187 - INQUIRY OF THE NITROGEN BASES CONCENTRATION IN PLASMATIC CONCENTRATION IN ATHLETE DURING HIGH INTENSITY AND LONG DURATION EXERCICE

MARCELO NISSENBAUM; DENISE CHARPENEL; BRUNO PECEGO; MARCIA ALBERGARIA LAFIEX
Laboratory of Physiology of the Exercise & Measures and Evaluation
Akxe Campus Course of Physical Education, University Estácio de Sá, Rio De Janeiro, RJ/Brasil
mba@infolink.com.br

Introduction: The effect of the physical exercise come being described since 3ª decade of the last century as part of the health. One knows that the individuals nowadays need to change its habits due not transmissible the chronic illnesses as: sedentarism, obesity, alcoholism, tobacco, diabetes mellitus, etc. (GREEN et al, 2000).

Physical exercise and mainly high intensity and long duration cause great stress to human body modifying temporarily its metabolism. Some products and by-products are formed during this process where the body answers and looks its balance almost that immediately so that this exactly organism can support a load of still bigger exercise in a next stress (GREEN et al, 2000).

Physical exercise (race) of high intensity (75%-85%FCmax) and long duration (2 hours) so that it can be executed must be had in mind that, is not alone the exercise the main citizen of this process, because, external factors (heat, cold, humidity, altitude) and interns exist (micron and macro nutrient deficiency, hormones and emotional factors) that many times cannot be controlled due to high established energy demand during this type of activity, an example very argued in the scientific community is the mechanism for which the fatigue can restore in the human body, had the innumerable factors that they corroborate for such; 1)Glycogen depletion/glycogen replacement; 2) Micron and macron nutrient insufficiency and/or deficiency; 3) Loss of hydro volume; 4) Environment (heat, cold); 5) Altitude; 6) Great humorais alterations, 7) Emotional factors and etc (LEMON and MULLIN, 1980; SALTIM and BLOMSTRAND, 1999).

One knows that during the physical activity the human body oxidates amino acids, carbohydrates and lipids. In this study they are the most excellent amino acids, because these participate of processes that liberate nitrogen substrates that in excess can be maleficent for the individual. One knows that during the physical activity, athletes can arrive to produce ammonia in an amount of 400% greater in relation to the rest. (GRAHAM and MACLEAN, 1992; HELLSTEN et al, 1999)

Two factors are very important how much to the physical activity; the intensity and the duration of the effort make sprouting of ammonia in the blood. The ammonia produced during the muscular contraction can come of the oxidation of amino acids, as for example; the amino acids of ramified chain (BCAA) - valine, leucine and isoleucine or the purines nucleotides cycle (PNC) (MACLEAN et al, 1991; GRAHAM et al, 1995).

The ammonia is toxic for the human beings. Our organism is capable to unpoisen ammonia through the liver all diminishing its deleterious effect the system (organism).

The ammonia can cause a local and central fatigue in the human beings, for this it can be recognized as one of the possible biomarkers of physical stress that already had been described in literature and scientific community (GRAHAM and MACLEAN, 1992; HELLSTEN et al, 1999).

Objectives: Analyze and compare the answers of nitrogen composites after high intensity and long duration continue exercise.

Methodology: The present study is descriptive cause not had manipulation in studied with laboratorial intervention in result of the methodological procedures of collection and analysis of the samples.

The variables analyzed were collected at two distinct moments: Before-stimulation and aerobic exhausting after-activity of 2H (120 min) of duration. The characteristics that they determine to the collection define the model as comparative how much to the analysis the substrates results colleted (THOMAS and NELSON, 2005)

For the study had been used 7 (seven) triathletes of the masculine sort with ages between 25 and 40 years old, practicing of the modality at least three years. All the components of the group with the same trainer and participate in the same team. The volunteers are subdivided part of the amateur category in distinct daily pay-established etary bands for the tests. The group has age average of 31,0 +/- 7,87 years, stature average 1,78 m +/- 0,04 meters and corporal mass average of 74,57 kg +/- 6,16.

The test-simulated instrument of was a race in field with duration of 120 minutes in an approach intensity of 75-80% of the FC Max. Before if submitting at field evaluation all had signed the Participation Assented Term (Attached B), had answered to the PAR-Q, one anamnesis and had been made the mensurações of corporal mass and stature.

In the eve of the test-simulated one, the necessary recommendations to not the interference in the results of the mensurações had been made that if would follow. Iso-energy feeding was recommended, not xanthin consumption, alcohol and too much pernicious substances to the health. They had been submitted then to the first stage of the analysis where, the collection of the blood in laboratory of Clinical Analyses was carried through commercial.

Of ownership of the sanguineous sample of each volunteer the analysis of the levels was carried through, then of rest of urea, creatinina, ammonia and acid úrico.

At as the moment of the study the accomplishment of the test-simulated one was carried through the collection of blood of the volunteers immediately after.

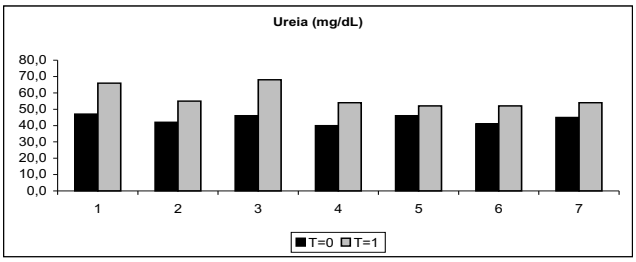
The hematológicas analyses that had been carried through at as the moment had been to the same ones of the ones of the first moment.

The test-simulated one, instrument of the study was executed in the same conditions where he was made for the athletes. Hour, place, group and trainers kept in the same conditions of daily pay-evaluation.

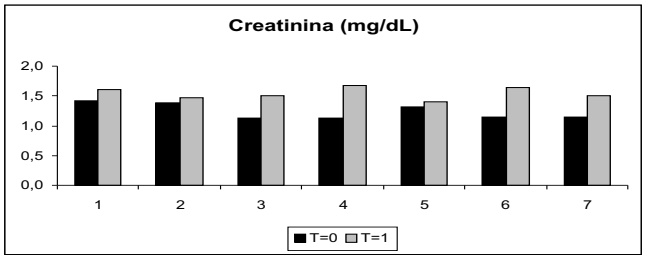
For analysis of the data, techniques of descriptive statistics through average, shunting line minimum and maximum standard, values had been used. E inferencial statistics through test t of Student pareado for difference analysis enters the averages to the level of significance of 95% ($p < 0,05$).

It cannot be made analyzes it of the ammonia concentrations due to difficulty for the same collection of the after test carried through in field.

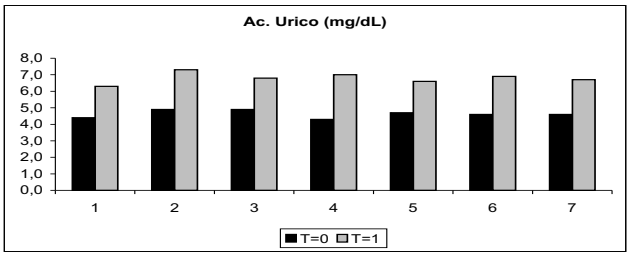
Results:



The protéico organism chosen team when used as energy substratum for the physical activity degrades the amino acid resulting in one of the main final by-products that are analyzed in the blood.



The creatinine is a product of degradation of the creatina during the physical activity, and still it is a pointer of renal function.



The acid úrico is a product of elimination of the metabolism of nitrogen in the human body.

Discussion: The shown results previously indicate that the metabolism of amino acids (degradation of amino acids) is oxidated during the physical activity and concomitantly the cycle of the PNC is used as attempt to keep the energy state of the mitocondrial compartment (ressíntese of the ATP is stimulated by the alteration of relation ATP/ADP). The nitrogenados composites, Urea, creatinina, acid úrico, ammonia are by-products of these reactions in the human metabolism. The activity of high intensity provokes modifications in the cellular metabolism resulting in a probable reduction of energy proceeding from the mitocôndrial matrix, thus causing a reduction of the intensity and duration of the physical activity in the individuals.

Conclusions and Recommendations: It was observed that during the physical activity of long duration and high intensity the human metabolism tends to look the balance saw degradation of energy composites (lipídeos, protein and carboidratos) proceeding from the diet and the compartments of the human body. In this study the macro-nutrients are the amino acids that are in quarrel, due to importance of them during the physical activity, therefore the responsible had ones for the increase of the metabólitos nitrogenados in the blood are these. It knows that during the activity (muscular contraction) of high intensity and long duration the body degrades amino acids to repair fabrics and to keep the energy state next to the balance, in this situation the cellular metabolism chosen team (amino acids) unchains reactions that result in probable by-products that can be analyzed as bio-markers of estresse for the activity of high intensity and long duration, as already cited previously. It is claimed that these by-products (urea, creatinina, acid Úrico and ammonia) are the probable pointers of physical stress, thus, as described others already in literature. One sends regards for future studies numbers differentiated greater of tested individuals, sorts and to use other types of stimulatons so that the study he is next to the ideal.

References:

BANISTER, E. W; CAMERON, B. J. C. **Exercise Induced Hyperammonemia: Peripheral and Central Effects**. International Journal of Sports Medicine. n. 11, p. 129-142, 1990.

BRASS, E. P.; HIATT, W. R. **The Role of Carnitine and Carnitine Supplementation During Exercise in Man and in Individual With Special Needs**. Journal of American College of Nutrtion. v. 17, n. 3, p. 207-215, 1998.

BREMER, J. **Carnitine metabolism and functions**. Physiological Reviews. v. 63, n. 4, p. 1420-80, 1983.

BROBERG, S.; SAHLIM, K. **Adenine Nucleotide Degradation in Human Skeletal Muscle During Prolonged Exercise**. Journal of Applied Physiology. v. 67, p. 116-122, 1989.

BUTTERWORTH, F. R**. Pathophysiology of Hepatic Encephalopathy: A New Look at Ammonia.** Metabolic Brain Disease. v. 17, n. 4, p. 221-227, 2002.

DI LISA, F; BLANK, P. S; COLONNA, R; GAMBASSI, G; SILVERMAN, H. S; STERN, M. D; HANSFORD, R. G. **Mithocondrial Membrane Potential in Single Living Adult Rat Lcardiac Myocites Exposed to Anoxia or Metabolic Inhibition.** Journal of Physiology. v. 486, p. 1-13, 1995.

FELIPO, V; MONFORT, P; KOSKENKO, E; ERCEG, S; CANALES, J. J. **Molecular Mechanism of Acute Ammonia Toxicity: Role of NMDA Receptors**. Neurochemistry International. N. 45, p. 95-102, 2002.

GIANFRANCO, G.; ROBERTA, S.; GIANNI, B. **Carnitine Metabolism in Uremia. American Journal of Kidney Deseases.** v. 38, n. 4, suppl. 1, p. 63-67, 2001.

GRAHAM, T. E.; TURCOTTE, L. P.; KIENS, B.; RICHTER, E. A. **Effect of Endurance Training on Ammonia and Amino Acid Metabolism in Humans**. Medicine Sport Exercise. v. 29, n. 5, p. 646-653, 1997.
GREEN, H; TUPLING, R; ROY, B; O'TOOLE, D; BURNETT, M; :GRANT, S. **Adaptation in Skeletal Muscle Exercise Metabolism to a Sustained Session of Heavy Intermittent Exercise.** American Journal of Physiology and Endocrinol Metabolism. n. 278, p. 118-126, 2000.
HARRIS, R. T.; DUDLEY, G. A. **Exercise Alters the Distribution of Ammonia and Lactate in Blood.** Journal of Applied Physiology. v. 63, p. 313-317, 1989.
HELLSTEN, Y; RICHTER, E. A, KIENS, B, BANGSBO, J. **AMP Deamination and Purine Exchange in Human Skeletal Muscle During and After Intense Exercise**. Journal of Physiology. v. 3, p. 909-920, 1999.
HIATT, W. R.; WOLFEL, E. E.; REGENSTEINER, J. G.; RUFF, L.; BRASS, E. P. **Carnitine Metabolism During Exercise in Humans: Dependence on Skeletal Muscle Metabolic State**. Journal Clinical Investigation. v. 84, p. 1167-1173, 1989.
KRAHENBUHL, S; WACHTER, S; VOGT, M; KREIS, R; BOESCH, C; BIGLER, P; HOPPELER, H. **Long-Term Administration of L-Carnitine to Humans: Effects on Muscle Carnitine Content and Physical Performance**. Clinica Chimica Acta. N. 318, p. 51-61, 2002.
LEMON, P. W. R.; MULLIN, J. Effect **Of Initial Muscle Glycogen Levels on Protein Catabolism During Exercise**. Journal of Applied Physiology. v. 48, p. 624-629, 1980.
LO P. Y.; DUDLEY G. A. **Endurance Training Reduce the Magnitude of Exercise Induce Hyperammonemia in Humans**. Journal of Applied Physiology. v. 62, n. 3, p. 1227-1230, 1987.
LOWENSTEIN, J. M. **The Purine Nucleotide Cycle Revisited**. International Journal of Sport Medicine. v. 11, p. 37-46, 1990.
MACLEAN, D. A.; GRAHAM, T. E.; SALTIM, B. **Stimulation Of Muscle Ammonia Production During Exercise Following Branched-Chain Amino Acid Supplementation In Humans**. Journal Physiology (London). v. 493, p. 909-922, 1996.
MEYER, R. A.; DUDLEY, G. A.; TERJUNG, R. L. **Ammonia and IMP in Different Skeletal Muscle Fibers After Exercise in Rat**. Journal of Applied Physiology. v. 49, n. 6, p. 1037-1041,1980.
REBOUCHE, C. J.; PAULSON, D. J. **Carnitine Metabolism and Function in Humans**. Annual Review of Nutrition. v. 6, p. 41-66, 1986.
SALTIM, B; BLOMSTRAND, E. **Effect of Muscle Glycogen on Glucose, Lactate and Amino Acid Metabolism During Exercise and Recovery in Human Subjects**. Journal of Physiology. v. 1, p. 293-302, 1999
SHONA, L. H; MATTHEW, W. B; ROMAIN, M; BART, B; MICHAEL, G; DAVID, A. J; ASKER, E. J. **Time Course of Performance Change and Fatigue Markers During Intensified in Treined Cyclists**. Journal of Applied Physiology. n. 93, p. 947-956, 2002.
SOOP, M; BJORKMAN, O; CEDERBLAD, G; HANGENFELDT, L; WAHREN, J. **Influence of Carnitine Supplementation on Muscle Substrate and Carnitine Metabolism During Exercise**. Journal of Applied Physiology.v. 64, p. 2394-2399, 1998.
YUAN,Y; SO, R; WONG, S; CHAN, K. M. **Ammonia Threshold Comparison to Lactate Threshold, Correlation to Other Physiological Parameters and Response to Training.** Scandinavian Journal of Medicine Science Sports. n. 12, p. 358-364, 2002.

Laboratório de Fisiologia do Exercício & Medidas e Avaliação - Campus Akxe - Universidade Estácio de Sá
Avenida Prefeito Dulcídio Cardoso 2900, Barra da Tijuca, CEP:22631-021, Rio de Janeiro, RJ, Brasil
Tel: 55 21 30895000 R.6040

INVESTIGATION ABOUT NITROGENATES BOUNDS CONCENTRATION IN PLASMATICS LEVEL OF THE RUNNER DURING AN EXERCISE OF HIGH INTENSITY AND LONG DURATION

Abstract: Physical Activity and mainly the high intensity and long duration great cause stress to the human body modifying temporarily his metabolism. Some products and by-products are formed during this process where the body answers and looks its balance almost that immediately so that this exactly organism can support a load of still bigger exercise in a next event (stress). Being thus the present study has characteristics of the type comparative descriptive of field and objective compare concentrations the blood concentration of Urea. Úric Acid, Ammonia and Creatinine from practicing athletes of Triathlon. The used instrument was the Test of field race with duration of 120 minutes 75-85 % of the maximum heart hate. Had been used 7 individuals with ages between 25 and 44 years old practicing of its at least 6 years. to leave of these boarded subjects it is intended to place in question the interferences of practical activities of long duration and high intensity in the concentration of nitrogenated compound in the blood. The gotten results had been that significant differences ($p<0,05$) for the concentrations Urea, Úric Acid, and Creatinine in the daily pay and the one after test, the Ammonia cannot be dosed because the lack of apparatus for collection in the test place.

Key-Words: Nitrogenades bounds comcemtration, Physical Activity of high intensity and long duration

LA RECHERCHE AU SUJET DE NITROGENATES BONDIT LA CONCENTRATION DANS LE NIVEAU DE PLASMATICS DU COUREUR PENDANT UN EXERCICE DE L'INTENSITÉ ÉLEVÉE ET DE LA LONGUE DURÉE

Abrégé : Effort physique de cause d'activité et principalement d'intensité élevée et de longue durée le grand au corps humain modifiant temporairement son métabolisme. Quelques produits et sous-produits sont formés pendant ce processus où le corps répond et regarde à son équilibre presque qui immédiatement de sorte que cette exactement organization puisse soutenir une charge de plus grand exercice encore dans un prochain événement (effort). Être de ce fait la présente étude fait comparer des caractéristiques du type descriptif comparatif du champ et de l'objectif des concentrations la concentration en sang de l'urée. Acide, ammoniaque et créatinine de Úric des athlètes de pratique de Triathlon. L'instrument utilisé était l'essai de la course de champ avec la durée de 120 minutes 75-85 % de la haine maximum de coeur. Avait été employé 7 individus avec des âges entre 25 et 44 ans de pratique de ses au moins 6 années. au congé de ces sujets embarqués on le prévoit pour placer en question les interférences des activités pratiques de la longue durée et l'intensité élevée dans la concentration de nitrogenated le composé dans le sang. Les résultats obtenus avaient été que les différences significatives pour l'urée de concentrations, l'acide de Úric, et la créatinine dans le salaire quotidien et celle après essai, l'ammoniaque ne peut pas être dosée parce que le manque d'appareil pour la collection dans l'endroit d'essai.

Mots-clés : Nitrogenades bondit le comcemtration, l'activité physique de l'intensité élevée et la longue durée

LA INVESTIGACIÓN SOBRE NITROGENATES LIMITA LA CONCENTRACIÓN EN EL NIVEL DE PLASMATICS DEL CORREDOR DURANTE UN EJERCICIO DE ALTA INTENSIDAD Y DE LA DURACIÓN LARGA

Extracto: Alta de la intensidad y de la duración larga la gran tensión física de la causa de la actividad y principalmente al cuerpo humano que modifica temporalmente su metabolismo. Algunos productos y subproductos se forman durante este proceso donde el cuerpo casi contesta y mira a su equilibrio que inmediatamente de modo que este organismo pueda apoyar exactamente una carga del ejercicio más grande inmóvil en un acontecimiento siguiente (tensión). El ser así el actual estudio hace que las características del tipo descriptivo comparativo de campo y de objetivo comparen concentraciones la concentración de la sangre de la urea. Ácido, amoníaco y creatinina de Úric de atletas practicantes de Triathlon. El instrumento usado era la prueba de la raza del campo con la duración de 120 minutos 75-85 % del odio máximo del corazón. Había sido utilizado 7 individuos con edades entre 25 y 44 años viejo practicar de sus por lo menos 6 años. a la licencia de estos temas subidos se piensa para poner en la pregunta las interferencias de actividades prácticas de la duración larga y la alta intensidad en la concentración de nitrogenated el compuesto en la sangre. Los resultados conseguidos habían sido que las diferencias significativas para la urea de las concentraciones, el ácido de Úric, y la creatinina en el pago diario y la que esta' después de prueba, el amoníaco no se puede dosificar porque la carencia del aparato para la colección en el lugar de la prueba. **Palabras claves**: Nitrogenades limita el comcemtration, la actividad física de alta intensidad y la duración larga

INVESTIGAÇÃO DA CONCENTRAÇÃO DE COMPOSTOS NITROGENADOS NA CONCENTRAÇÃO PLASMÁTICA DE ATLETAS DURANTE O EXERCÍCIO E ALTA INTENSIDADE E LONGA DURAÇÃO

Resumo: O exercício físico e principalmente o de alta intensidade e longa duração causa grande estresse ao corpo humano modificando temporariamente seu metabolismo. Vários produtos e subprodutos são formados durante este processo onde o corpo responde e procura seu equilíbrio quase que de imediato para que este mesmo organismo possa suportar uma carga de exercício ainda maior num próximo evento (estresse). Sendo assim o presente estudo tem características do tipo pesquisa descritiva comparativa de campo e objetiva comparar as concentrações plasmáticas de Uréia Ac. Úrico, Amônia e Creatinina de atletas praticantes de Triathlon. O instrumento utilizado foi o Teste de campo de corrida com duração de 120 minutos a 75-85 % da Freqüência Cardíaca máxima foram utilizados 7 indivíduos com idades entre 25 e 44 anos praticantes de suas modalidade há pelo menos 6 anos. Com isso, a partir desses assuntos abordados pretende-se colocar em questão as interferências da prática de atividades de longa duração e alta intensidade na concentração de compostos nitrogenados no sangue. Os resultados obtidos foram que ocorreram diferenças significativas ($p<0,05$) para as concentrações de Uréia, Ac. Úrico, e Creatinina no pré e no pós- teste, a amônia não pode ser dosada devido a falta de aparato para coleta no local de teste.

Palavras-Chave: Bases Nitrogenadas, Exercício de alta intensidade e longa duração.