Nutrition

# Energy Balance

## Lesson 2

Become an expert at understanding energy balance in the body and how it can be controlled.

The amount of energy expenditure of the body can be calculated. It is the basal metabolic rate (BMR), the thermic effect of food (TEF) and the amount of energy used to perform movement all added together.

The basal metabolic rate also known as BMR is the amount of energy the body uses in a normal state of rest at a neutral temperature whilst in a fasting state.

The thermic effect of food also known as TEF. This is the energy required to digest, absorb and metabolise food which is consumed.
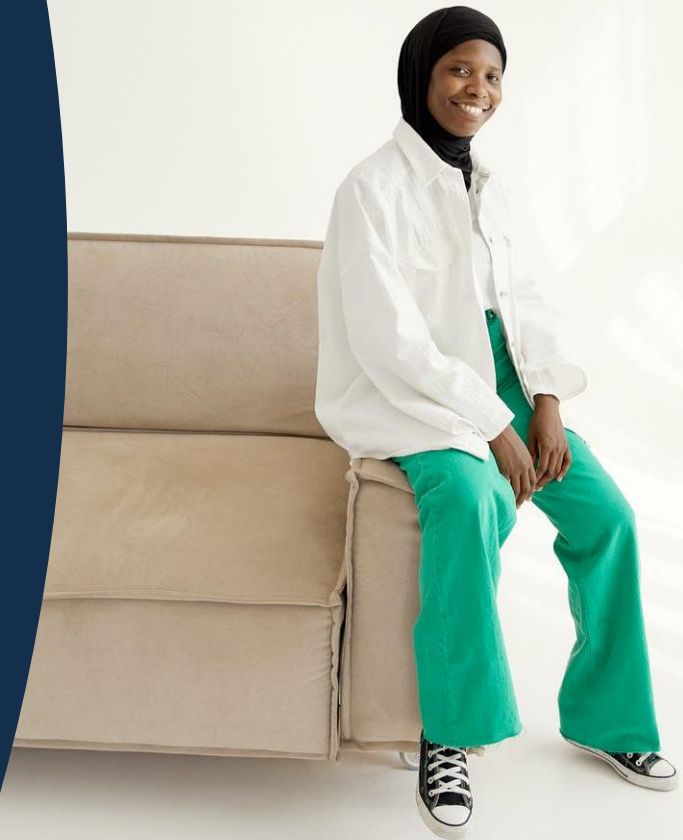
Energy used to perform movement can vary depending on the activity being performed e.g. sprinting uses a lot of energy.

Approximately three quarters of the amount of the energy expenditure is the BMR this can vary between people because it is based on the age and sex of the person.

The BMR is the amount of energy the body uses to keep the body functioning during rest. This keeping the heart beating, organs functioning, breathing and maintaining temperature.

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On average an adult will use 1.1 kcals a minute to function normally during rest.

Infants and young children have higher BMR's to account for fast growth and development.

Males usually have more muscle mass than females so their BMR is higher.

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Older adults have a lower muscle mass so their BMR is lower than younger people.

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**One way to estimate the BMR is through the Harris-Benedict formula:**

Women BMR (kcal) = (10 x weight in kg) + (6.25 x height in cm) – (5 x age in years) – 161

Men BMR (kcal) = (10 x weight in kg) + (6.25 x height in cm) – (5 x age in years) + 5

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**Everyone uses a different amount of energy on a daily basis for different types of movement.**

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The amount of activity a person performs is known as the Physical Activity Level (PAL).

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## The estimated PAL are:

1.4 for a very low level of physical activity e.g. during leisure time

1.6 females and 1.7 males for moderate activity e.g. a brisk walk

1.8 females and 1.9 males for high physical activity levels e.g. sprinting

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## The energy expenditure calculation:

## Energy expenditure = BMR x physical activity level (PAL)

## This calculation is used to estimate average energy requirements.

The Committee on the Medical Aspects of Food and Nutrition Policy (COMA) in 1991 produced a guide of Estimated Average Requirements (EAR's) of energy for the UP population.

# EAR's for energy 0-18 year olds

| Age | Boys kcal/day | Girls kcal/day |
| --- | --- | --- |
| 0-3 months | 545 | 515 |
| 3-6 months | 690 | 645 |
| 7-9 months | 825 | 765 |
| 10-12 months | 920 | 865 |
| 1-3 years | 1230 | 1165 |
| 4-6 years | 1715 | 1545 |
| 7-10 years | 1970 | 1740 |
| 11-14 years | 2220 | 1845 |
| 15-18 years | 2755 | 2110 |

# EAR's for energy of males with low activity

| Age | Weight (kg) | Kcal/day |
|---|---|---|
| 19-49 years | 74 | 2550 |
| 50-59 years | 74 | 2550 |
| 60-64 years | 74 | 2380 |
| 65-74 years | 71 | 2330 |
| 75+ years | 69 | 2100 |

# EAR's for energy of females with low activity

| Age | Weight (kg) | Kcal/day |
| --- | --- | --- |
| 19-49 years | 60 | 1940 |
| 50-59 years | 63 | 1940 |
| 60-64 years | 63.5 | 1900 |
| 65-74 years | 63 | 1900 |
| 75+ years | 60 | 1810 |