



To test or not to test, that is the question

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Introduction

Decompression models describe bubble formation in the organism, the majority of them have been tested using decompression sickness as the end point. Uncertainties in diagnostic criteria as well as large statistical confidence intervals will show that hardly any of the procedures used today have been tested adequately to show their effectiveness in reducing the risk of injury both in the short and long term.

Evaluation of decompression procedures can not be done without performing dives with a measurable end point. The statement that

"x number of dives have been performed without any significant problems"

is probably not good enough, as most modern procedures will fulfill these criteria. If we believe that injury and disability from decompression is caused by the body reaction to gas bubble formation, it is reasonable to presume that procedures that produce the least amount of gas bubbles are the safest.

Material and methods

Twelve divers performed six No-Stop air dives in the range 18 – 33 msw with bottom times as recommended by the Norwegian Tables. All dives were below the exposure limit p_{vt} of 25 required by Health and Safety Executive (HSE), UK for professional divers.

Ultrasound of the heart was performed post-dive for 120 minutes. The bubbles were graded as described by Eftedal & Brubakk, UHM 1997, B&E 2003.

Divers were tested for PFO; found in only one diver.

Bubbles

Grade 4A, 1=<1 bubbles/cm².



All divers with Grade 4C had arterial bubbles, even without PFO !

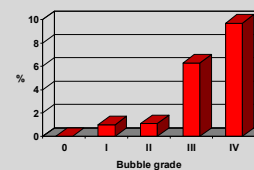


Dives

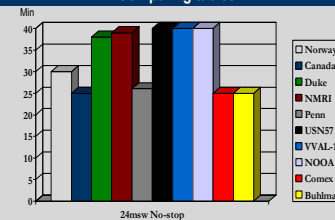
Dive	Depth	Bottom time	Deco.	p _{vt}
1	18 msw	60 min	-	21.7
2		70 min	3msw/5m	23.4
3	24 msw	30 min	-	18.6
4		40 min	3msw/5m	21.5
5	33 msw	15 min	-	16.7
6		20 min	3msw/5m	19.2

p_{vt}: p=pressure in bar, t=time in minutes

Bubble grades and DCS (Sawatsky et al 1988)



Comparing tables



Conclusions

Accepted dive procedures may lead to high venous bubble grades and arterial bubbles. The results from the present study, combined with the fact that large deco. differences exist between tables, show that further testing and evaluation is needed. The method of testing and the criteria for evaluation may be a matter of discussion, we, however, believe that vascular gas bubbles is a good risk indicator. Bubble grade =< 3 in a dive series indicate a significant increase in risk.

To test or not to test ??

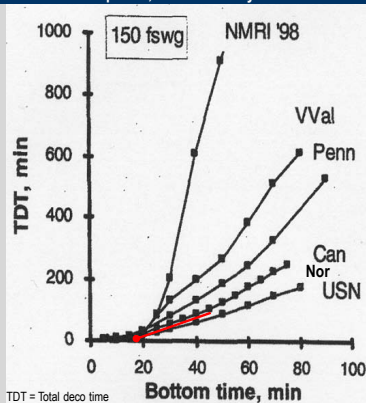


You will have less problems if you do not look down !

Acknowledgement

The project was supported by NTNU and the Norwegian Labor Directorate as part of the personal dive computer (PDC) evaluation project

Deco compared, Van Liew & Flynn 2004



RESULTS

Dive	No. dives	No. of divers with Grade 4	No. of divers showing arterization
1	12	8	0
2	12	10	3
3	11	8	4
4	11	9 (+1G5)	2
5	11	10	1
6	12	10	1