

Energy of Food

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Slide 1



Food energy

Food energy:

- **Food energy** is the amount of energy in food that is available through digestion
- This energy is not a nutrient but is released from food components



Food energy

- The amount of food energy in a particular food could be measured by completely burning the dried food in a bomb calorimeter, a method known as direct calorimetry
- The energy value of a food indicates its value to the body as a fuel.
- This energy value may be less than the heat value obtained experimentally by 'burning' the food outside the body in a 'bomb calorimeter'



'Atwater factors'

- The first system for giving energy values to the macronutrients was described by Dr W. O. Atwater in 1899
- Atwater made experiments in which he analysed the faeces of three young american men over a period from 3-8 days.
- Atwater found that 92% of protein, 95% fat and 99% carbohydrates are normally absorbed.



'Atwater factors'

- From these observations the 'Atwater factors' for the energy of food were derived.

	kilojoules per gram	kilocalories per gram
Fat	37	9
Alcohol	29	7
Protein	17	4
Carbohydrate	16	4

Fat is the most energy-dense macronutrient, followed by alcohol, protein and carbohydrate



'Atwater factors

- Only carbohydrates (including fiber), fats, proteins, organic acids, and ethanol contain food energy.
- Everything else in food is non-caloric, including water, vitamins, minerals, antioxidants, caffeine, and natural flavors. Tea and coffee also have no calories without sugar or milk added



'Atwater factors'

- So the energy obtained from food is measured in kilojoules or calories.
- There are 4.2 kilojoules in 1 kilocalorie.

Example:

If someone having 2000 kilocalories each day would be having 8400 kilojoules, also known as 8.4 megajoules



'Atwater factors'

- By using 'Atwater factors' it is easy to calculate the energy in any food,

Example:

If we have a piece of cheese that contains 39g carbohydrate, 10g proteins, and 16g fat the energy will be as follows:

$$\text{CHO} = 39 \times 4 = 156 \text{ kcal}$$

$$\text{Protein } 10 \times 4 = 40 \text{ kcal}$$

$$\text{Fat } 16 \times 9 = 144 \text{ kcal}$$

So the piece of cheese that contains

$$156 + 40 + 144 = 340$$



Energy expenditure at rest

When a subject is at rest and no physical work is being carried out, the energy required for the activity of the internal organs and maintain body temperature is called the:

The basal metabolic rate



The basal metabolic rate

- Basal metabolism represents the minimal energy your body needs to expend to keep a resting, awake body alive
- It represents about 60-70% of the energy needed by your body on a daily basis.
- An additional 5-10% of energy needed is for the digestion, absorption and utilization of nutrients
- An additional 7% or so is used to keep the body warm in cold condition



The basal metabolic rate

Keeping your Basal Metabolic Rate (BMR) as high as possible is vital when it comes to weight loss and maintaining healthy body fat levels!



Factors Affect Basal Metabolic Rate

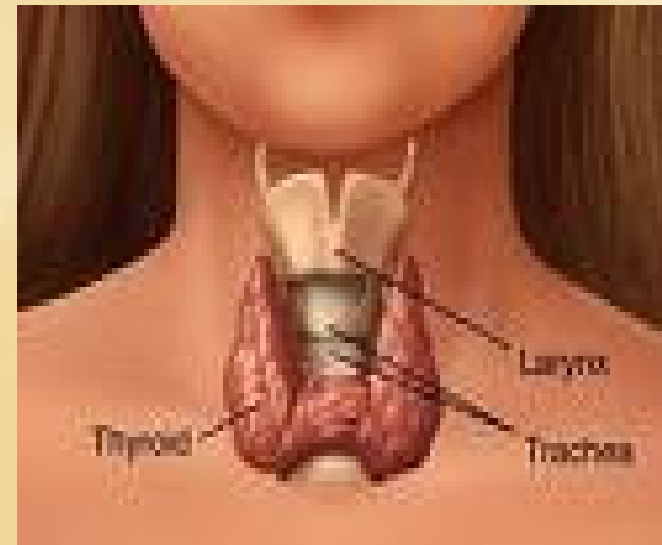
- 1) **Exercise:** This is one of the biggest factors that influence basal metabolic rate. BMR increases in people who exercise regularly





Factors Affect Basal Metabolic Rate

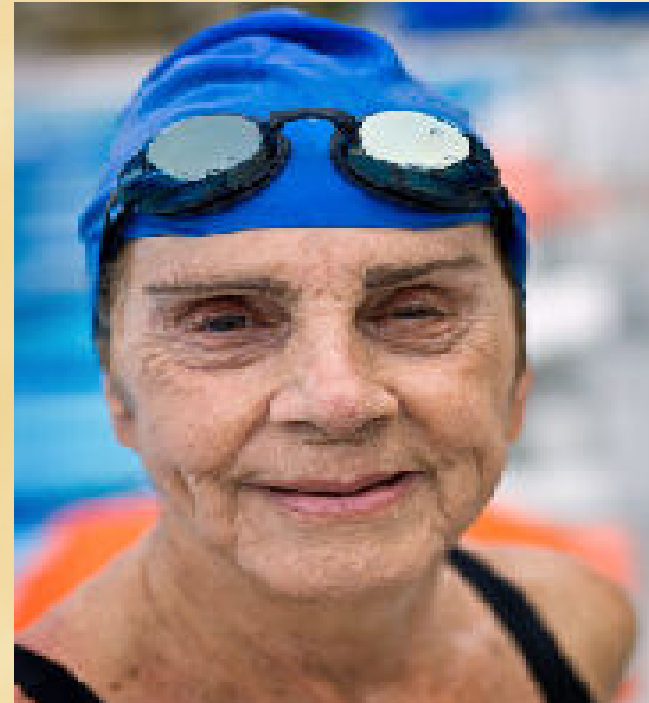
- **2) Hormones:** some hormones such as Thyroxin, which is creases the level of BMR..





Factors Affect Basal Metabolic Rate

- **3) Age:** As we get older our basal metabolic rate becomes increasingly slower. BMR is higher in children and decreases by about 2% decade of life.





Factors Affect Basal Metabolic Rate

4) sex:

Males tend to have higher basal metabolism than females due to an abundance of hormones such as testosterone and elevated levels of muscle mass when compared to that of females, causing increased calorie requirements.





Factors Affect Basal Metabolic Rate

- **5) Food Types:** The type of food we eat can also have a significant effect on our basal metabolic rate.
- **protein rich** foods have the greatest effect with carbohydrates and fats eliciting a smaller impact





Factors Affect Basal Metabolic Rate

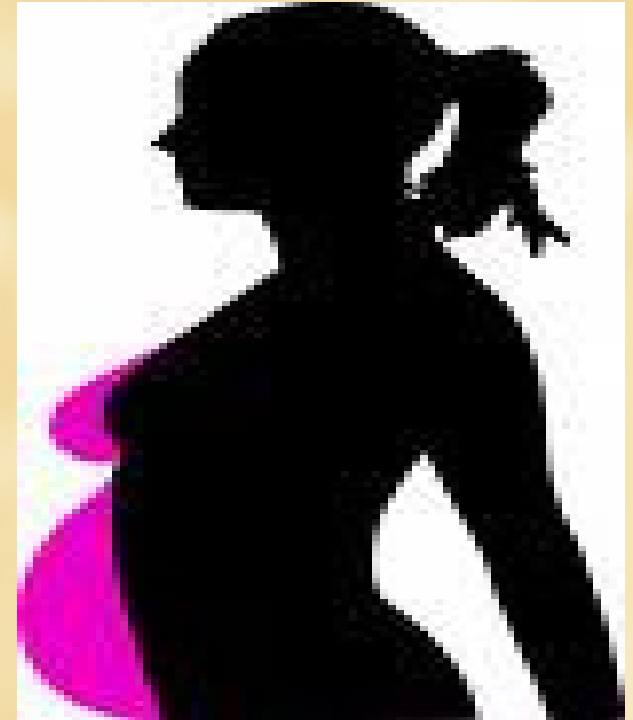
6) **Fever:** increases BMR.





Factors Affect Basal Metabolic Rate

7) **Pregnancy:** decrease metabolic rate in early stages and then increase with increasing body weight





Factors Affect Basal Metabolic Rate

8) **Environment:** Basal Metabolic Rate increases with cold winter





Factors Affect Basal Metabolic Rate

- **9) Starvation:** a decrease of up to 50 % of Basal Metabolic Rate has been reported as a way of adaptation of the body.



Starvation diets are short sighted and could lead to a myriad of health problems.



Factors Affect Basal Metabolic Rate

- **10) Surface area:** BMR is directly proportional to the surface area which is related to weight and height.

