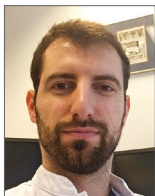


Reply: Pitfalls in aerobic capacity estimation of a chronic angina population



Carlo Zivelonghi, MD; Stefan Verheye*, MD, PhD

Antwerp Cardiovascular Center, Ziekenhuis Netwerk Antwerpen Middelheim, Antwerp, Belgium

We read with interest the letter by Georgios Tzanis et al¹ concerning our study “Coronary sinus Reducer implantation results in improved oxygen kinetics at cardiopulmonary exercise test in patients with refractory angina”².

In brief, in our manuscript we presented, for the first time, data regarding cardiopulmonary exercise testing before and after Reducer implantation. Improvements in oxygen kinetics were shown by increased VO_2 max (+11.3%, $p=0.026$), increased VO_2 at anaerobic threshold (+9.1%, $p=0.06$), and increased effort tolerance of approximately 34% (68 ± 28 W vs 81 ± 49 W, $p=0.05$). These observations were associated with consistent improvements in Canadian Cardiovascular Society class.

As the authors of the letter stated, our results are in line with previous evidence of reduction in myocardial ischaemia following Reducer implantation³, including an investigation by the same group who described improved parameters of cardiac magnetic resonance imaging. Of key importance, our study design and endpoints – including cardiopulmonary exercise test (CPET) parameters – were similar to a previous investigation by Adachi et al⁴ reporting comparable results after percutaneous coronary intervention in patients with stable angina (e.g., VO_2 max +14%). Furthermore, in the limitations paragraph of our manuscript we also stated that “relative new parameters of oxygen kinetics were not available in our analysis”, such as O_2 -pulse, O_2 -pulse flattening duration and $\Delta VO_2/\Delta W$ slope.

We firmly believe that our results demonstrated for the first time that clinical improvements in patients with refractory

angina treated with the Reducer can be translated into a better peak oxygen consumption. This parameter should be considered in studies investigating the possible reduction in myocardial ischaemia after Reducer implantation, unlike the studies cited by Tzanis et al.

While appreciating the dedication and interest of the authors in raising such considerations, we see little scientific value.

Conflict of interest statement

S. Verheye is a consultant for Neovasc Inc. C. Zivelonghi has no conflicts of interest to declare.

References

1. Tzanis G, Giannini F. Letter: Pitfalls in aerobic capacity estimation of a chronic angina population. *EuroIntervention*. 2021;16:1376-7.
2. Zivelonghi C, Konigstein M, Azzano A, Agostoni P, Topilski Y, Banai S, Verheye S. Coronary sinus Reducer implantation results in improved oxygen kinetics at cardiopulmonary exercise test in patients with refractory angina. *EuroIntervention*. 2020 Feb 25. [Epub ahead of print].
3. Banai S, Ben Muvhar S, Parikh KH, Medina A, Sievert H, Seth A, Tsehori J, Paz Y, Sheinfeld A, Keren G. Coronary sinus reducer stent for the treatment of chronic refractory angina pectoris: a prospective, open-label, multicenter, safety feasibility first-in-man study. *J Am Coll Cardiol*. 2007;49:1783-9.
4. Adachi H, Koike A, Niwa A, Sato A, Takamoto T, Marumo F, Hiroe M. Percutaneous transluminal coronary angioplasty improves oxygen uptake kinetics during the onset of exercise in patients with coronary artery disease. *Chest*. 2000;118:329-35.

*Corresponding author: Interventional Cardiology, Cardiovascular Center, ZNA Middelheim, Lindendreef 1, 2020 Antwerp, Belgium. E-mail: stefan.verheye@gmail.com