

## Letter to the Editor

The relative safety of forward and reverse diving profiles.

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To the Editor:

I read with interest the manuscript of McInnes et al (1) reporting DCS incidence in guinea pigs exposed to “forward” and “reverse” multi-level (three depth stages) dive profiles (FDP.ML and RDP.ML) as well as two series of three “forward” and “reverse” repetitive dives (FDP.RD and RDP.RD). They observed DCS in 6/11 RDP.ML vs 0/11 FDP.ML ( $P=0.01$ ) and significantly more DCS in the two RDP.RD profiles compared to the FDP.RD ( $P=0.01$ ). The authors concluded that “This current investigation shows that reverse profiles, as they apply to multi-level and repetitive diving, are not merely the mirror image of forward profiles and do not carry equal decompression obligations.”

I fully agree with the authors with respect to the fact that a FDP can not automatically be mirrored to a RDP and considered equally safe. But has that been suggested by anyone? The proceedings from the Reverse Dive Profile Workshop (2) holds a number of presentations, repeating again and again, that the deeper repetitive dive in a reverse dive profile will be “punished” by a shorter bottom time compared to the alternative of doing the deepest dive first. There is no disagreement that organizing the dives with FDP will allow more working time under water compared to RDP. The question is whether the repetitive dive - utilizing maximum no-decompression bottom time - will have a

higher DCS risk in a FDP or RDP profile. In my opinion, the experimental setup of McInnes et al. does not allow an answer to this question. The authors have decided to use identical bottom times on each of the three consecutive dives in the FDP and RDP series. Haldanian/flow-limited gas transport theory will predict a significantly higher saturation in the slow tissues after the third RDP dive compared to the third FDP dive. Since the dives were no-decompression/direct ascent dives, there is no surprise that a higher DCS incidence was observed in the RDP compared to the FDP profile. A simple practical comparison would be to investigate the USN procedure for maximum bottom times on no-decompression dives to 100, 80 and 60 fsw with 2h surface intervals. This would in the FDP mode allow 100 fsw/25min; 80 fsw/17 min and 60 fsw/24 min. If this profile was mirrored, the decompression procedure would have been violated, since 11 min would be maximum allowed bottom time at 100 fsw.

In conclusion: I agree with the authors that a FDP will be safer than a RDP designed as a mirrored FDP: However, I don't believe the authors have investigated whether maximum allowed bottom times (using conventional tables or dive computers) with RDP are less safe than FDP. And in the end that remains the most interesting question for the diving community.

1. McInnes S, Edmonds C, Bennett M. The relative safety of forward and reverse diving profiles. *Undersea Hyperb Med* 2005;32(6):421-27
2. Lang MA, Lehnder CE (eds). Proceedings of the reverse dive profiles workshop 29-30 October 1999. Smithsonian Institution, Washington DC