Reply:

We appreciate the concerns raised by Jüttner et al.[1] regarding our recent paper on first-aid oxygen delivery devices and flow rates.[2] Our unexpected results with the use of the demand valve have been an area of much discussion both within our research group and at the SPUMS 2015 Annual Scientific Meeting. We agree this issue is complex and the lower than expected values we observed with demand valve ventilation may be attributable to several variables, however any leak caused by the nasal cannula should be minimal, and would not fully explain our findings.

Although the data presented by Jüttner et al. are interesting, it is important to note that experiments in the anaesthesia environment might not adequately capture the realities of out-of-hospital care. In our study, we tried to replicate the types of equipment, personnel and process of use as experienced in the pre-hospital environment. That said, the data presented by Jüttner et al. in many ways corroborate our premise that $P_{tc}O_2$ can be used as a surrogate marker for P_aO_2, and that our use of a head hood as our reference standard

(which produced $P_{tc}O_2$ values in the upper limb similar to the P_aO_2 values obtained by Jüttner et al.) was appropriate.

Of course we all agree that the gold standard for oxygen administration in first aid for decompression sickness is an inspired fraction of 100% in order to obtain optimal tissue oxygenation. This should be achievable using the DAN oxygen kit demand valve, but clearly further work is required to identify the device modifications and methods of deployment required to ensure that it does achieve this. In the meantime, our data should reassure first responders without access to a demand valve, or who are unable to achieve adequate oxygenation using the device, that a non-rebreather mask with 15 $L \cdot min^{-1}$ oxygen flow rate can achieve reasonably high values of $P_{tc}O_2$.

References

1 Jütter B, Großheim M, Theiss K. Tissue oxygenation using different oxygen delivery devices and flow rates (Letter). *Diving Hyperb Med*. 2016;46:58.
2 Blake DF, Naidoo P, Brown LH, Young D, Lippmann J. A comparison of the tissue oxygenation achieved using different oxygen delivery devices and flow rates. *Diving Hyperb Med*. 2015;45:79-83.

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Editors note: Carl is a Founder Member of SPUMS, a former Editor of the *SPUMS Journal* and an indispensible resource of diving medical knowledge for as long as this Editor can remember. You may think that you have retired Carl, but I'll still find you for advice wherever you are!