

Physical Activity And Public Health

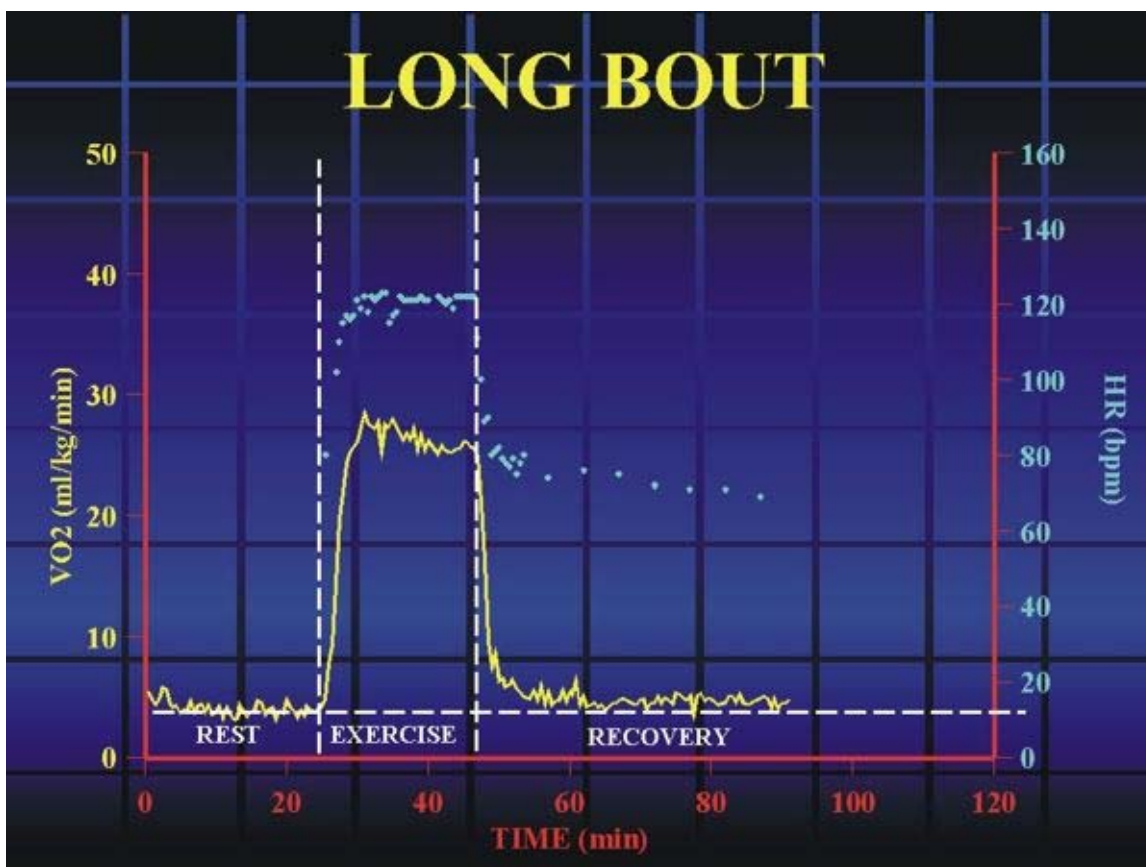
The National Center for Injury Prevention and Control at the Centers for Disease Control and Prevention in Atlanta recently made quantitative estimates indicating that sedentary living is responsible for about one-third of deaths due to coronary heart disease, colon cancer, and diabetes - three diseases for which obesity and physical inactivity are established causal factors. Statistics reveal that 74 percent of all Americans over the age of 25 years are considered overweight; this number is up from 59 percent in 1986. However, it is a fact in the United States that 80 percent of Americans do not adhere to a regular program of exercise and in general remain essentially sedentary.

In an attempt to combat the alarming trend in declining fitness levels of the American population, a group of experts was brought together in 1995 by the Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) to review the pertinent scientific research and to develop a clear, concise "public health message" regarding physical activity. The panel concluded that every US adult should accumulate a daily caloric expenditure due to exercise of between 120 and 210 Calories, and that the activity does not need to be continuous. In fact, it was stated "accumulation of physical activity in intermittent, short bouts is considered an appropriate approach to achieving the activity goal". This recommendation was based on the mounting evidence indicating that the health benefits of physical activity are linked to the total amount of physical activity performed, suggesting that the amount of activity is more important than the specific manner in which the activity is performed (i.e., mode, intensity, or duration of the activity bouts). This approach to exercise has also been previously recommended by the Institute for Aerobics Research in Dallas, Texas, that recommended the type, frequency, intensity, and duration of exercise training be modulated to achieve a weekly energy expenditure comparable to the above guidelines. It was also stated by the expert panel that health organizations and educational institutions must implement effective strategies that promote the adoption of physically active lifestyles.

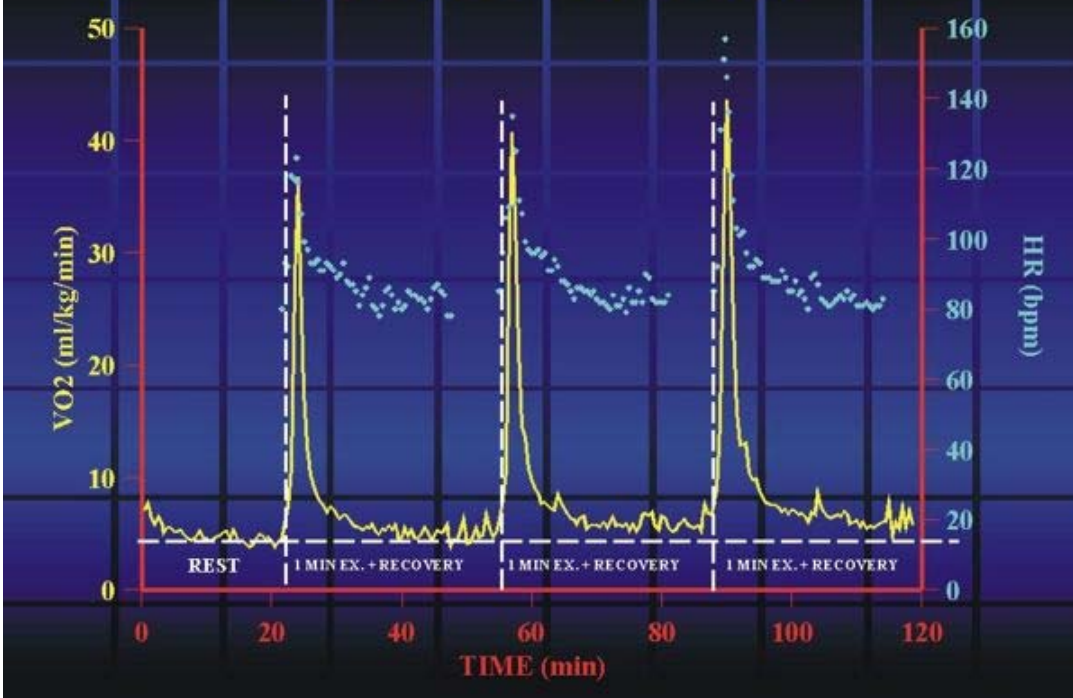
After exercise is terminated, oxygen consumption (calories) decreases with time and reaches resting levels. The elevated oxygen consumption following exercise is termed EPOC (Excess Post-exercise Oxygen Consumption). EPOC is influenced more by intensity than duration and consequently one minute of high intensity exercise can produce an equal or greater EPOC than twenty minutes of low-moderate intensity exercise (see scientific support references below). By completing multiple minutes separated by rest from exercise, one is able to benefit from this elevated metabolism more than once. When comparing the one-minute bout of intense exercise with twenty minutes of moderate intensity exercise, it was discovered that only four one-minute bouts of intense exercise would be required to exceed the total oxygen consumption of a twenty-minute bout of moderate (60% max HR) intensity exercise. The research data showed that the one-minute bouts of intense stepping on the X-iser Machine™ used an average of 46.7 Cals/min compared to only 9.3 Cals/min for a twenty-minute bout of typical aerobic exercise. Graphs summarizing the data are shown below.

RESEARCH PILOT DATA

In the first two graphs below, the rate of oxygen consumption is represented by the solid line. To obtain the total amount of oxygen consumed due to exercise one has to calculate the area under the line. The 20-minute bout with recovery used 38.8 liters of oxygen (186.2 Calories). Each 1-minute bout plus recovery was calculated as a percentage of the 20 minute oxygen consumption. Each 1-minute bout with recovery had higher oxygen consumption than the preceding bout, such that four bouts would have burned more calories than 20 minutes of typical aerobic exercise (60% max HR). The actual caloric expenditure and the relative percentage of each one minute bout of exercise is shown in the third graph.

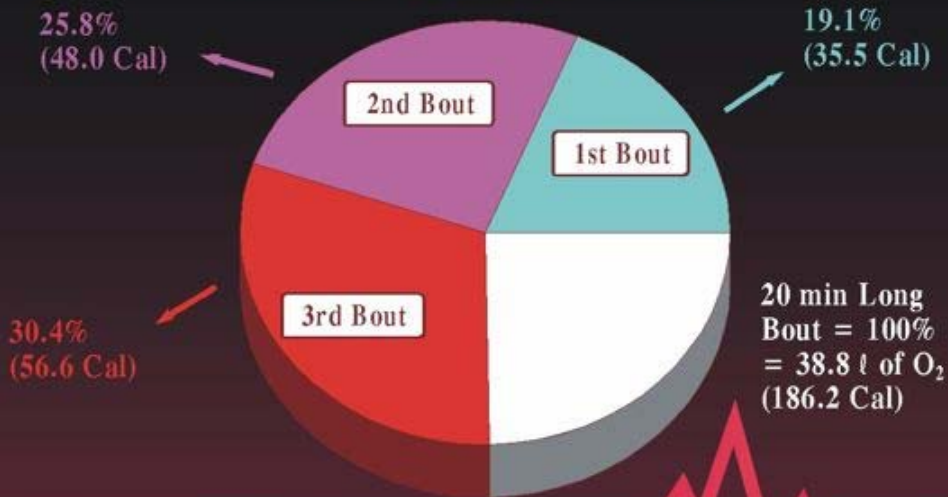


SHORT BOUTS



Metabolic Consequences

Short Bout v Long Bout



Scientific Support for the Short Blast Exercise Program™

- A five-minute per day fitness program has demonstrated both physical and psychological improvements (1).
- High intensity exercise, either intermittent or continuous, increases recovery oxygen consumption (burns more calories) more than prolonged low intensity exercise (2-5).
- Sixty seconds is an optimal time to exercise at high intensity in order to maximize the post-exercise oxygen consumption (6).
- In comparison to low-moderate intensity exercise, high-intensity intermittent-training causes metabolic adaptations in skeletal muscle that favors lipid oxidation (burning fat) (7).
- Muscle triglyceride lipolysis (using intramuscular fat) is stimulated only at higher exercise intensities (8).
- A minimally intense bout of exercise is needed to improve the Thermic Effect of Food (elevates the bodies metabolism with the intake of food) (9).
- Both type I and type II muscle fibers contribute significantly to high intensity exercise, whereas low-moderate intensity exercise utilizes primarily only type I fibers (10).
- The loss of muscle mass, and hence muscle strength, associated with aging is in part due to a decrease in the size of the muscle cells, with the Type II fibers showing a preferential atrophy (11).
- Beta-endorphin levels associated with positive changes in mood state are increased in short term high intensity exercise (12).
- Human growth hormone (somatotropin), an activator of lipolysis and muscle growth, is stimulated by the exercise intensity threshold (hence maintenance of muscle mass and strength with aging) (13).
- Plasma glutamine an essential amino acid for the normal functioning of the immune system, is decreased after long-duration exercise and increased after short-term, high intensity exercise (14).
- Short-bouts of exercise may enhance exercise adherence, enhance weight loss, and produce similar changes in cardiorespiratory fitness when compared to long-bouts of exercise (15).
- Increases in high-density lipoprotein cholesterol levels have been demonstrated with intermittent exercise as compared to continuous exercise (16).
- Compared to exercise duration, exercise intensity had a 13.3 times greater effect on systolic blood pressure, a 2.8 times greater effect on diastolic blood pressure, and a 4.7 times greater effect on waist circumference in men (17).
- Total energy expenditure and energy expenditure from vigorous activities, but not energy expenditure from nonvigorous activities, related inversely to mortality (18).
- Moderate-intensity aerobic training that improves the maximal aerobic power does not change anaerobic capacity, whereas high-intensity intermittent training may improve both anaerobic and aerobic energy supplying systems significantly, probably through imposing intensive stimuli on both systems(19).

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