Concept of MET

One metabolic equivalent (MET) is defined as the amount of oxygen consumed while sitting at rest and is equal to 3.5 ml O2 per kg body weight x min.

The MET concept represents a simple, practical, and easily understood procedure for expressing the energy cost of physical activities as a multiple of the resting metabolic rate.

The energy cost of an activity can be determined by dividing the relative oxygen cost of the activity (ml O2/kg/min) x by 3.5.

Physical activity classification according to energy expenditure

Criterion measure for physical activity intensities is classified according to current recommendations for exercise prescriptions by the *American College of Sports Medicine* as percentage of maximal oxygen uptake (light, <46%; moderate, 46–63%; vigorous, ≥64%).

According to METs, the intersities is classified as

- Light activity: <3 METs
- Moderate activity= 3.0 to 6.0 METs (3.5 to 7 kcal/min)
- Vigorous activity =Greater than 6.0 METs (more than 7 kcal/min)

Factors affecting energy expenditure

1. Physical activity
2. Diet induced thermogenesis
3. Climate
4. Pregnancy

Physical activity

Physical activity is defined as any bodily movement produced by skeletal muscles that results in energy expenditure. Physical activity accounts for 15-30% of total energy expenditure.

Energy expenditure of activity (EEA) is the amount of energy needed to fuel body movement as it occurs in activities of daily living, including exercise. Muscle tissue consumes approximately 20% of this energy at rest, but during vigorous exercise, the rate of energy consumption by muscle tissue may go up 50 times or more. Physical activity can have a dramatic impact on a person's daily energy expenditure. During heavy physical exertion (vigorous activity), the muscles may burn as many as 1200 Cal per hour in a very fit individual. An unfit person may only be able to expend 200 Cal per hour. Involuntary movements such as fidgeting and posture control (called NEAT: non-exercise activity of thermogenesis) also contribute to EEA. Exercise is an extremely important variable in the daily energy expenditure equation and the maintenance of energy balance. Not only is exercise the most changeable component during a 24-hour period, but it is also the one component that is completely under voluntary control (for most people).

Dietary Induced Thermogenesis (Thermic effect of food (TEF))

Diet-induced thermogenesis (DIT) refers to the increase in metabolic rate that follows the ingestion of food, as well as changes associated with chronic alterations in the overall level of energy intake

Consuming food increases energy metabolism from the energy-requiring processes of digesting, absorbing, and assimilating nutrients. Dietary-induced thermogenesis (DIT; also termed thermic effect of food (TEF) typically reaches maximum 1 hour after feeding, depending on food quantity and types of food consumed. The magni- tude of DIT ranges between 10% and 35% of the ingested food energy. A meal of pure protein, for example, produces a thermic effect often equaling 25% of the meal's total energy content.

Advertisements routinely tout the high thermic effect of protein consumption to promote a high-protein diet for weight loss. Advocates maintain that fewer calories ulti- mately become available to the body compared with a lipid- or carbohydrates.

Climate

Environmental factors influence the resting metabolic rate The resting metabolism of people living in tropical cli- mates, for example, averages 5% to 20% higher than coun- terparts in more temperate regions. Exercise performed in hot weather also imposes a small 5% elevation in metabolic load that translates to correspondingly higher oxygen uptake compared with the same work performed in a ther- moneutral environment. Three factors directly produce an increased thermogenic effect:

1. Elevated core temperature

2. Additional energy required for sweat-gland activity

3. Altered circulatory dynamics

Cold environments also increase energy metabolism depending on the body's fat content and thermal quality of clothing. During extreme cold stress, resting metabolism can triple because shivering generates heat to maintain a stable core temperature referred to as shivering thermogenesis. The effects of cold stress during exercise become most evident in cold water from extreme difficulty maintaining a stable core temperature in such a hos tile environment.

Pregnancy

Maternal cardiovascular dynamics follow normal response patterns, Moderate exercise presents no greater physiologic stress to the mother than that imposed by the additional weight gain and possible encumbrance of fetal tissue. Pregnancy does not compromise the absolute value for aerobic capacity (L min). As pregnancy progresses, increases in mater- nal body weight add to the exercise effort during weight-bearing activities such as walking, jogging, and stair climbing and may reduce the economy of movement Pregnancy, particularly in the later stages, increases pulmonary ventilation at a given submaximal exercise intensity. The hormone progesterone increases the sensitiv- ity of the respiratory center to carbon dioxide and directly stimulates maternal hyperventilation.

References

Jetté, M., Sidney, K., & Blümchen, G. (1990). Metabolic equivalents (METS) in exercise testing, exercise prescription, and evaluation of functional capacity. *Clinical cardiology*, *13*(8), 555–565. https://doi.org/10.1002/clc.4960130809

Mendes, M. A., da Silva, I., Ramires, V., Reichert, F., Martins, R., Ferreira, R., & Tomasi, E. (2018). Metabolic equivalent of task (METs) thresholds as an indicator of physical activity intensity. *PloS one*, *13*(7), e0200701. https://doi.org/10.1371/journal.pone.0200701

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