypothermia, sometimes not until core temperature is below 28°C. However, memory registration and reasoning can be impaired at a core temperature of 36°C and progressively reduce the survivor's capacity for co-ordinated and well-planned action.