

THE THERMAL ENVIRONMENT AND THE HUMAN THERMOREGULATION IN SIMULATED DIVING AND IN REAL DIVING INTO THE SEA

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The necessity to work in submarine environment makes evident multiple problems regarding the human organism reactivity in these special conditions. The pressure and its variations, the thermal factors, the humidity, the swimming are some of these conditions. Hence for ensuring the divers to perform this activity it is necessary to know their organism adaptation to the mentioned factors. The studies in this field are made in two stages: simulated dry or wet diving in caisson, real diving into the sea. Our study carried out in summer with 10 professional autonomous divers, young healthful men, in their training in caisson with compressed air in dry diving at the equivalent depth of 80 m (9 ATA) and at diving into the sea at 5 m (1.5 ATA), 25 m (3.5 ATA) and 40 m (5 ATA). The time of compression and decompression, of diving and return were established according to the French Diving Tables. Following indicators were assessed: air temperature and humidity in caisson and outdoor, sea water temperature, skin temperature in central and peripheral points, heart rate, body weight, thermal sensation.

In caisson the whole time of the diving with compression and decompression was 105 minutes. The subjects, dressed only in slippers, were in sitting rest. Great and sudden variations of the air temperature and humidity (increases, decreases) were determined in caisson because of the air compression and decompression. During the 5 minutes of compression the temperature increased to 43-45°C and it decreased to 35-32°C during the 20 minutes at 9 ATA, to 18°C at 2.5 ATA, followed by a new increase to 20-31°C during the decompression. The relative humidity increased at 9 ATA and in decompression to 79-100%. The skin temperature increased in all points with 1.6-1.8°C to 9 ATA and it decreased with 4.5-6.8°C to 2.2 ATA. The body weight decreased during the diving with 250-1,250 g, showing a negative water balance of the organism because of the great sweat. These data show a sudden high thermal strain.

In real diving the divers wore semiwet tight suit from alveolar neoprene and air compressed bottles on their back. The diving times were: 40 minutes at 5 m and water temperature of 20°C, 24 minutes at 25 m and 10°C, 20 minutes at 40 m and 6°C. The air temperature was 20-23°C. The skin temperature decreased with: 1.6-3.2°C at 5 m, 2.5-5.1°C at 25 m, 4.4-5.8°C at 40 m. At 25 m and 40 m the divers showed the sensation of cold, at 40 m they showed also numbings of the hand fingers. The heart rate was 120-152 beats/min at the return from the diving. The skin temperature decrease may determine the decrease of the organism activity efficiency. There is a constriction of the blood vessels, which makes heavier the gaseous organism desaturation during the decompression, hence during the return from the diving. It shows also the low thermal protection of the divers' suit at the water temperature of 6-10°C, the necessity to wear suit with higher thermal protection.