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LETTER TO THE EDITOR

In response to the comments by Fernandes et al.

Antonio Crisafulli

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To the Editor of the Journal of Physiological Sciences,

In the last issue (March 2013) of the Journal of Physiological Science Fernandes et al. [1] commented on our recent paper [2] published in the Journal of Physiological Sciences. We are glad that Fernandes and co-workers consider our paper as "an interesting study in the field of exercise physiology applied to swimming". However, they have also raised some concerns about our methodological approach. In detail:

1. Fernandes et al. claimed that we did not provide the values of dead space. This is incorrect, as we clearly indicated that "athletes breathed through a low volume (about 200 ml), corrugate flexible plastic tube…" (see page 3 of the manuscript). The only information missing was the diameter of the tube, which was 25 mm, a value that should not impose a high internal resistance.
2. They raised concerns about the fact that the gas analyser we used had only one breathing tube for inspiration and expiration, so that the possibility of mixing gases was not negligible. However, we validated the system by conducting incremental cycling tests with and without the adapted snorkel. The results, which are clearly described in the text, indicated that the system provided similar outcomes in terms of calculated oxygen uptake and carbon dioxide production, while pulmonary ventilation and heart rate was slightly increased at sub-maximal workloads with respect to free breathing ventilation. The gas analyzer employed assumes that the atmospheric inspired gas has a constant concentration in CO_2 (0.04 %). Thus, if gas mixing happened, then F_ACO_2 would have increased and, consequently, calculated VCO_2 values reported by the machine would have increased erratically. In other words, unpredictable increases in calculated VCO_2 values at rest and during exercise with, as compared to without, the snorkel may be a sign of gas mixing. Similarly, calculated oxygen uptake would have decreased since the F_AO_2 decreased. However, we did not observe such erratic increases in calculated VCO_2 and a decrease in calculated VO_2. Thus, gas mixing was unlikely.
3. Fernandes et al. declared that we did not report previous studies concerning specific snorkel and vale systems for swimming VO_2 assessment, specifically the AquaTrainer®. However, our investigation was not intended to be an exhaustive review. We inserted 34 references, which in our opinion should suffice in an original paper. This is why we did not cite all the scientific literature about swimming testing with all commercially available snorkel devices.
4. They are worried that 1 min increments did not suffice to allow adaptation in swimming. However, we chose this protocol since in the other three incremental testing procedures, steps of 1 min were employed. In fact, 1 min-steps (with total exercise lasting between 6 and 12 min) is what classically recommended to elicit VO_{2max}. Thus, our choice was intended to avoid large differences in exercise duration between testing procedures.
5. Fernandes et al. are also worried about the fact that "… as reported by Pinna et al. swimming requires less muscle mass than running and cycling". We are sorry that Fernandes et al. misunderstood our reasoning. In fact, we meant that although swimming is thought to require less muscle mass than running, in our

A. Crisafulli (✉)
Department of Medical Sciences, Sports Physiology Lab., University of Cagliari, Via Porcell 4, 09124 Cagliari, Italy
e-mail: crisafulli@tiscali.it

investigation we did not find any difference between these two kinds of exercise in terms of maximal oxygen uptake. In fact we wrote: "However, in the present study, this was not the case". Thus, we agree with Fernandes et al. that probably the statement that swimmers use less muscle mass when swimming than when running is misleading.

We hope that our responses may suit concerns raised by Fernandes and co-workers.

With my best regards
Antonio Crisafulli

References

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