

Considerations of the Energetic Expenditure in the Control and Treatment of Excessive Body Weight and Obesity

By Dr. Richard Visser and other authors

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Summary

Energy is defined as the most important component in nature in relation with the capacity of the system to perform a job. The cell is identified as the functional and structural unit of any living system, and the metabolic function as the most important biological function that supports and feeds the nutritional chemical categories. The energetic expenditure is analyzed in different components and also in relationship with physical activity. Structured physical activity is defined as a procedure that enables the increase of total body energetic expenditure in relation to the integrated characteristics of the system. Some functional particularities of the skeletal and muscular system and the cells constitute these are described here. It is concluded that using structured physical activity, changes periodically, speed and force of the contraction and relaxation process and appropriate combination of the energetic food chemical categories of the diet is possible to achieve treatments against obesity in a short period of time.

Key words: child obesity, interventions

Introduction

The energy is a universal attribute to all living and non-living matter. It represents the most important component of nature and reflects the capacity that a system has in order to perform a job, inside itself or the relation to the environment (1-3).

The systems can be thermodynamic or not. The first ones are those that are constituted by a high number of atoms, molecules and it could be of three different types: Closed, isolated, and open (4-6).

The closed thermodynamic system does not share energy (e), work (t), chemical substance (sq) or information (l) with the physical environment. The isolated systems share only energy or work and they open systems might share everything.

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(5,6).

The cell is the functional and structural unit of any system and living organism and in the same way, belongs to the open, thermodynamic system (1,7).

Development

METABOLIC FUNCTION

The biological function is any kind of manifestation of vital activity. The most important of this manifestation is the metabolic function or simple metabolism and its importance is so great that it does not make sense at all to speak about life outside of this conception (8).

The metabolism is no more than a collection of chemical reactions that are produced inside of a biosystem in a determined period of time. It is the biological function of major significance because during its development the required energy begins to move in order to execute different types of jobs that support life: It is also important because it makes possible the dialectic and necessary interrelationships between the different components of the living things and in between living things and their environments (1,7-9).

The substantial suppliers and supporters of the metabolic function are the nutrients contained in the different nutritional chemical categories that can be part of the diet eaten by the individual; in other words, the different chemical sustenance's necessary to maintain a structure and normal functions involve all parts of the cell (1,10).

NUTRITIONAL CHEMICAL CATEGORIES

The nutritional chemical categories can be of two types: Energetic and Non-energetic. The first group is composed of neutral fats or triglycerides that produce 9.0 kcal/g when they are burned; The homopolisaccharides, or the starch glucose complex, and the heteropolisaccharides, sucrose and lactose (produce 4.0 kcal/g when burned) and proteins (4.0 kcal/g when burned). The non-energetic chemical categories are composed by the deoxyribonucleic (DNA) and ribonucleic acid (RNA) (1,11).

Among the nutritional chemical categories are the oxygen (the most important for human beings in order to keep an aerobic energetic metabolism); the water, amino acids, mono saccharides, fatty acids, liposolubles and hydrosoluable vitamins and minerals and oligo-elements (1,11).

ENERGETIC EXPENDITURE

When the intensity of the organic cell tissue metabolism increases the body also increases its metabolism proportional to the total energetic expenditure. One of the more important factors that determines the energetic expenditure is the physical activity performed by the individual in relationship to the resting meta-

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bolic rate, the thermo genesis produced by the food and also the adaptive thermo genesis. (12,13).

PHYSICAL ACTIVITY

During the execution of any type of physical activity there are always two groups of different contraction-skeletal muscles: antagonist and protagonist (14).

In order to produce the muscular contraction process as well as the muscular relaxation process, it is necessary to release energy coming from oxidative stretched muscular cells; That is why this kind of process is important, because it establishes a negative energetic balance which is required to eliminate weight by using the extra fat of the body and is also an effective treatment against obesity (15,16).

FRACTIONALLY ENERGETIC EXPENDITURE

The body's energetic expenditure depending on the physical activity is integrated, in other words, the amount of caloric energy generated by muscular contractions called isotonic and isometric; which can be of different durations and intensity levels, produce at different times and in several muscular groups are added in the process. This summation is very useful to increase the total energetic expenditure of the population who are not able to dedicate much time doing physical activities and using this procedure it is possible to achieve a reduction of obesity "without working too hard" (17,18).

STRETCHED SKELETAL MUSCLE

The stretched skeletal muscles are defined as a group of cells focused on the use of chemical configured potential energy, contained in the biomolecule of phosphorous creatine and adenosin trifosfato or (ATP) in the way of free radicals because of the isothermic and isobaric in any biosystem in the performance of mechanical work (17,19).

The sarcoplasmic of the stretched skeletal muscle is a viscous medium through which different kinds of proteins have been identified which are involved in the contraction process: but only four of these proteins (troponin, tropomyosin, G actin, and myosin) are related in a more direct way with the contraction process: the same result occurs in muscular relaxation (20,21).

In the above mentioned process a large amount of free radicals are transformed into caloric energy which helps to diminish the viscosity of the sarcoplasm and also helps reduce the requirements of the provided energy of the phosphorous creatine in order to perform a job against friction. In this way the contraction and relaxation process are maximized with the increase of the efficient thermodynamic energy, which is the same as muscular activity; especially the one that is done in a uniform and monotonous way, tending to diminish the total energetic expenditure which is equivalent to the principle of Le Chatelier-van't Hoff (21-23).

If the physical activity is performed with programmed changes of rhythm, speed

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and force in the open thermodynamic system which is the stretched skeletal muscle and is not performed in the muscle producing the optimal relaxation-contraction process, the result is an increase of the energetic expenditure plain; this is very important in relating to how we perform physical exercises that are used in the treatment against obesity; all this added together to the idea of fractional physical activity and also to a balanced diet (24,25).

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Authors:

Dr. Richard Visser*

Dr. Troadio González**

Dr. Angel Caballero**

* Director of the Visser Wellness and Research Center of Aruba

** Doctor of medical sciences. Instituto de Nutrición e Higiene de los Alimentos de Cuba

Information about the principal researcher:

Dr. Richard Visser is Director of the Visser Wellness and Research Center of Aruba, conducting research in the field of child obesity and develops scientific activities with the purpose of identifying behaviors of this disease in order to apply preventative actions against obesity, promoting health in relation to healthy lifestyles.

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