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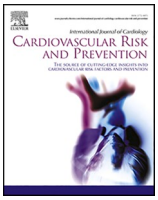

Exercise training for cardiovascular patients: Push me across the *threshold*!

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As a mystical formula of invocation or incantation, the "physical activity is a cornerstone of cardiovascular (CV) prevention" mantra (or an equivalent concept) is systematically recited by cardiologists and other clinicians when approaching patients at high risk for recurrent cardiovascular disease (CVD).

This is obviously derived from a large amount of evidence and solid recommendations focusing on the protective role of physical activity against CV morbidity, mortality, and disability, so even during routine consultations and patient contacts physicians and allied professionals are encouraged to promote exercise in all patients [1,2]. The delivery of lifestyle modification through physical activity prescription represents a quality indicator for CV prevention [3], and the management of exercise reflects an "entrustable professional activity" - requiring multiple competencies in an integrative holistic approach - for the sub-specialty of preventive cardiology [4]. Preventive actions reduce CV risk during the whole lifetime, even in the preconceptional and post-mortem phases, according to the widely used "from the cradle to the grave and beyond" motto [5] of CV prevention: in this perspective, with obvious limitations at the extremities of life's spectrum, physical activity plays a fundamental role. In healthy adults at least 150–300 min a week of moderate-intensity or 75–150 min a week of vigorous-intensity aerobic exercise are generally recommended [1], while CV patients (both "historical" and "new challenging" patient groups) receive standardized exercise protocols in the Cardiac Rehabilitation setting, sometimes of even greater volume [6].

These are the facts. But do cardiologists usually include physical training as an add-on intervention to patients with risk factors or established CVD? Probably yes. Do they prescribe exercise in a structured way (i.e. by adopting the frequency, intensity, time, type (FITT) model), aimed to a defined energy expenditure, and targeted to individualized goals? Maybe not, or not always [7].

A position statement from the Secondary Prevention and Rehabilitation Section of the European Association of Preventive Cardiology (EAPC) [8] has recently pointed out how to establish exercise intensity for patients with CVD. That is a crucial step, due to the importance to precisely defining the perimeter of "moderate" or "vigorous" efforts in primary/secondary prevention, and mostly to prescribe a desired training volume (i.e. the equation having intensity, session time, and number of sessions as factors) to CVD patients. Since intensity determination is key in each exercise training plan, there was a need to update current recommendations in view of internal inconsistencies discovered among currently applied objective techniques, the wider use of resistance/strength training (whose modality of intensity evaluation and prescription is different from aerobic training), and difficulties to build in progression in exercise intensities during the program.

Three main messages from the position statement deserve attention and further comments.

First, the reinforcement of cardiopulmonary exercise testing (CPET) as the gold standard to obtain parameters for aerobic training (both endurance continuous and interval training), through determination of the first (VT1) and second (VT2) ventilatory thresholds. *Pushing patients across the thresholds* could represent a nice reminder to modern prescribers of exercise training in CVD patients, in the sense that the determination of the isocapnic buffering phase (i.e. the period between VT1 and VT2) could precisely define a low-intense (at an heart rate or work rate below VT1), moderate-intense (between VT1 and VT2), and high-intense (above VT2) training zone. The reliable determination of these thresholds is given by the nadir of ventilatory equivalents (VE/VO2 and VE/VCO2) to work rate relationships and may be applied to the majority of CVD patients. This clear indication will help clinicians to implement tailored and individualized training programs (at least in healthy persons, this approach leads to a significantly lower risk of 'non-responding' to exercise intervention), but it largely depends on the availability of CPET at a local level, as far as on being patients fit enough to perform an incremental test, and finally on the possibility to evaluate both VT1 and VT2 (not always guaranteed in markedly deconditioned patients). To date, patients referred to structured Cardiac Rehabilitation programs are often fast-tracked after a major CV event, needing further clinical stabilization, or with incomplete revascularization, or planned to receive implantation of a cardiac device: these situations reflect the importance of the adequate timing of CPET testing in the pathway of CV patients, as far as the need of additional recommendations on how to train "no-CPET patients".

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The second message concerns resistance/strength exercises, that after initial hesitation from the medical community are now strongly recommended in addition to aerobic training for several CVDs [6]. Evidence is now emerging on the superiority of dynamic high-intense resistance training (D-HIST) as compared to low-intense resistance training (D-LIST) in maximizing muscle mass and strength gains, without impact on medical safety. Even though a modern clinical trial on exercise without inclusion of resistance/strength training in the CV setting would be inconceivable, in the real life we are probably far away from its systematic adoption. This is mainly due to difficulties in predisposing an adequate training volume based on specified number of sets, number of repetitions, and the weight lifted during the muscle contraction, in a defined circuit of enrolled muscles. The intensity of dynamic resistance/strength training is usually referred as percentage of one repetition maximum (1RM, i.e. the maximum weight a patient can lift in one complete repetition) and the best way to assess it is by use of a dynamometer. The technical requirement could discourage this modality of training, and consequently the position statement "opened" to easier subjective methods (such as the <10RM test) or equations to predict 1RM. This represents a pragmatic approach to "empower enough" exercise programs for the large majority of CVD patients and in different clinical settings.

Third, the determination of exercise intensity progression. This really constitutes a professional task because the prescription of exercise in CVD patients is not a "shoot and forget" act. It requires long-term adherence promotion (i.e. the "phase III" in the Cardiac Rehabilitation language), the up-titration of weekly energy expenditure to achieve CV protection, and shared-decision making. As a general advise supported by the position statement, the progression of exercise dose should ensure the maintenance of prescription goals, should be really individualized and include all the FITT components. Starting to increase exercise duration before to increase intensity might be a good move, taking care that when the global fitness of the patient changes during the exercise program, then the exercise intensity should be carefully re-assessed. This is often more complicated than the usual "treatment to target" approach very well known by preventive cardiologists – as for instance in the field of hypertension or hypercholesterolemia – but it would be very useful to improve CV prognosis.

Given that, rather than leading to a commonplace and impersonal advice to get some exercise, the "physical activity is a cornerstone of CV prevention mantra" should push cardiologists to professionally prescribe and monitor a structured exercise training program.

References

[1] F.L.J. Visseren, F. Mach, Y.M. Smulders, et al., ESC Guidelines on cardiovascular disease prevention in clinical practice, Eur. Heart J. 42 (34) (2021) 3227–3337, 2021.
[2] A. Pelliccia, S. Sharma, S. Gati, et al., ESC Guidelines on sports cardiology and exercise in patients with cardiovascular disease, Eur. Heart J. 42 (1) (2020) 17–96, 2021.
[3] S. Aktaa, B. Gencer, E. Arbelo, et al., European society of cardiology quality indicators for cardiovascular disease prevention: developed by the working group for cardiovascular disease prevention quality indicators in collaboration with the European association for preventive cardiology of the European society of cardiology, Eur. J. Prev. Cardiol. (2021), https://doi.org/10.1093/eurjpc/zwab160. Oct 23; zwab160 (Online ahead of print).
[4] M. Wilhelm, A. Abreu, P.E. Adami, et al., EAPC core curriculum for preventive cardiology, Eur. J. Prev. Cardiol. 29 (1) (2022) 251–274.
[5] P. Dendale, M. Scherrenberg, O. Sivakova, I. Frederix, Prevention: from the cradle to the grave and beyond, Eur. J. Prev. Cardiol. 26 (5) (2019) 507–511.
[6] M. Ambrosetti, A. Abreu, U. Corrà, et al., Secondary prevention through comprehensive cardiovascular rehabilitation: from knowledge to implementation. 2020 update. A position paper from the Secondary Prevention and Rehabilitation Section of the European Association of Preventive Cardiology, Eur. J. Prev. Cardiol. (2020), https://doi.org/10.1177/2047487320913379. Apr 7:2047487320913379 (Online ahead of print).
[7] D. Hansen, G. Rovelo Ruiz, P. Doherty, et al., Do clinicians prescribe exercise similarly in patients with different cardiovascular diseases? Findings from the EAPC EXPERT working group survey, Eur. J. Prev. Cardiol. 25 (7) (2018) 682–691.
[8] D. Hansen, A. Abreu, M. Ambrosetti, et al., Exercise intensity assessment and prescription in cardiovascular rehabilitation and beyond: why and how: a position statement from the Secondary Prevention and Rehabilitation Section of the European Association of Preventive Cardiology, Eur. J. Prev. Cardiol. 29 (1) (2022) 230–245.

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