Our energy requirements

As human beings, we depend on energy in many ways.

A ....

This comprises a series of functions that are essential for life, such as cell function and replacement; the synthesis, secretion and metabolism of enzymes and hormones to transport proteins and other substances and molecules; the maintenance of body temperature; the uninterrupted work of cardiac and respiratory muscles; and brain function. The amount of energy used for basal metabolism in a period of time is called the *basal metabolic rate* (BMR), and is measured under standard conditions that include being awake in the supine position after ten to 12 hours of fasting and eight hours of physical rest, and being in a state of mental relaxation in an ambient environmental temperature that does not cause heat-generating or heat-dissipating processes. BMR represents 45 to 70 per cent of daily total energy expenditure and is determined mainly by the individual's age, gender, body size, body composition and lifestyle.

B ....

Eating requires energy for the ingestion and digestion of what we put in our mouths, and for the absorption, transport, interconversion, oxidation and deposition of nutrients. These metabolic processes increase heat production and oxygen consumption, and are known by terms such as *dietary-induced thermogenesis*, *specific dynamic action of food* and *thermic effect of feeding*. The metabolic response to nutrition increases total energy expenditure by about 10 per cent of the BMR over a 24-hour period in individuals eating a mixed diet.

C ....

This is the most variable and, after BMR, the second largest component of daily energy expenditure. Humans perform *obligatory* and *discretionary* physical activities. Obligatory activities can seldom be avoided within a given setting, and they are imposed on the individual by economic, cultural or societal demands. The term "obligatory" is more comprehensive than the term "occupational" that was used in the 1985 report (WHO, 1985) because, in addition to occupational work, obligatory activities include daily activities such as going to school, tending to the home and family and other demands made on children and adults by their economic, social and cultural environment.

D ....

Discretionary activities, although not socially or economically essential, are important for health, well-being and a good quality of life in general. They include the regular practice of physical activity for fitness and health; the performance of optional household tasks that may contribute to family comfort and well-being; and the engagement in individually and socially desirable activities for personal enjoyment, social interaction and community development.

E ....

The energy cost of growth has two components: 1) the energy needed to synthesize growing tissues; and 2) the energy deposited in those tissues. The energy cost of growth is about 35 per cent of total energy requirement during the first three months of age, falls rapidly to about 5 per cent at 12 months and about 3 per cent in the second year, remains at 1 to 2 per cent until mid-adolescence, and is negligible in the late teens.

F ....

During pregnancy, extra energy is needed for the growth of the foetus, placenta and various maternal tissues, such as in the uterus, breasts and fat stores, as well as for changes in maternal metabolism and the increase in maternal effort at rest and during physical activity.

G ....

The energy cost of lactation has two components: 1) the energy content of this food for the baby; and 2) the energy required in its production. Well-nourished lactating women can derive part of this additional requirement from body fat stores accumulated during pregnancy.

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