

Food4Me Nutrition Quiz



The Science Behind the Game

Background

UCD and Creme Global are partners in a major European Union FP7 Research project on personalised nutrition called Food4Me [1]. The complete mapping of the human genome sequence in 2000 introduced the possibility of individualised medicine, including personalised nutrition. Many are hopeful about the ability to plan diet recommendations based on an individual's genetic profile. However, so far, the promise of personalised nutrition has not yet developed as a mainstream commercial service, and matching dietary advice to genetic profiles has proven challenging. The fundamental question is, "how can we best use our current understanding of food, genes, and physical traits to design healthier diets tailored for each individual?". To address these questions, Food4Me has gathered an international group of experts to survey the current knowledge of personalised nutrition, and to explore the application of individualised nutrition advice. For more information see www.food4me.org.

Foods

The foods displayed in this game are foods that are commonly consumed by the Irish population. To assess the nutritional status and health of a population, national food consumption surveys are carried out. These are surveys that assess the dietary intakes of the population. The portion sizes depicted in the photographs were measured into various sizes based on the actual portion sizes of foods consumed in Ireland, based on our national surveys.



Energy (kcal)

- Energy is needed by your body to stay alive, grow, keep warm and move around.
- Energy is provided by food and drink. It comes from fat, carbohydrate, protein and alcohol in particular.
- Energy requirements vary from one individual to the next, depending on factors such as age, gender, body composition and physical activity level [2].

Basal Metabolic Rate

The **basal metabolic rate (BMR)** is the rate at which you use energy to maintain the basic functions of the body – breathing, keeping warm, and keeping the heart beating – when at complete rest.

An average adult uses around 1.1kcal each minute just maintaining the above functions. BMR differs from one person to the next, both within a population and between population groups. Infants and young children tend to have a proportionately high BMR for their size due to their rapid growth and development. Men usually have a higher BMR than women since they tend to have more muscle. Older adults usually have a lower BMR than younger people since their muscle mass tends to decrease with age. The BMR accounts on average for about three quarters of an individual's energy needs [3].

In this game the BMR was calculated using the Henry equation [4]. An average weight for each gender and age group is multiplied by a specific coefficient of the Henry equation and added to a constant.

Example (for 8-10 year old boys): $BMR = 26.90 \text{ kg} * 23.30 + 514.0 = 1,140.77 \text{ kcal/day}$

Physical Activity Level

In addition to BMR, you use energy for movement of all types. The amount of energy a person uses to perform daily tasks varies depending on factors such as his or her weight (the heavier a person is the more energy is required for movement) and their physical activity level.

An estimate of the amount of energy an individual needs can be calculated by multiplying their BMR by a factor appropriate to the amount of activity that person does, known as the **Physical Activity Level (PAL)**. A PAL of 1.4 is associated with a very low level of physical activity at work or during leisure time. In contrast, a PAL of 1.6 for women or 1.7 for men represents moderate intensity activity, and values of 1.8 for women or 1.9 for men represent high levels of physical activity.

When understanding how much energy we burn each day and during exercise and other activities we use the BMR and the PAL to calculate our Energy Expenditure, (**Energy expenditure = BMR x PAL**). Using this approach and published data, estimates of average energy requirement for different population groups have been established [3].

The Game

The nutrition quiz game was developed by Creme Global [5] in collaboration with UCD and brings all of the above together. We have calculated the energy (calories) in the portions of foods depicted. We have then calculated how many minutes the energy in the food would allow you to run or cycle based on your age and gender.

It is important to note that whilst these foods are shown in isolation, we must remember that we need to consider the energy content of the total diet. The nutritional value of a person's diet depends on the overall balance of foods that is eaten over a period of time, as well as on the needs of the individual.



A healthy diet is likely to include a variety of foods, from each of the main food groups, as this allows us to get all the nutrients that we need. A healthy diet should provide us with the right amount of energy (calories), from foods and drinks to maintain energy balance. Energy balance is where the calories taken in from the diet are equal to the calories used by the body. We need energy to carry out everyday tasks such as walking and moving about but also for all the functions of the body we may not even think about. Each food provides a different range of essential nutrients, emphasising the importance of a varied diet. No single food can provide everything we need [6].

References

1. www.food4me.org
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4. Henry CJ. Basal metabolic rate studies in humans: Measurement and development of new equations. Public Health Nutr 2005;8:1133-52.
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