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EDITORIAL

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EXERCISE PRESCRIPTION IN PATIENTS WITH CHRONIC DISEASES

According to the World Health Organization (WHO, 2014), chronic diseases (CDs), sometimes referred to as noncommunicable diseases, are medical conditions which last for long periods of time and generally progress slowly. CDs are the major challenge to global health as they have a devastating social, economic and public health impact, being by far the leading cause of deaths worldwide (more than 41 million people died from these diseases in 2016) and the main responsible for poor health, disability and health-care costs (Bauer, Briss, Goodman, & Bowman, 2014; Booth, Roberts, & Laye, 2012; WHO, 2014, 2018). Cardiovascular diseases (i.e. heart attacks and stroke), cancer, chronic respiratory diseases (i.e. chronic obstructed pulmonary disease and asthma) and diabetes are the major types of CDs, as they are responsible for about 80% of CD deaths (WHO, 2014, 2018).

Although the CD burden is the result of a combination of genetic, physiological, environmental and behaviours factors (as tobacco use, poor diet and the harmful use of alcohol) (Bauer et al., 2014; WHO, 2014), physical inactivity, itself, plays a decisive role in the development of CDs and in the reduction in both, the total years of life and the quality of these years (Booth et al., 2012; Booth, Roberts, Thyfault, Ruegsegger, & Toedebusch, 2017; Warburton, Nicol, & Bredin, 2006; WHO, 2014). In this sense, physical inactivity has become an important health, economic and social problem in the Western countries due to the decrease in physical activity levels and the increase of time spent in sedentary activities (Bull, Goenka, Lambert, & Pratt, 2017).

There is strong evidence showing the effectiveness of regular physical activity and exercise in the primary and secondary prevention of several CDs (cardiovascular diseases, diabetes, obesity, cancer, etc.) and premature death (Bull et al., 2017; Durstine, Gordon, Wang, & Luo, 2013; Sallis, Franklin, Joy, Ross, Sabgir, & Stone, 2015; Warburton et al., 2006). Based on this conclusive evidence, a number of health organizations have developed physical activity recommendations for CD prevention and management (Haskell et al., 2007; Piercy et al., 2018). Moreover, physical exercise is considered as a cornerstone of non-pharmacological treatments for patients with CDs (Kujala, 2006; Durstine et al., 2013; Sallis et al., 2015). Although there are potential risks associated with physical exercise, these can be minimized with proper exercise programs and they are clearly outweighed by the benefits (Sallis et al., 2015).

Considering the great potential of physical exercise to address the CD burden, the *European Journal of Human Movement* presents here a special issue on exercise prescription in patients with CDs. This special issue is based on a collection of 10 invited papers, i.e., two *viewpoint* and eight *narrative review* articles, which provide an overview of the role of physical exercise in several chronic conditions and syndromes that affect most physiological organ systems. The authors were invited to review the literature, including their own work in this field, to describe the physical exercise benefits on quality of life and health for people with CDs, to discuss about which training characteristics are more suitable to maximize benefits and reduce risks, and to establish some guidelines for prescribing physical exercise in these populations.

The first two papers are *viewpoints* focused on the effect of physical activity and exercise on two of the most relevant clinical syndromes, i.e., metabolic and frailty syndromes, which are associated with many chronic conditions. The first paper by *Ortega, Artero, Jimenez-Pavon and Ruiz* provides an overview of the current evidence supporting the positive influence of practicing physical activity regularly and improving physical fitness, mainly cardiorespiratory fitness and muscular strength, on metabolic and overall health. In the second paper, *Izquierdo* presents physical exercise as a therapeutic agent to improve intrinsic capacity in older adults, highlighting multi-component physical exercise programs and, in particular, strength training as the most effective interventions to delay disability and other adverse events in this population.

The following eight papers are *narrative reviews* about the role of physical exercise on cancer, cardiovascular diseases, chronic obstructive pulmonary disease, severe obesity, multiple sclerosis, Parkinson's disease, post-transplant quality of life and dementia. In the third paper of this special issue, *Casla-Barrio and Alfaro* show the relevance of exercise-oncology programs in cancer patients, providing strategies on how to prescribe physical exercise in this population (e.g. exercise individualization, types of exercise, training intensity and volume, etc.). The fourth paper, by *Sarabia, Manresa-Rocamora, Oliveira and Moya-Ramón*, analyses the effects of endurance training, resistance training and combined endurance and resistance training (i.e. concurrent training) on cardiac patients, highlighting the lack of control of exercise training characteristics (frequency, intensity, time and type) in the current exercise-based cardiac rehabilitation. In the fifth paper, *Alcazar, Rodriguez-Lopez, Alfaro-Acha, Alegre and Ara* explore the effects of physical exercise on limb muscle dysfunction, exercise tolerance and health-related quality of life in patients with chronic obstructive pulmonary disease, presenting the concurrent training as the most beneficial exercise intervention in these patients. In the sixth paper, *Moya-Ramón, Picó-Sirvent and Aracil-Marco* present a review of the effects of exercise programs on severe obesity before and after bariatric surgery,

showing that despite the heterogeneity of the analysed programs, moderate-to-vigorous aerobic training and strength training may help to avoid the loss of fat-free mass associated to surgery and the high dietetic restrictions normally prescribed to these patients. The seventh paper, by *Barbado, Gómez-Illán, Moreno-Navarro, Mendoza, Reina Vaillo and Sempere*, analyses the physical exercise capacity to modulate the immune system behaviour regulating the pro- and anti-inflammatory cytokine balance and to promote neuroprotective and neurorestorative mechanisms through the brain-derived neurotrophic factor stimulation in multiple sclerosis. The eighth paper, by *Fernández-del-Olmo, Sanchez-Molina, Morenilla, Gómez-Varela, Fernández-Lago, Bello and Santos-García*, presents a review of promising results suggesting the use of aerobic and resistance exercises for motor improvements in Parkinson's disease patients, although the mechanisms underlying these improvements are still unknown and require further research. The ninth paper, by *Hernández-Sánchez*, shows the health benefits of exercise programs in kidney, heart, lung and liver transplant recipients, especially the increase in cardiorespiratory fitness, muscle strength and quality of life. Finally, the tenth paper, by *Tortosa-Martínez, Caus, Martínez-Canales and García-Jaén*, summarizes the increasing evidence showing benefits of physical exercise for people with mild cognitive impairment and dementia and establishes some preliminary guidelines for prescribing exercise efficiently and safely in this population.

Overall, the papers compiled here provide a robust body of evidence supporting the health benefits of physical exercise in people with different chronic conditions and syndromes. In order to maximize benefits and reduce risks associated to physical exercise in these populations, most papers emphasize that exercise programs should be designed and supervised by a multidisciplinary group in which exercise science professionals or exercise physiologists (i.e. exercise specialists with a degree in Sport/Exercise Science) have a key role. Despite the accumulating evidence on the benefits of exercise as therapeutic agent in CDs, the papers compiled in this special issue have found some inconsistencies and controversies in the literature which must challenge and inspire researchers to develop further research. The main challenges could be to understand the mechanisms underlying these exercise effects better and to improve the dose-response characterization of exercise programs in patients with CDs.

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REFERENCES

Bauer, U. E., Briss, P. A., Goodman, R.A., & Bowman, B. A. (2014). Prevention of chronic disease in the 21st century: elimination of the leading preventable causes of premature death and disability in the USA. *The Lancet, 384*(9937), 45-52. doi: 10.1016/S0140-6736(14)60648-6.

Booth, F. W., Roberts, C. K., & Laye, M. J. (2012). Lack of exercise is a major cause of chronic diseases. *Comprehensive Physiology, 2*(2), 1143-1211. doi: 10.1002/cphy.c110025.

Booth, F. W., Roberts, C. K., Thyfault, J. P., Ruegsegger, G. N., & Toedebusch, R. G. (2017). Role of inactivity in chronic diseases: evolutionary insight and pathophysiological mechanisms. *Physiological Reviews, 97*(4), 1351-1402. doi: 10.1152/physrev.00019.2016.

Bull, F., Goenka, S., Lambert, V., & Pratt, M. (2017). Physical activity for the prevention of cardiometabolic disease. In Prabhakaran D, Anand S, Gaziano TA, Mbanya JC, Wu Y, Nugent R, editors. *Cardiovascular, Respiratory, and Related Disorders* (third edition). Washington (DC): The International Bank for Reconstruction and Development / The World Bank. Chapter 5.

Durstine, J. L., Gordon, B., Wang, Z., & Luo, X. (2013). Chronic disease and the link to physical activity. *Journal of Sport and Health Science, 2*(1), 3-11. http://dx.doi.org/10.1016/j.jshs.2012.07.009.

Haskell, W. L., Lee, I. M., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A., . . . & Bauman, A. (2007). Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Medicine and Science in Sports and Exercise, 39*, 1423-1434.

Kujala, U. M. (2006). Benefits of exercise therapy for chronic diseases. *British Journal of Sports Medicine, 40*(1), 3-4.

Piercy, K. L., Troiano, R. P., Ballard, R. M., Carlson, S. A., Fulton, J. E., Galuska, D. A., & Olson, R. D. (2018). The physical activity guidelines for Americans. *Jama, 320*(19), 2020-2028.

Sallis, R., Franklin, B., Joy, L., Ross, R., Sabgir, D., & Stone, J. (2015). Strategies for promoting physical activity in clinical practice. *Progress in Cardiovascular Diseases, 57*(4), 375-386. doi: 10.1016/j.pcad.2014.10.003.

Warburton, D. E., Nicol, C. W., & Bredin, S. S. (2006). Health benefits of physical activity: the evidence. *Canadian Medical Association Journal, 174*(6), 801-809.

World Health Organization. (2014). *Global status report on noncommunicable diseases 2014.* "*Attaining the nine global noncommunicable diseases targets; a shared responsibility*". WHO Library Cataloguing-in-Publication Data. Switzerland.

World Health Organization. (2018). *World health statistics 2018: monitoring health for the SDGs, sustainable development goals.* Geneva: World Health Organization.