

Review

Metabolism: A review

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Abstract:

Metabolism is a biochemical process in which the body converts food into energy through a series of chemical reactions, in which nutrients are destroyed within the digestive system and converted to energy by building and destroying cells and tissues. Food has been converted into energy through a series of chemical reactions in which basic food is broken down into the debris, resulting in energy. These molecules are also used in the formation of more complex materials, so as to build cells and tissues. Metabolism is divided into catabolism whether carbohydrate, protein, or fat, are broken down in different ways from biological reactions to simple molecules. This results in access to energy. Anabolism, Small particles resulting from the demolition can be used as a nucleus to build more complex materials, whether protein or nuclear acids. This happens through a series of interactions so as to build tissue and consume energy in those interactions.

Keywords: Metabolism, anabolic, catabolic.

الملخص:

الأيض

الأيض هو آلية الخلايا الحية لتكوين، تحويل وتخزين الطاقة من المواد الغذائية. الأيض هو شبكة معقدة من التفاعلات الكيميائية داخل حدود الخلية التي يمكن تحليلها في أجزاء مكثفة ذاتيا تسمى المسارات. تساهم

المسارات الأيضية في الهدم - الانحلال التأكسدي للجزيئات ، والتمثيل الغذائي - التركيب الاختزالي للجزيئات. من المهم إدراك أن المسارات ، سواء أكانت تقويضية أو مستقبلة في الطبيعة ، مترابطة ومسيطر (على سبيل المثال هرمونات) حسب احتياجات الطاقة (على سبيل المثال النمو ، والعمل ، والهضم) والنشاط الفسيولوجي للكائن الحي. الأيض هو عملية دائرية إلى حد كبير لتحويل الطاقة في خلايا الكائنات الحية. يتم استخراج الطاقة الكيميائية من المواد الغذائية (الهدم) وتستخدم هذه الطاقة بدورها لتجميع جزيئات جديدة من نفس النوع من العناصر الغذائية للحفاظ على بنية ووظيفة الكائن الحي. ولتحقيق كلاهما ، قل استخلاص الطاقة من البروتينات الحيوية والتوليف الحيوي لها ، إن استقلاب الخلايا الحية هو شبكة مكانية وزمنية من التفاعلات الكيميائية قريبة من ، ولكن ليس أبداً عند التوازن الكيميائي. تحافظ الكائنات الحية على حالة من الاستتباب الأيضي الذي يمكن اعتباره حالة ثابتة أو تدفق الطاقة والمستقبلات للحفاظ على وظائف الجسم وهياكله.

Introduction:

Definition:

Metabolism is a group of chemical reactions in the cells of the organism that preserves life. The metabolism convert diets to energy for cellular processes and to convert diets into small molecules for biosynthesis of fats, proteins, sugars and some nucleic acids, in addition to that to remove any nitrogenous metabolic waste.¹ Metabolism can be classified into two categories: undermining, ie cracking organic matter, for example, cracking glucose into pyruvic acid, by cellular respiration, and building up, ie building cell components such as proteins, carbohydrates and nucleic acids.²

In metabolic pathways, chemical metabolism processes are arranged. Through these reactions and processes, a chemical compound is transformed into another chemical compound through a series of metabolic steps and processes and with the help of a different set of enzymes. Enzymes play an important and prominent role in metabolism by allowing organisms to make necessary energy interactions. These processes and reactions will not occur without the presence of enzymes. The most important functions of enzymes are to act as catalysts to speed up chemical reactions. Enzymes also allow to arrange representation paths Food response to changes in cell or signal from other cells.³

Functions:

One of the most important functions of the metabolism is the processing of energy or calories necessary and necessary for the cells and thus the body as well as to maintain the vital functions of the body. Metabolism is the regulator and director of energy in the body of the organism. It can occur that occur hundreds of metabolic processes in the same Time. Muscle metabolism is a great way to keep it, build it, and do the tasks it needs. Therefore, a person who has a larger muscle mass is more metabolized than the body of the person with the largest fat mass and less

metabolism . Metabolism plays an important role and is closely related to weight, weightlessness, and weight gain.⁴ Those who try to lose weight increase their metabolism to consume more energy during the day, especially during rest. The metabolic rate is determined by a number of factors in general, such as body size. The higher the body weight and the size of the body, the higher its metabolic rate, and it is also determined by sex; males in general have a higher metabolic rate than females, and other factors that determine the proportion of metabolism is Age.⁵

Major biochemicals

Metabolic reactions are concentrated and dependent on these substances or molecules to build cells and tissues, or to divide and use them as a major source of energy, and through digestion. These biochemicals can be combined to make polymers such as deoxyribonucleic acid and proteins, which are the basic molecules of life.¹

Carbohydrates:

Carbohydrates are polyhydroxy aldehydes or polyhydroxy ketones or substances that give these molecules on hydrolysis. They can be classified into monosaccharides, disaccharides, oligosaccharides and polysaccharides. monosaccharides are molecules that can not be hydrolysed into simple molecules for example glucose, mannose, lactose and ribose. disaccharides consist of two molecules of monosaccharides linked by glycosidic linkage. Oligosaccharides consist of two to ten molecules of monosaccharides and polysaccharides classified into hetero or homo polysaccharides for example starch and glycogen.

Lipids:

Fats are insoluble in water but are soluble in non polar organic compounds like chloroform, benzene and ether. The main function of lipids are storage form of energy in the human body specially in the adipose tissue for example triglycerides. triglycerides consist of three fatty acid and one glycerol. triglycerol is also called neutral fats. Some lipids act as structural components of cell membrane for example phospholipids and cholesterol.

Fat is a large group of compounds that contain fatty acids and glycerol, a glycerol part associated with 3 esters of fatty acids called triglycerides. There are many variations on the underlying structure, including alternative structures such as sphingolipids in sphingolipids, and water-loving group such as phosphate in phospholipids.⁶

Proteins and amino acids:

Amino acids are the major units of protein, amino acids binding with amino acids formed dipeptides, binding with another amino acid formed

tripeptid, if 3 to 10 amino acids binding by peptide bonds formed oligopeptide bonds, if more than 50 amino acids linked together formed proteins. Proteins

have many important functions for example some proteins are enzymes, inter in structural components ,act as a transporter.

Nucleotides:

Both DNA and RNA are polymers of nucleotides each them consist of a phosphate groups Nuclear DNA, DNA, and ribose (RNA) are polymers of nucleotides. Each nucleotide is made up of a phosphate group that is associated with hypoxic ribose or ribose sugar, which is associated with anitrogenous bases. Nuclear acids have important roles for the storage of genetic information, and protein synthesis. This enformation is protected by DNA repiar mechanisms and is spread by the doubling of ribosome DNA. Many viruses have a genome of ribosome DNA, suchas HIV, which uses reverse transcription to make a DNA model from the RNA genome. The RNA in ribosome DNA enzymes such as conjugation and ribosomes are similar to enzymes in their ability to stimulate chemical reactions. Nucleosides are formed by binding a nuclear base with ribose sugar. These bases are heterogeneous ring compounds containing nitrogen, classified as either pyurines or pyrimidines. Nucleotides act as adjuncts in metabolic reactions.⁸

Metabolism and immunity:

Many cytokines and hormones are changed in response to over- or undernutrition. One of the earliest reports of this is with tumor necrosis factor-alpha (TNF- α). TNF- α can be secreted from adipose tissue, and its expression is increased during obesity but decreased following weight loss (8). TNF- α is a well-known pro-inflammatory cytokine that is essential for the acute phase reaction. Studies from the 1990s demonstrated that TNF- α was essential for the development of insulin resistance in high-fat diet-induced obesity in mice (1) and that deletion of TNF- α protected high-fat diet-induced obese mice from developing insulin resistance (4). TNF- α can be secreted from both adipose tissue-localized macrophages, which are increased in obesity, and from adipocytes (5, 6). Following these early studies showing the importance of TNF- α in mediating metabolic disease in obesity, multiple other cytokines and hormones were also found to play a similar role.

Interleukin-6 (IL-6) is another cytokine that is secreted by many immune and non-immune cells in the adipose tissue including adipocytes, macrophages, pre-adipocytes, and T cells, in response to tissue damage (7). IL-6 has broad pleiotropic functions leading to the expansion of many types of immune cells including B cells and T cells (8, 9). IL-6 can signal through binding to the IL-6 receptor dimerized with gp130 on the surface of cells; however, IL-6 effects can also be mediated through trans-signaling, in which IL-6 binds to soluble IL-6 receptor, thereby permitting IL-6 to act on any cell that expresses gp130. In that way, IL-6 receptor trans-signaling contributes to the broad pleiotropic effect of

IL-6 (10). In general, IL-6 promotes T cell survival and resistance to apoptosis (11). IL-6 also has a pro-inflammatory role promoting CD4+ T cell differentiation to the Th17 or Th1 lineages, which produce the pro-inflammatory cytokines IL-17 and interferon gamma (IFN- γ), respectively.

Method of Metabolism:

The metabolism is divided into two main parts:

1. Catabolism, in which food, carbohydrates, fats and proteins are broken down into different forms of energy, depending on the need of the body, such as heat energy when feeling cold, energy for human movement when exercising, etc.

Anabolism, where cells use the rest of the food produced by the demolition process to build different cell types and tissues, and reduce this process with the increase of human life, as the highest possible in children, their ability to build different tissues higher what can, and the fact that this ability when older people are very few, and this is what happens when notes broken bones when older. There are three cases where physical energy is used, so the metabolic rate can be divided into three parts:

Energy used during rest: the amount of energy consumed during rest, including energy to maintain on the internal balance of the body, the survival of all the organs function properly, this energy is known as the rate of basic metabolism, and form the most necessary energy during the day.

Energy used during physical activity: The average contribution of exercise is estimated at 20% of the energy consumed per day. The real value of the energy consumed in the individuals' bodies varies according to several factors such as weight, age, health status and physical activity intensity.

Energy used during eating: The energy used to eat, digest, and metabolism in the body.⁹

Factors Affecting the Metabolic Rate:¹⁰

The metabolic rate is affected by several factors, the most important of which are the following:

Body size: The metabolic rate increases as body size increases.

The amount of muscular and fatty tissue: so that the rate of energy burning in the muscles is large, while it is very little in the fatty tissue.

Severe diet: Strict diets, in which a person consumes a small amount of energy, encourage the body to retain its energy by reducing the rate of metabolism.

Age: The rate of metabolism decreases with age, due to hormonal and neurological changes in the body, as well as loss of muscle tissue

Growth: Young children and infants need a large amount of energy to provide energy for growth and to maintain body temperature.

Gender: The male metabolic rate is often faster than that of females.

Genetic predisposition: The metabolic rate is partly influenced by genetics.

Hormonal imbalances: Nerves and hormones control metabolic rate, and any problems or imbalances in hormones, affect the speed of burning energy.

Ambient temperature: If the temperature around the body is high or low significantly, the body consumes more energy to maintain its temperature.

Illness: The body needs more energy in the event of infection or disease, so as to build new tissues, and support the immunity, thus increasing the rate of basic metabolism.

Physical activity: Regular exercise increases muscle mass, and stimulates the body to increase the rate of energy burning, even at rest.

Medicines: Some types of drugs increase the basic metabolic rate, such as caffeine and nicotine.

Deficiency of nutrients: It is important to take some substances and elements within the systems used to maintain the rate of metabolism within the natural levels, for example the lack of iodine intake, reduces the work of the thyroid, and thus slow down the rate of metabolism.

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