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The influence of body fat on post-dive bubble formation in recreational divers measured with precordial Doppler monitoring

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INTRODUCTION/BACKGROUND Despite many studies it remains uncertain whether body fat (BF) is a predisposing factor in venous gas embolism (VGE) and decompression sickness. BF (range 16-44%) was studied in relation to the bubble grade as measured by precordial Doppler monitoring. To prevent bias, the effect of age (range 34-68 years), body mass index (BMI; range 17-34 $kg.m^{-2}$) and a modelled estimate of VO_{2max} (maximal O_2 uptake; range 24-54 $mL.kg^{-1}.min^{-1}$) were taken into account.
METHODS KM bubble grades were determined in 43 recreational divers after a sea air dive (20msw/40min). KM scores were transformed to the logarithm of the number of bubbles/cm^2 (logB) and to the logarithm of Kisman Integrated Severity Score to allow numerical evaluation. Statistical analyses were performed with Pearson's regular and partial correlations and uni- and multivariate linear regression with Variance Inflation Factor (VIF).
RESULTS The partial correlations strongly reduced the collinearity between age, VO_{2max}, BMI and BF, allowing a clear view on the exclusive contribution of body fat. For middle-aged and older divers, the analyses indicate that neither BF nor BMI enhance the formation of bubbles as the correlations are highly non-significant. In contrast, age and especially VO_{2max}, appeared to determine bubble development. For this type of diving and these divers it was found that $logB = -1.1 + 0.023age - 0.041VO_{2max}$ (VIF only 1.2).
SUMMARY/CONCLUSIONS We conclude that BF and BMI do not influence VGE. We recommend that in medical examinations more attention is paid to VO_{2max} and age, and that international institutions come to a consensus regarding minimum allowable VO_{2max} criterion values. A low VO_{2max} also limits the physical reserve. Swimming with SCUBA at a pace of 1 knot requires 25 $mL.kg^{-1}.min^{-1}$. For recreational divers we would like to suggest a VO_{2max} of 25 mL/min.kg as a minimum value. (Schellart et al., ASEM 2012;83:951-7).

Keywords: adiposity, VO_{2max}, age, BMI, bubble count, venous gas embolism.