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General Information About Metabolism and Methods of Their Study

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Abstract: In this article, detailed theoretical information about the process of metabolism in the body is covered. It also provides information about the metabolism map, metabolic pathways and methods of studying metabolism. In addition, opinions about how important the process of metabolism is in the health and functioning behavior of the body are expressed.

Keywords: Metabolism, learning methods, metobolism map, metabolic pathway, protein, carbohydrate, organism.

Introduction: Metabolism, processes of its occurrence in the human body, when an opinion is expressed about the work mechanism, first of all about what is metabolism, need to know information. It is known that a person receives food from the external environment, food in the body substances that are changed, digested, and released from residual substances is an exchange. Energy is created as a result of the exchange of substances. This is energy at the expense of the organs, the cells multiply, the young organism grows and develops, the body constant temperature is ensured. Metabolism is two closely related processes, passes through assimilation and dissimilation. Cells of food components transition is called assimilation. Components of cells as a result of assimilation will be updated, they will increase. The younger the organism, the more active the assimilation passes, which ensures the growth and development of a young organism [1].

Metabolism is highly integrated, goal oriented is a process in which the environment and the cell are involved in multienzyme systems exchange of matter and energy is provided between them. Metabolism due to this, the following processes take place in the cell:

1. Obtaining energy from the external environment. It is organic matter it can be in the form of chemical energy or solar energy.

2. Decomposition of exogenous substances in cell organelles and transformation of cellular macromolecular components into precursors.

3. Synthesis and decomposition of macromolecules. A series of metabolic reactions, especially central metabolic pathways are the same in all living organisms. Krebs to these cycle, glycolysis, biosynthesis of proteins, fats, carbohydrates, etc. A living organism is affected by the external environment and depending on the use of what food products, the metabolic directions will change possible to a certain extent. For example: glycolysis processes prevail in anaerobic conditions, and in aerobic conditions - Krebs cycle and oxidation-phosphorylation processes prevails.

Several types of metabolic pathways are distinguished:

1. Central metabolic pathways - several hundred grams of proteins, carbon dioxide, CO2, H2O and energy as a result of fat decomposition is formed.

2. Secondary metabolic pathways are specific substances formation in the cell. For example, hormones, toxins, coenzymes and others. Their amount is measured in mg. 3. Cyclic metabolic pathways. They are characteristic of microorganisms.

they use oxalate as cell fuel.

Currently, more than 2000 enzymes are involved in cellular metabolism participation has been determined. Some of them are basic, others participates in secondary metabolic events. But theirs everything is inextricably linked. Their schematic view

make up the metabolic card.

METHODS

Methods of studying metabolic processes are mainly divided into two groups divided into: examinations carried out on the whole organism and carried out in isolated parts of the body disintegrating methods. Studying the metabolism of substances in the whole organism. This is a process carried out in several different ways. Knoop badge in the early 20th century fat in the body using the phenyl radical as a molecule. It was determined that acids are decomposed by β-oxidation. Substance different heavy isotopes or radioactivity in the study of exchange from isotopes (deuterium, 2H, 15N, 13C, 18O, 32P, 33P, 14C, 35S, 131I, 59Fe, 24Na) also widely used. Only with the metabolism of various substances determination, using the methods of determining the breath coefficient, also substance the status of the exchange can be determined. When disintegration methods are used, the organism is isolated taken parts - organs, sections of tissues, fractions of cells organelles and even some enzymes and other systems can also serve as inspection objects. Taken in this the results show the metabolic process in the whole body is valuable as a step biochemical. Different in the organs isolated from the body by studying the arterio-venous difference of their indicators biological processes can be studied. Including in the liver from ammonia formed from the breakdown of amino acids formation of uric acid was determined in this way. In this way excess of lactic acid in the blood flowing from the muscle, flowing from the liver it was found that there is no lactic acid in the blood. Cut tissue into special solutions containing nutrients if incubated, according to the change in the composition of the solution, it is possible to think about the metabolic process taking place in the tissue. The method of centrifugation from the composition of tissue homogenate to isolate different organelles and different subcellular particles possible by studying subcellular elements separately it is determined in which processes they participate. For example: ribosomal - in protein synthesis; mitochondrial enzymes - tissue respiration participation in the acquisition has been determined. A living organism is characterized by the exchange of matter and energy

different from inanimate nature. Eating and breathing are external to the body not only a connecting factor with the environment, but also matter and energy is one of the main stages of exchange. The main meal components: protein, carbohydrates, fats, energy for the body source and plastic material. Diary of the body 5.5% of energy needs come from carbohydrates, 15% from protein and 30% is covered by fat breakdown (catabolism).Catabolism consists of 3 stages: In the first stage, carbohydrates - hexoses, glucose, fructose, galactose: from proteins - amino acids; Glycerin and oil from fats acids are formed. The amount of energy released in these processes almost not much, and the total energy of nutrients is approximately it is 0.6-1%. In the second step, monosaccharides and glycerol are converted into pyruvate, and fatty acids turn into acetyl-CoA, amino acids into pyruvate, acetoglutarate, acetoacetate, succinate and acetyl-CoA. This approximately 30% of the energy in nutrients is released during the phase.4 final products formed in the third step: acetyl-CoA, α-ketoglutarate, succinate to CO2 and H2O in the citric acid cycle breaks down. As a result, 60-70% energy is left from nutrients separates.Taking the example of breaking down 1 molecule of glucose, the total is 38 a molecule of ATF is synthesized, and in the 1st stage - 2 molecules of pyrozum

acid and 8 molecules of ATF are synthesized; In the 2nd stage - 2 molecules acetyl-CoA, 2 molecules of CO2 and 6 molecules of ATF are synthesized; 3-stage - 4 molecules of CO2 and 24 molecules of ATF are formed [11].

RESULTS AND DISCUSSION

The validity of most commercially available metabolic cart is mostly unknown. Thus, we aimed to determine the accuracy, precision, within-subject reproducibility, and concordance of RMR and RER measured by four commercially available metabolic carts [Cosmed Q-NRG, Vyaire Vyntus CPX, Maastricht Instruments Omnical, and Medgraphics Ultima CardiO2]. Further, we studied whether a previously proposed simulation-based post-calorimetric calibration of cart readouts [individual calibration control evaluation (ICcE)] modify the RMR and RER reproducibility and concordance [8,9]. The validity of a metabolic cart can be determined [4,6,7] by (i) assessing its accuracy (i.e. the proximity of measurements to trace- able standards and precision (i.e. the variability in repeated measures of the same magnitude by controlled pure gas in-fusions [nitrogen (N2) and CO2]; (ii) assessing its accuracy and precision by alcohol burning tests, and; (iii) assessing the within-subject reproducibility (i.e. the variability in repeated measures performed in individuals under the same conditions, thereinafter called reproducibility)[3,5]. For many of the commercially available metabolic carts, there is no

published validity data for RMR and RER while some metabolic carts have provided unacceptable accuracy, precision, and/ or reproducibility. Of note, most studies examining the ac- curacy and/or precision of different metabolic carts have not compared them within the same settings and conditions or have not used recently manufactured metabolic carts [2,10,12].

CONCLUSION

In conclusion, it can be said that the body manages the nutrients it receives from the external environment through the process of metabolism. For this reason, it is important to study this process, deepen the essence of its stages, and strengthen knowledge in this regard. looking at the content of the researches, we can say that they have not been fully completed and that there is a need to conduct many researches in this regard in the future.

REFERENCES

Abdusatarova Z, Alimova D. MODDALAR ALMASHINUVINING YOSH XUSUSIYATLARI. RESEARCH FOCUS | VOLUME 1 | ISSUE 4 | 2022

Black C, Grocott MPW, Singer M. Metabolic monitoring in the intensive care unit: a comparison of the Medgraphics Ultima, Deltatrac II, and Douglas bag collection methods. Br J Anaesth 2015; 114:261e8. 10.1093/bja/aeu365. - DOI - PubMed

Chen KY, Smith S, Ravussin E, Krakoff J, Plasqui G, Tanaka S, et al. Room indirect calorimetry operating and reporting standards (RICORS 1.0): a guide to conducting and reporting human whole-room calorimeter studies. Obesity 2020; 28:1613e25. 10.1002/oby.22928. [DOI] [PMC free article] [PubMed] [Google Scholar]

Cooper JA, Watras AC, O'Brien MJ, Luke A, Dobratz JR, Earthman CP, et al. Assessing validity and reliability of resting metabolic rate in six gas analysis systems. J Am Diet Assoc 2009; 109:128e32. 10.1016/j.jada.2008.10.004. [DOI] [PMC free article] [PubMed] [Google Scholar]

Da Rocha EEM, Alves VGF, Da Fonseca RBV. Indirect calorimetry: methodology, instruments and clinical application. Curr Opin Clin Nutr Metab Care 2006; 9:247e56. 10.1097/01.mco. 0000222107. 15548. f5. - DOI - PubMed

Ferrannini E. The theoretical bases of indirect calorimetry: a review. Metabolism 1988;37: 287e301. 10.1016/0026-0495(88)90110-2. - DOI - PubMed

Fullmer S, Benson-Davies S, Earthman CP, Frankenfield DC, Gradwell E, Lee PSP, et al. Evidence analysis library review of best practices for performing indirect calorimetry in healthy and non-critically ill individuals. J Acad Nutr Diet 2015; 115:1417e46. 10.1016/j.jand.2015.04.003. e2. - DOI – PubMed ISSN: 2181-3833 ResearchBip (14) | Google Scholar | SJIF (4.597) | UIF (8.3)

JMA Alcantara, L Jurado-Fasoli , M Dote-Montero , E Merchan-Ramirez , F J Amaro-Gahete , I Labayen , J R Ruiz , G Sanchez-Delgado . Impact of methods for data selection on the day-to-day reproducibility of resting metabolic rate assessed with four different metabolic carts. 2023 Nov;33(11):2179-2188. doi: 10.1016/j.numecd.2023.07.017. Epub 2023 Jul 18.

JMA Alcantara a,*, JE Galgani b,c, L Jurado-Fasoli a, M Dote-Montero a, E Merchan-Ramirez a, E Ravussin d, JR Ruiz a,e,1, G Sanchez-Delgado a,d,1. Validity of four commercially available metabolic carts for assessing resting metabolic rate and respiratory exchange ratio in non- ventilated humans. published in final edited form as: Clin Nutr. 2022 Feb 4;41(3):746–754. doi: 10.1016/j.clnu.2022.01.031

Kaviani S, Schoeller DA, Ravussin E, Melanson EL, Henes ST, Dugas LR, et al. Determining the accuracy and reliability of indirect calorimeters utilizing the methanol combustion technique. Nutr Clin Pract 2018; 33:206e16. 10.1002/ncp.10070. [DOI] [PMC free article] [PubMed] [Google Scholar]

R.A. Sobirova, O.A. Abrorov ,F.X. Inoyatova, A.N.Aripov BIOLOGIK KIMYO . Toshkent«Yangi asr avlodi» 2006

Schadewaldt P, Nowotny B, Strassburger K, Kotzka J, Roden M. Indirect calorimetry in humans: a postcalorimetric evaluation procedure for correction of metabolic monitor variability. Am J Clin Nutr 2013; 97:763e73. 10.3945/ajcn.112.035014. - DOI – PubMed.