Measuring aerobic fitness in divers

The editorial by Bosco, Paoli and Camporesi in the last issue of this journal provides an interesting overview of some of the factors that are either known or suspected to be important in the physiological health of divers.[1] The part pertinent to our paper concerns the meaning and use of metabolic equivalents (MET).[2] Our goal was to estimate the metabolic effort required for a substantial sample of recreational dives. Computing MET values based on an assumed resting oxygen consumption rate of 3.5 millilitres of oxygen per kilogram body mass per minute is well established. Most pointedly, MET is used in the Recreational Scuba Training Council (RSTC) Guidelines for Recreational Scuba Diver's Physical Examination found in the Medical Statement documentation.[3] Given the increasingly widespread use of the RSTC assessment, it makes the most sense to be consistent. Concerns over whether or not a more appropriate index value could be used are moot. Anyone wishing to compute a different base for 1.0 MET can simply cross-multiply and divide.

The question to be answered is not what level of aerobic capacity is desirable for divers, the answer to that is the higher the better. The critical question is what constitutes a reasonable minimum threshold aerobic capacity consistent with operational safety. The authors mention the often invoked 13 MET capacity identified as a threshold for US Navy divers. What is typically ignored, however, is the fact that the Navy has far more applicants for dive school than posts to be filled, making very stringent selection standards feasible even if not truly operationally necessary. It is not at all clear that this is a reasonable threshold for the broader diving community. Despite this, the RSTC documentation adheres to the traditional position. "*Formalized stress testing is encouraged if there is any doubt regarding physical performance capability. The suggested minimum criteria for stress testing in such cases is at least 13 METS [sic]. Failure to meet the exercise criteria would be of significant concern*." This is contrary to the available data. A review of 14 studies in which the aerobic capacity of divers was measured found that mean aerobic fitness ranged from 37–57 $mL \cdot kg^{-1} \cdot min^{-1}$ (10.6–16.3 MET).[4] The lowest individual scores were below 5.0 MET. The threshold of 13 MET was exceeded by the group mean in only six of the 14 studies described. This certainly does not support 13 MET as a meaningful threshold for participation.

Our current work was intended as a simple effort to begin to assess the aerobic demands of recreational diving. It is our hope to promote discussion that is willing to risk the heresy of challenging conventional wisdom and to stimulate additional research.

We certainly agree with the authors and feel strongly that enhanced in-water evaluation of physical fitness is desirable to establish diver readiness. We would not, however, refer to this as a "medical examination" since it is likely that it will largely be dive professionals and not clinicians that conduct the evaluations.

References

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Neal W Pollock[1] and Peter Buzzacott[2]
[1] Divers Alert Network, Durham, N Carolina, USA
[2] Université de Bretagne Occidentale, Brest, France, and University of Western Australia, Perth, Australia

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Diving and hyperbaric medicine: an undergraduate's experience

As part of my undergraduate medical degree and as a keen scuba diver, I undertook my clinical elective at the Hyperbaric Medical Centre, Sharm el Sheikh, Egypt (Figure 1). The Centre first opened in 1993, and its hyperbaric chamber quickly became one of the busiest in the world. This was mainly owing to the popularity of Sharm with both scuba and free divers for the pristine reefs and rich underwater wildlife. The Centre offers consultations and diving medical examinations, as well as a 24 h emergency service. In recent years the number of divers has been affected, with diving eligibility examinations and injuries halved to around 1,200 each year, owing to the country's political climate.

During my elective, I learnt about diving physiology and hyperbaric chamber use, how to diagnose and treat common and severe diving injuries, and become proficient in diving medical eligibility assessment. Diving medicine and hyperbaric oxygen therapy are not covered in the core medical curriculum, despite doctors frequently certifying divers. Most days' work involved carrying out several diving medicals for instructors and training course candidates, or those who declared a pre-existing medical condition on their medical statement.[1] After observing the diving medical specialists, I was able to conduct my own consultations, which involved taking a focused history, a physical examination and, if necessary, cardiopulmonary exercise testing. The most useful skill I gained was confidence counselling divers on how to manage and prevent further injuries. Certain conditions (such as sinus congestion,