P-46 AIR CONSUMPTION DURING THE DESCENT OF OPEN WATER DIVES; A PRELIMINARY STUDY

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Introduction/Aims

The descent and minutes after reaching maximal diving depth (MDD) are critical parts of a dive. Gas filled cavities should be pressure-equalized, especially the lung. Descending is mentally more stressful than staying at depth. With less experienced recreational divers, this may cause extra ventilation. Experienced divers may also ventilate extra to prevent hypercapnia and N_2-narcosis. The aims of this preliminary study, novel in diving-physics and physiology, are firstly to develop an exact method of calculating air consumption and, secondly, to examine whether the descent of recreational, nearly effortless air-dives demands extra ventilation (corrected for lung volume equilibration).

Methods

Five divers with varied experience made an open sea descent (23 msw/min) to 34 msw and then stayed at 13-8 msw. Every four seconds, tank pressure, water temperature and heart rate (HR) were measured with the UWATEC Galileo dive computer. Gross air consumption in ambient pressure (aL/min) was calculated from tank pressure, water temperature with adiabatic correction with a given half time of the heat transport between gas in the tank and the water. Nett consumption was found after correcting for lung volume equilibration and for the effect of central pooling in the lung tissue.

Results

During descent, the extra ventilation of 3.7 aL/min (range 0-14 aL/min) compared with at 13-8 msw depth (15-20 aL/min) suggests that it is experience-dependent. During the dive, (following the initial descent), heart rate decreased: $HR_{descent} > HR_{MDD} > HR_{10\text{-}15}$ ($P < 0.01$).

Conclusions

During the descent heart rate is elevated and there seems to be subject-dependent extra ventilation. More research with standardized profiles and more subjects are needed to unravel air consumption and heart rate during descent.

Keywords:

Lung, ventilation, descent, adiabatic, temperature, heart rate