VLDL molecules carry blood lipids and their high concentrations have been found to relate to diabetes, cardiovascular disease and early deaths (Festa ey al. Garvey et al. 2003, Goff et al. 2005, Mora et al. 2010). High VLDL markers increase the diabetes risk by 400 % (Mora tm. 2010) and with GlycA mortality risk twofold Fischer et al. 2014).

Effects of exercise interventions on biomarkers have been observed to reduce concentrations of circulating VLDL molecules in healthy men and women (Kraus et al. 2002, Brown et al.2009) and in women suffering from polycystic ovarian disease (Halverstad et al. 2007). In corollary to this persistently physically active individuals had lower levels of VLDL molecules and GlycA than sedentary individuals (Kujala et al. 2013). Since high levels of GlycA and VLDLs present significant risks for diabetes, cardiovascular diseases, inflammation, dementia and cancer and predict early deaths and since regular exercises and physical activities reduce circulating levels of GlycA and VLDLs it is possible to tailor interventions for reducing the levels of these biomarkers.

The results of scientific studies demonstrate that increased physical activity is effective in preventing risk factors of diabetes, cardiovascular diseases, inflammations, dementia, cancers and early death in healthy and sedentary subjects. However, in none of these above-cited or other previous studies the exact amounts and intensities of physical activity preventing diabetes, cardiovascular diseases, inflammations, cancer or premature mortality have been described.

Summary of the intervention

According to a first aspect of the present invention, there is provided a method for defining and presenting threshold levels of physical activity to reduce GlycA and VLDLs of blood of persons having sedentary lifestyle, the method included: a step, in which by a transducer unit carried by a person accelerations of the body of the person induced by physical activity are registered; a step in which occurrence numbers of registered acceleration maxima within a certain time period are classified and stored according to the maxima magnitude to one of four acceleration classes by the transducer unit; a step in which the numbers of acceleration maxima of the person in each acceleration class are compared to the reference data measured from exercising persons' numbers of acceleration maxima in each acceleration classes by the transducer unit; and a step in which by using the number of acceleration maxima in the acceleration classes it is identified into which physical activity class the person can be classified by the transducer unit, characterized in that the method further includes: a step in which it is identified and presented by the transducer unit that the amount of the physical

activity performed is classified to a physical activity class that is beneficial for prevention of diabetes, cardiovascular diseases, inflammations, dementia, cancers and early deaths of persons having sedentary lifestyle; or a recommendation of additional physical activity is given.

According to a second aspect of the present invention, there is provided a transducer unit including: a uni- or polyaxial accelerometer that continuously register accelerations maxima induced by a physical activity of a person; a memory for storing the acceleration maxima; a processing unit configured to classify the acceleration maxima into acceleration classes between 0.3 g and 10 g, characterized in that it is further configured to: compare the classified acceleration maxima counts of the person with a threshold of 2980 daily steps in the acceleration classes 1.3–1.7 g, the exceeding of which have an effect for prevention of diabetes, cardiovascular diseases, inflammations, dementia, cancers and early deaths of persons having sedentary lifestyle; and inform the person under examination if his or hers physical activity is preventing diabetes, cardiovascular diseases, inflammations, dementia, cancers and early deaths.

According to a third aspect of the present invention, there is provided a computer program product, characterized in that it includes computer code means saved on a computer readable media, which computer code means are configured to execute the above method steps by executing said computer program in a processor unit.

Purpose of the intervention

High occurrence of chronic diseases and early deaths in the sedentary populations are major health problems and associate with high levels of GlycA and VLDLs. Regular physical activities are known to reduce high GlycA and VLDLs, but presently no physical activity guidelines are available to reduce these risk factors. It is our purpose to offer exact information about amounts and intensities of physical activity reducing blood GlyA and VLDLs and risks of diabetes, cardiovascular diseases inflammations, dementia, cancers and premature deaths. In order to achieve our purpose we registered physical activities and measured blood biomarkers in sedentary and active subjects and determined amounts and intensities of physical activities reducing GlycA and VLDLs concentrations. Our invention determines for the first time in sedentary subjects the thresholds of the amount and intensity of the physical