Universität Basel

Research Project

Functional Aging in Health and Disease - the COmPLETE Project

Third-party funded project

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Principal Investigator(s) Schmidt-Trucksäss, Arno ;
Organisation / Research unit
Departement Sport, Bewegung und Gesundheit / Sportmedizin (Schmidt-Trucksäss)
Department
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The increasing prevalence of chronic non-communicable diseases and associated risk factors contribute to earlier disability and frailty onset over the course of life in industrialized western countries. This process applies also to diseases of the cardiovascular system, including heart failure, which is a widespread syndrome in middle-aged and older people. Although life expectancy has steadily increased in past decades, the traditional curative way of thinking in medicine is unlikely to compress the disease phase to the final stage of life and thus increase the health span, which is defined as a period of relatively disease-free aging followed by a period of age-related diseases and disabilities. In the period of healthy aging, the function of the organs, including the cardiovascular system, is already deteriorating. To counteract this process and to increase the health span, the preservation or improvement of components of physical fitness (endurance capacity, muscle strength, and neuromuscular function) is thought to be an essential element. The proven, independently predictive value of the single physical fitness components for total and cardiovascular mortality confirms this assumption. However, comprehensive data regarding individual physical fitness characteristics over the course of life are not yet available. Such data is necessary for any targeted prevention program with physical activity and exercise training as crucial pillars. Furthermore, healthy reference values could be used to estimate the adaptive capacity in healthy individuals compared to patients. Therefore, the aims of the COmPLETE project are:1.To determine the trajectories of physical fitness components of healthy aging by measurement of endurance capacity, muscular strength and neuromuscular coordination in a healthy population sample between 20 and 100 years (COmPLETE-Health) and 2.To determine the health distance between healthy individuals (COmPLETE-Health) and heart failure patients (COmPLETE-Heart) on the basis of different physical fitness components (endurance capacity, muscular strength and neuromuscular coordination). After an extensive preparatory phase and obtaining approval from the Ethics Committee North-West Switzerland (EKNZ), we have started the recruitment and investigation. Ninety-nine (as of March 22, 2018) out of 490 planned participants of COmPLETE-Health have already been examined. The aim is to cover every decade up to 100 years of age, with 70 participants per age category (20-30, 30-40, 40-50, 50-60, 60-70, 70-80, and 80+ years of age), 50% women and 50% from the rural area of Basel region. Eighty well-characterized patients with heart failure (COmPLETE-Heart) will be examined as an example of chronic condition. The following core examinations will be carried out to characterize the components of physical fitness: cardio-pulmonary exercise test (maximal and submaximal aerobic capacity), leg and grip strength (isometric muscular strength and peak power), balance and coordination (balance plate and gait analysis). To accurately characterize cardiovascular health and to exclude vascular abnormalities, which potentially reduces physical fitness, additional non-invasive measurements of established cardiovascular parameters will be performed. This encompasses measurements such as echocardiography (in participants over 50 years), exercise ECG, pulse wave velocity, brachial artery flow-mediated dilation,

and retinal vessel analysis. Several questionnaires, blood analyses, and body composition analyses will supplement the characterization of the participants of both cohorts. We anticipate that, for the first time, a basis for targeted prevention programs will be created through better and comprehensive knowledge of the individual physical fitness to improve the health span. In addition, we are convinced that by calculating the health distance between healthy and heart failure patients, we are laying the foundation for more individual exercise therapy. The COmPLETE project could be the starting point for strengthening the in-depth diagnostics of physical fitness as a component of preventative health care.

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