Measurable Gains from an Increase in the Physical Activity Level, and the Impact on Life Expectancy

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INTRODUCTION

Obesity and other conditions at least partly attributable to physical inactivity are increasing in prevalence worldwide[1-4]. Several studies have shown that low levels of physical fitness result in premature death[5,6]. However, increases in life expectancy have been documented from 1.0-3.3 years when moving from low to moderate activity levels, and another 1.8-2.3 years when progressing to a high activity level[7-11]. Moreover, improving physical activity levels can reduce the number of years living with disabling health conditions such as coronary artery disease, cardiovascular disorders, chronic obstructive pulmonary disease, diabetes and arthritis[11-14].

Reviews and guidelines have been published by various countries, researchers and specialist associations[15-17] to explain the effects of low activity levels and to encourage lifestyle improvements, but massive population compliance remains elusive[5]. Devices capable of demonstrating the short-term gains in physical activity augmentation may improve participation. The goal of this study was to document the measurable short-term effects of a fitness program that could ultimately be used to encourage large population groups in a more active lifestyle.

METHODS

Web-based software (FitPrint, Biotonix, Canada) was developed to determine the physiological age of a subject's body based on the performance of normalized tests per the Canadian Society for Exercise Physiology (CSET) and the American College of Sports Medicine (ACSM) guidelines. These tests include a lifestyle questionnaire, skin folds measurements, VO2 max, grip strength, trunk forward flexion, vertical jump, push-ups, partial curl-ups and back extension. By comparing the performance to published data, the software computed a subject's physiological age. This figure can be compared to the subject's biological age to determine the weak areas and offer a personalized fitness program. The application was integrated gradually in a fitness center chain with 66 outlets starting in July 2006 and test results were recorded in a database.

The database was queried retrospectively in July 2010 for subjects having repeated the evaluation a second time, with the assumption that an exercise program had been undertaken in the interim. The physiological age from the two evaluations was compared with a 2-tailed paired student T test to verify statistical significance.

RESULTS

From a total 67,186 subjects, 14,182 (21%) were identified as having a second evaluation. The subjects were 34% male and 66% female with a mean age of 39 ± 13 years. A statistically significant reduction ($p<0.0001$) in physiological age was observed with an average 5.2 ± 6.5 years (as illustrated by subject's biological age category in Figure 1).

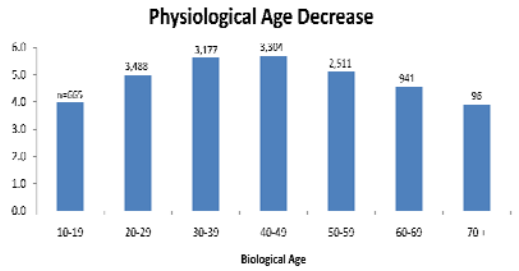

Figure 1: Physiological age decrease at re-evaluation

DISCUSSION

Current health related expenses are on the rise and repercussions can be felt on society as a whole[18]. Scientific evidence clearly demonstrates that a person's life expectancy with and without disabling illness is related to his physical activity level throughout his life. The physical gains measured with the software application are consistent with an efficient training program and can be assimilated to an augmentation to at least a moderate activity level, which corresponds approximately to a 2 year increase in life expectancy.

The main weakness of this study is that it is retrospective and no controls were placed on the participants to ensure compliance with the prescribed exercise program. However, such lack of compliance implies that the measured values are conservative. Moreover, this represents the actual implementation context of any health measure targeting a large public.

Improvement in access to such health awareness raising software would likely result in more widespread gains. Thus, life expectancy increases would warrant the implementation of self test application with personalized fitness programs based on published norms[19], with appreciable economies of scale for the health system and all related industries such as insurance companies and firms with large work forces.

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