

## Introduction/aims

Ever since Haldane, one thinks that more body fat (BF) increases VGB since more  $N_2$  dissolves during the dive. Because in general, multicollinearity between age, BF, and  $VO_{2max}$  was not taken into account, studies on the effect of BF in DCS-risk and VGE show inconsistencies. For a 40min/3.1bar(a) profile  $N_2$ -tensions and loads were calculated, using a novel model with 8 parallel Bühlmann compartments, preceded by a 0.5 s halftime blood compartment in series. Calculations were done for a lean and a fat subject. Outcomes were checked indirectly in a simulated dive (40min/3.1bar(a)).

## Methods

Modeling was performed numerically. Every minute the  $N_2$ -load of the blood compartment was corrected for the parallel compartments  $N_2$ -load to calculate the current  $PN_{2,blood}$ . The fat-lean difference was transformed to a bubble grade difference. Of 52 male divers with a small range in age (10y) and  $VO_{2max}$  (35-51 ml  $O_2/kg.min$ ) to minimize multicollinearity, a novelty, precordial Doppler KM scores were determined 4x after surfacing to calculate KISS values and  $\log\{\# bubbles/cm^2\}$  ( $\log B$ ).

## Results

Compared to Haldanian models, this model showed a substantial delay in  $N_2$  uptake and release. One hour after surfacing, a diver with 2x more BF (reference 14%) gave only 15% increase in the blood compartment. This would result in an increase in bubble grade of only 0.01 "KM unit". The outcomes hold for substantial changes in halftimes, compartment volumes and profiles. With saturation dives the difference is about 1/8 KM unit, also too small to be relevant in practice. All statistical outcomes of (partial) correlations between  $\log B$  or KISS and BF were highly non-significant, supporting the model.

## Conclusions

This work suggests that BF does not influence VGE. It is doubtful whether BF should remain a leading DCS-risk factor in the medical examination. (Partly published in Schellart et al., J Appl Physiol 2013;114:602-610).

## Keywords

Adiposity, Doppler bubble score, deterministic series-parallel model, blood nitrogen tension, delayed nitrogen release.