87 - CARBOHYDRATES IDENTIFICATION PROCESSES IN PRACTICAL CLASSES OF BASIC BIOCHEMISTRY IN THE COURSE OF PHYSICAL EDUCATION.

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INTRODUCTION

The initiative for practices accomplishment in Biochemistry laboratories, in the course of Physical Education, left of the need to a connection tuned most of the theory with the practice. The molecules degradation and absorption theoretical knowledge in the organism, formally elaborated by the experimentations conclusion of the occurred facts, it moves away more and more of the academic reality. It creates, so, a fragmented model and knowledge parallel with know how to do it, with a concepts approach paradoxical impossibility with the practical knowledge of the metabolic reactions and of the nutrients absorption forms, in the organism.

When initiating the Biochemistry studies, the students worry initially in answer doubts on the organism performance by the quantity of available carbohydrate and the intensity of the accomplished activity. Thus, it understands Kress' Reason (2001), when tells that the method chosen for accomplishment of an experiment can facilitate a lot the reach of wished result, and that students' relation with the material demonstrates the importance of the empiric existence. Such outlines, revealing itself insufficient, tend to modify themselves to get the integration of the unused data to already existing system. The modification of the itself for accommodation of the preceding state to the current exigencies. The accommodation appears, because, like the complementary term of the assimilation, putting in evidence the external pressures about the subject (GIUSTA, 2003).

The students mobilize themselves in the comprehension and in the theory relations with practice, when evaluating the digestive effects and degradation of organic substances, in a laboratorial reaction, simulating the terms “in Vitro” of temperature and pH of the mouth, stomach and thin intestine, as demonstrated by Crerici and et Al, 2006, in amylase enzymatic action experiments pancreatic, and of the glucose oxidase (GOD). The determination of alimentary dosages depends on the knowledge of the molecular composition and of the destiny followed by the byproducts of molecular degradation in distinct metabolic state, such as repose and training. (Cabral, 2004; Maughan, 2000).

The macromolecules are numerous in the cells. They get form by the union of built polymers, simply, by the connection covalent among monomers that are smaller subunits. The carbohydrates also called saccharides, carbons hydrates or moisturized carbons are composed aldehydes or cetonics with many hydroxyls and one of her functions is the source and the energy storage, serving, as well, like metabolic intermediary. (BERG, 2004).

The glycogen is the polysaccharide formed by glucose molecules and private in the liver and in the muscle. According to Berg 2004, the glucose is, in mammals, the only energy source that the brain uses in terms without fast and the only that hemaces can use in any circumstance.

The molecule breakage initial phase of glucose occurs in cytosol in the oxygen absence and makes available for the pyruvate cell, that will be able to follow varied destinies, depending on the oxygen availability, since the anaerobic and aerobic metabolism are generation events of complementary energy. In one of the metabolic routes, lactate is formed from pyruvate, as it occurs in several microorganisms in a process called lactic fermentation. The reaction, as well, occurs in the cells of the superior organisms when the oxygen quantity is limiting, in this case, it optimizes time of ATP gain, attending to muscle emergency. The organism stability, however, is favored by the maintenance of the complete metabolic way, with direction of pyruvate to mitochondria, location where occurs for oxidation descarboxilation forming Acetyl Filters, that will be completely oxidized in water formation, carbon dioxide and an ATP's Great Quantity. (BERG, 2004; ALBERTS, 2006).

METHODOLOGY

The classes practices goal was to contribute for the Biochemistry teaching improvement, in the course of Physical Education. The carbohydrate dosage analysis in the organism is based in 3 activities, two qualitative and a quantitative, developed in laboratory and in field, considering carbohydrates properties, its digestion and absorption, and the metabolic action of it's byproducts.

Practice 1 – Carbohydrate Solubility

In this class, was objectified test disaccharides solubility in water and alcohol. It's used to such, the following material: 6 test tubes; Distilled water and alcohol, as solvent; And as solutes it's used saccharose, maltose and lactose. It used 3 test tubes with 5 ml of distilled water and 3 test tubes with 5 ml of alcohol; it added to each tube, 5g of the solute, it shook the tube, with action of low upwards, counting 10 times in each case.

Practice 2 – Carbohydrate Identification

In this class, was objectified to identify the presence of sugars reducers, in which we include glucose, galactose, lactose, maltose and mannose, using Benedict's Reagent, who consists basically, of a cupric sulfate solution in a little alkaline, and to identify the presence of polysaccharide as starch, that blushes of intense blue, with the Iodine test. It's used to such, the following material: distilled water, glucose, fructose, saccharose and starch. At first stage, it used 5 test tubes, one contend 1 ml of distilled water and 4 with 1ml of fructose solutions, glucose, saccharose and starch. In each one of the tubes it's added 2ml of Benedict's reagent and heated for 5 minutes. At the second, it preceded of similar way, the tubes distribution and added 4 lugol drops, to detect the presence of the starch for coloration.

Practice 3 - Lactate sanguine analyses

In this class, it objectified verify the involvement of the lactic anaerobic metabolism by means of measured of lactato sanguine, after effort. It used as material the equipment Accutrent Lactate (Roche®), Cardiofrequencimentro (polar®), lancets and gloves.

In the procedure, it's selected 2 students practitioners of regular physical activities and wearing appropriated clothes, being a 35 years old untrained, weighing 80 kg, measuring 1,75m and a trained with 22, 69Kg and 1,82m. It collected a blood drop, to measured of lactate of an aerobics activity and pasted , directly in the test ribbon BM-Lactate, for repose lactate analysis, LR. After 3 returns of slow walk around of the UNIVERSO-BH soccer field, totalizing 1.050 meters, for detection of the initial

anaerobic threshold, LAO. After 3 returns of fast walk, lactate liberated in an activity moderated, LRNO, and 20 minutes of race-LRN 20, lactate liberated in an intense physical activity.

RESULTS

The practices were developed by 52 students of the 2nd period, in the first semester of 2008 in the UNIVERSO-UNIVERSITY Salgado de Oliveira, in Belo Horizonte, 98% concordant that the practices accomplished in laboratories favor the learning of Biochemical concepts, and 99% consider that the manipulation in laboratory and in field favor the carbohydrates recognition process.

In the experiment accomplished to detect the carbohydrate solubility, it objectified observe and to evaluate the reactions occurred in each case using +, for present solubility, and –, for low or absent solubility. The relation between solute quantity (g), for solvent quantity (/100g of solvent), in determined temperature (ºC), constitutes the solubility coefficient (CS). The results found by the students demonstrate that disaccharides are soluble in water and insoluble in alcohol.

In the carbohydrate identification experiment, also of qualitative character, the students did coloration observations. The appearance of one precipitated of red-brick coloration indicated that the ions Cu2+ of the reagent of Benedict were reduced for Ass+, indicating presence of sugar reducer. The development of intense blue coloration indicated, in the test with lugol the presence of the polysaccharide, starch.

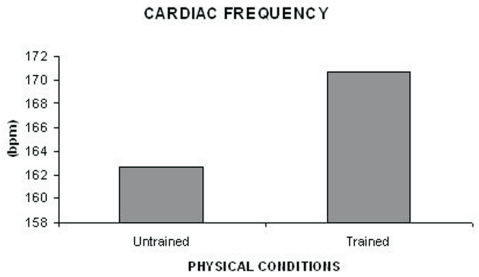
In the field experiment, the cardiac annotation frequency of beats was done for minutes, table and graph 1, after the first, second and third walk return and of race, for the untrained student (155-172; 162, 7± 8,6) and trained (150-187; 177±18,9), table and graph 01.

TABLE 01: Variability of the cardiac frequency (bpm)

Student	Mínimum	Máximum	Avarage	SD
Untrained	155	172	162,7	8,6
Trained	150	187	170,7	18,9

Analysis of the cardiac frequency i n rest, after walk and race 20 minutes race in UNIVERSO -BH soccer field, in April 2008.

GRAPH 01:



Average of the cardiac frequency (FC), per minute (bpm), after walk and 20 minutes race in the UNIVERSO-BH soccer field, in April 2008.

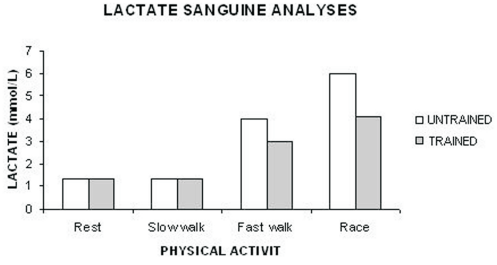
The calculation of the minimum variations was done and maximum, average and divert lactate values standard obtained for the untrained student (1,3-6;3,15±2,89) and for the trained student (1,3-4,1;2,4±1,37), resultant of the repose-LR lactate evaluation after 3 returns of slow-LAO walk, 3 returns of fast-LRN walk, and 20 minutes of race-LRN. The students' minimum values was presented inside the standards, considering that, lactate concentration in the blood of an individual belongs to, about, 1,0 mmol/L to 1,8 mmol/L, in repose, The increase in blood lactate concentrations with values superior to 4 mmol/l suggests utilization of the anaerobic way in ATP's Production, what demonstrates the indices presented after more intense physical activity, table and graph 02.

TABLE 02: Lactate dosage in rest and during the physical activity.

Student	LR (mmol/L) Rest	LAO(mmol/L) Slow walk	LRNO(mmol/L) 3 fast walk	LRN (mmol/L)	Lactato(mmol/L 20 minutes
Untrained	1,3	1,3	4	6	3,15 ± 2,29
Trained	1,3	1,3	3	4,1	2,43 ± 1,37

Lactate measures analyses in 2 students, untrained and trained, in rest, after 3 returns of slow walk, in soccer field at the external track of the UNIVERSO of Belo Horizonte, totalizing 1.050 meters, 3 returns of fast walk, and 20 minutes race, in April 2008.

GRAPH 02:



Lactate dosage in 2 students, untrained and trained, in rest, after 3 returns of slow walk in soccer field at the external part of UNIVERSO at Belo Horizonte, totalizing 1.050 meters, 3 returns of fast walk, and 20 minutes race, in April 2008.

CONCLUSION

The accomplished experiments are of easy accomplishment and can be used to review of some chemical concepts, especially in what concerns to the concepts comprehension related scientific to carbohydrates, and beginning of the energetic metabolism study in the Basic Biochemical discipline. In posterior classes, necessary the solubility coefficients quantitative analysis is done, for dilution and absorption forms comprehension of the monosaccharide in the organism, and coloration indices quantitative analyses for forms recognition of conventional carbohydrates in a diet addressed for the organism according to the physical activity. It suggests lactate analysis in other sporty modalities, such as, for understanding improvement of metabolic ways, and of the carbohydrates destiny and its byproducts for energy production.

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CARBOHYDRATES IDENTIFICATION PROCESSES IN PRACTICAL CLASSES OF BASIC BIOCHEMISTRY IN THE COURSE OF PHYSICAL EDUCATION.

ABSTRAT

This work has as goal to contribute for the Biochemistry teaching improvement in the course of Physical Education. The activities developed in the classes practices consolidate the carbohydrates properties, its digestion and absorption, and the metabolic action of it's byproducts. They boarded the next themes: 1 - disaccharides solubility; 2 - Identification of monosaccharide, disaccharides and polysaccharides, with dosages in laboratory, for dilution and reactions degree observation in the coloration acuity; 3 – Blood lactate analysis in field to verify the involvement of the lactic anaerobic metabolism by means of measures, before and after conservative and intense effort. It applied to methodology with students of the 2nd period, in the first semester of 2008 at UNIVERSO- Salgado de Oliveira University, in Belo Horizonte, 98% agree that the practices accomplished in laboratories favor the learning of Biochemical concepts, and 99% consider that the manipulation in laboratory and in field favor the carbohydrates recognition process. In the experiments of qualitative analysis it noticed for solubility reaction observation of disaccharides and the sugars reducer coloration intensity, with Benedict's Reagent and of the starch with Iodine. Quantitatively, in a work accomplished in field, it was analyzed blood lactate quantity in rest, after 3 returns in soccer field measuring 1050m, and after run of 20 minutes, untrained student (3,15 ± 2,29), cardiac frequency (155-172; 162,7± 8,6) and trained (2,43 ± 1,37), cardiac frequency (150-187; 177±18,9). The done experiments are of easy accomplishment and can be used to revision of some chemical concepts, especially in what concerns to the concepts comprehension related scientific to carbohydrates and beginning of the study of energetic metabolism in the Basic Biochemical discipline.

KEY-WORDS: Biochemistry teaching, Carbohydrates, Physical activity.

LES PROCÉDURES D'IDENTIFICATION DES GLUCIDES DANS BIOCHIMIE DANS LA PRATIQUE DE L'ÉDUCATION PHYSIQUE.

RESUME

Le présent document vise à contribuer à améliorer l'enseignement de la Biochimie dans le cours d'Éducation Physique. Les activités dans les enseignements pratiques s'appuient sur les propriétés de la digestion et l'absorption des glucides, et l'action de sous-produits métaboliques. Abordé les questions suivantes: 1 - la solubilité des disaccharides -, 2 - Identification des monosaccharides, disaccharides et polysaccharides, avec des forces dans le laboratoire pour observer le degré de dilution et les réactions en couleur visuelle; 3 - Analyse des lactates dans le domaine de vérifier l'implication du métabolisme anaérobie lactique par des mesures avant et après un modéré et intense effort. Nous avons appliqué la méthodologie avec les étudiants en 2 e période dans la première moitié de 2008 dans l'UNIVERSO - Universidade Salgado de Oliveira à Belo Horizonte, 98% des répondants conviennent que les pratiques menées dans les laboratoires de favoriser l'apprentissage de concepts biochimiques, et 99% croient que les expériences de laboratoire et de soutien sur le terrain, sont importants dans le processus de reconnaissance des hydrates de carbone. Dans les expériences de l'analyse qualitative a été noté en observant la réaction de la solubilité de disaccharides et de l'intensité de la coloration de sucres réducteurs avec le réactif de Benedict et de l'amidon à l'iode. Quantitativement, nous avons analysé le lactate artérielle au repos, après 3 tours sur le terrain de football mesure 1050m, et après les 20 minutes, les étudiants non formés (3,15 ± 2,29), la fréquence cardiaque (155-172, 162,7 ± 8,6) et formé (2,43 ± 1,37), la fréquence cardiaque (150-187, 177 ± 18,9). Les expériences peuvent être utilisés pour examiner les concepts de certains produits chimiques, en particulier en ce qui concerne la compréhension des concepts

scientifiques liés à des glucides et des premières études du métabolisme énergétique dans la discipline de la Biochimie.

MOTS-CLÉS: Enseignement de la Biochimie, Glucides, Activité physique.

PROCESOS DE IDENTIFICACIÓN DE CARBOHIDRATOS EN CLASES PRÁCTICAS DE BIOQUÍMICA BÁSICA EN EL CURSO DE EDUCACIÓN FÍSICA.

RESUMEN

Este trabajo tiene por objetivo contribuir para mejorar la enseñanza de Bioquímica en el curso de Educación Física. Las actividades desarrollas en las clases prácticas consolidan las propiedades de los carbohidratos, su digestión y absorción, y la acción metabólica de sus subproductos. Se han abordado los siguientes temas: 1 - solubilidad de disacáridos; 2 - Identificación de monosacáridos, disacáridos y polisacáridos, con dosis en laboratorio, para observación del grado de dilución y reacciones en la acuidad de coloración; 3 – Análisis del lactato sanguíneo en campo para verificar la relación con el metabolismo anaeróbico láctico por medio de medidas, antes y después del esfuerzo moderado e intenso. Se aplicó la metodología con alumnos del 2º período, en el primer semestre de 2008 en UNIVERSO-Universidade Salgado de Oliveira, en Belo Horizonte. El 98% está de acuerdo con que las prácticas realizadas en laboratorios favorecen el aprendizaje de conceptos Bioquímicos, y el 99% considera que la manipulación en el laboratorio y en el campo favorece el proceso de reconocimiento de carbohidratos. En los experimentos de análisis cualitativos se notó por observación la reacción de la solubilidad de disacáridos y la intensidad de coloración de azúcares reductores, con reactivo de Benedict y de almidón con Iodo. Cuantitativamente, se analizó la cantidad de lactato sanguíneo en reposo, después de dar 3 vueltas en un campo de fútbol midiendo 1050m, y después de una carrera de 20 minutos, alumno desentrenado (3,15 ± 2,29), frecuencia cardíaca (155-172; 162,7± 8,6) y entrenando (2,43 ± 1,37), frecuencia cardíaca (150-187; 177±18,9). Los experimentos realizados son fáciles de ser llevados a cabo y pueden ser utilizados para revisión de algunos conceptos químicos, especialmente en lo que respecta a la comprensión de conceptos científicos relacionados con los carbohidratos y el inicio del estudio del metabolismo energético en la disciplina Bioquímica Básica.

PALABRAS-CLAVE: Enseñanza de Bioquímica, Carbohidratos, Actividade física.

PROCESSOS DE IDENTIFICAÇÃO DE CARBOIDRATOS EM AULAS PRÁTICAS DE BIOQUÍMICA BÁSICA NO CURSO DE EDUCAÇÃO FÍSICA.

RESUMO

Este trabalho tem como objetivo contribuir para a melhoria do ensino de Bioquímica no curso de Educação Física. As atividades desenvolvidas nas aulas práticas consolidam as propriedades dos carboidratos, sua digestão e absorção, e a ação metabólica dos seus subprodutos. Abordaram-se os seguintes temas: 1 - solubilidade de dissacarídeos; 2 - Identificação de monossacarídeos, dissacarídeos e polissacarídeos, com dosagens em laboratório, para observação de grau de diluição e reações na acuidade de coloração; 3 - Análise do lactato sangüíneo em campo para verificar o envolvimento do metabolismo anaeróbio lático por meio de medidas, antes e após esforço moderado e intenso. Aplicou-se a metodologia com alunos do 2º período, no primeiro semestre de 2008 na UNIVERSO-Universidade Salgado de Oliveira, em Belo Horizonte, 98% concordam que as práticas realizadas em laboratórios favorecem a aprendizagem de conceitos Bioquímicos, e 99% consideram que a manipulação em laboratório e em campo favorecem o processo de reconhecimento de carboidratos. Nos experimentos de análise qualitativa notou-se por observação de reação da solubilidade de dissacarídeos e a intensidade de coloração de açúcares redutor, com reagente de Benedict e do amido com Iodo. Quantitativamente, em um trabalho realizado em campo, analisou-se o lactato sanguíneo no repouso, após 3 voltas no campo de futebol medindo 1050m, e após corrida de 20 minutos, aluno destreinado (3,15 ± 2,29), frequência cardíaca (155-172; 162,7± 8,6) e treinado (2,43 ± 1,37), frequência cardíaca (150-187; 177±18,9). Os experimentos feitos são de fácil realização e podem ser utilizados para revisão de alguns conceitos químicos, especialmente no que se diz respeito à compreensão de conceitos científicos relacionados aos carboidratos e início do estudo de metabolismo energético na disciplina Bioquímica Básica.

PALAVRAS-CHAVE: Ensino de Bioquímica, Carboidratos, Atividade física.

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