

## DIVING DEPTHS CORRECTED FOR AGE AND VO2MAX

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**Aims:** Diving by seniors is becoming increasingly popular. However, above 40 years physiological functions (muscles, heart, lungs) decrease progressively and substantially. This may influence bubble stress and consequently the risk of decompression sickness (DCS). Models underlying dive tables and algorithms of dive computers (DCs) are generally developed with data of divers <40 years with high VO<sub>2</sub>max values. Conservatism adjustments of DCs (personal and micro-bubble settings) result in a decrease of no-stop times (NSTs) but never in a limitation of diving depth. It is questionable whether such measures are sufficient for safe diving of seniors. Age and VO<sub>2</sub>max are known to affect RDCS and venous gas embolism (VGE). The study aims to develop a simple, preliminary model which calculates the maximal allowable diving depths and bottom times with given age and VO<sub>2</sub>max.

**Methods:** From a set of diving tables with known RDCS NSTs for any depth can be calculated. Since VGE grades and RDCS are statistically related a depth-NST-VGE model results. With published VGE, age and VO<sub>2</sub>max data of a 35-msw air-dive and a similar own dataset of a 20-dive, a simple depth-age-VO<sub>2</sub>max model is developed which estimates VGE grades.

**Results:** Using the VGE-outcomes of the latter model, NSTs for a given depth can be calculated with the depth-NST-VGE model. In contrast to decompression algorithms of DCs, it was found that older (especially >60 years) or unfit divers should limit diving depths in addition to reducing NSTs.

**Conclusions:** The limitations and reductions found in this preliminary study, with its restricted underlying data sets and various assumptions, are strengthened by the large decrease in cardiac and pulmonary reserves that seriously cuts down the chance on a successful narrow escape. This small study aims to encourage large scale investigations to make elderly diving more safe.

**Keywords:** Model, diving depth, age, VO<sub>2</sub>max, VGE, DCS