

Comparison of immunological variables between soccer players from sub-15, sub-17 and professional categories

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The aim of this study was to compare blood immunological variables between soccer players of different categories. The sample was comprised of players from sub-15 (n = 23, age 14.9 ± 0.3 years, body weight 63.1 ± 6.2 kg and height 173.4 ± 5.8 cm), sub -17 (n = 18, age 16.4 ± 0.5 years, body weight 71.6 ± 7.3 kg and height 176.5 ± 5.6 cm) and professional (n = 22, age 23.6 ± 3.7 years, body weight 72.7 ± 4.3 kg and height 177.6 ± 4.6 cm) categories. Variables evaluated were: total leukocytes (LEU, $10^3/\text{mm}^3$), lymphocytes (LYM, $10^3/\text{mm}^3$) and monocytes (MONO, $10^3/\text{mm}^3$). The count of immunological variables was performed by an automated counter (ColterT-890). Comparison between categories was performed by one way analysis of variance (ANOVA) followed by post hoc Sheffé, with a significance level of $P < 0.05$. There were no significant differences for LEU, and higher values were found for LYM in the sub-15 (2.7 ± 0.6) compared with professional category (2.3 ± 0.4). MONO values were significantly lower in the professional category (0.3 ± 0.1) than for sub-15 (0.6 ± 0.2) and sub-17 (0.6 ± 0.2). We conclude that the soccer players in the professional category have lower values in immune cell counts compared with players of sub-15 and sub-17 categories.

Keywords: soccer, immune system, men.

Effects of exercise training on myostatin protein expression in dexamethasone-induced muscle atrophy

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Muscle atrophy is always associated with Dexamethasone (Dexa) treatment, however the mechanisms are not completely understood. This study investigated the effects of Dexa on myostatin protein expression and if previous exercise training (T) can attenuate these effects. Thirty-two rats were distributed into 4 groups: sedentary control (SC), sedentary treated with Dexa (SD; 0.5 mg/kg per day, *i.p.*, 10 days), trained control (TC) and trained treated with Dexa (TD) and underwent a training period where they were either submitted to a running protocol (60% of physical capacity, 5 days/week for 8 weeks) or kept sedentary. After T period, animals underwent Dexa treatment concomitant with training. Western blot analysis was performed to identify myostatin protein expression in the tibialis anterior (TA) muscle. Ten days of Dexa treatment increased fasting glucose (SD=+88%), however previous T attenuated this increase (TD=+24%, $p<0.05$). Dexa determined significant decrease in body weight in SD (-20%) followed by TA reduction (-23%). Training could not avoid these decreases. Myostatin protein expression was not significantly modified by 10 days of Dexa treatment (+12%) which was not affected by T (TD= +5%). The results of this study allowed us to conclude that previous training attenuates the hyperglycemia induced by Dexa, however it did not prevent the body or muscle weight reductions. Even in the presence of muscle atrophy, the expression of myostatin were similar among groups, suggesting that other catabolic proteins may be involved in the process of muscle atrophy induced by 10 days of Dexa treatment. **Financial support:** FAPESP.

Keywords: Exercise, glucocorticoids, muscle atrophy, myostatin.

Influence of position on vertical jump values and performance of 10, 20 and 30 m on players soccer

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The purpose of this study was to compare the values of the vertical Jump Squat jumping (SJ) and Countermovement Jump (CMJ) with the time in seconds (s) on 10 (T₁₀), 20 (T₂₀) and 30 meters (T₃₀) players in different positions and the categories U-15, U-17 and U-20. One hundred and fifty-three football players were subjected to tests for vertical jumps CMJ and SJ and speeds T₁₀, T₂₀ and T₃₀. Data were partitioned according to category (U15, U17 and U20) and positioning (Goalkeeper, Defenders, Lateral, Midfielders and Forwards). Comparison of data was conducted with the analysis of variance test (ANOVA One Way), followed where necessary by post hoc Tukey test with significance level at P<0.05. No significant differences were observed between positions. Concerning the categories observed which the values from SJ (40.43 ± 3.80 cm), CMJ (45.13 ± 4.16 cm) of the players belonging to the category Sub-20 were significantly better than the values observed in U-15 (SJ = 36.01 ± 4.78 cm and CMJ = 37.72 ± 4.40 cm), and U-17 (SJ = 35.46 ± 3.96 cm and CMJ = 37.87 ± 3.74 cm). For time values (s) performance of category U-17 was better just in T₃₀ (3.98 ± 0.56) when compared with the category U-15 (4.86 ± 0.35). Therefore it can be concluded that: 1-) Values from vertical jumps and time (s) have not been influenced by positioning in the field; 2-) players belonging to the category Sub-20 showed superior results.

Keywords: Vertical jump, performance, soccer, players.

The effect of static loads on the performance of swimmers in the course of 25-meters in front crawl mode

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Postactivation potentiation (PAP) is a phenomenon that occurs after maximal or submaximal contraction in which muscular features and structures are reinforced, increasing strength and power performance. The PAP response has been observed in both animal and human research, leading to a discussion about its sports applicability.

The objective of this study was to verify the effect of static load in the performance of swimmers in the 25 meter front crawl. Nine swimmers (male, 19.5 ± 2.11 years old; corporal weight: 74.5 ± 5.54 kg; height: 1.80 ± 0.07 m; training time: 9.25 ± 2.96 years; training volume on the last two weeks: $4.600 \pm 821, 58$ m), performed a standard warm-up, first sprint (test 1), 10-minute interval, second sprint (test 2), execution of static loads, 10-minute interval, and third sprint (test 3). Sprint time (8.37 seconds ± 0.005) and speed (1.793 meters/second ± 0.001); frequency (1.02 armful/second ± 0.005); length (1.76 meters ± 0.01) and stroke cycle (8.73 cycles ± 0.23) was obtained by filming the sprints. There was no significant difference in the variables ($p > 0.05$). Finding no difference among the sprints for all variables can be explained because it is a sport whose technique represents a close relation with performance; the volume, intensity and contraction type, individual features (fiber type, muscular strength and training level) are variables that must be analyzed for the applicability of the PAP maneuver. In this study, it was concluded, that the protocol used neither increased nor decreased the performance in front crawl after two maximal static loads.

Keywords: Postactivation potentiation, swimmers.

Analysis of fatigue index of flexors and extensors of knee in female indoor soccer players

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The change in torque production due to fatigue can increase susceptibility to muscle injury. The aim of this pilot study was to analyze the fatigue index of the flexors and extensors of the knee in female indoor soccer players through an isokinetic dynamometer (Biodex System Pro4). Four female UNICAMP indoor soccer players participated, aged 23.0 ± 2.2 years. The assessment consisted of one set of 30 concentric repetitions in extension / flexion of the knee limb kicking at an angular velocity of 180°/s. By reason of work between the first and last repetition, it was possible to characterize the fatigue index (FI) in athletes ($> 20\%$). The FI was achieved by three volunteers (37.6% / 31.3%; 29.9% / 38.9%; 25.4% / 25.6%) for extensor and flexor, respectively, where one of the volunteers did not reach in both muscles (14.1% - 9,0%). The decrease in torque production of extensor and flexor muscles in the limb was evaluated over the repetitions and was quantified by the percentage of decline, with values of 39.1% - 30.7% - 26.2% in extensors and 39.2% - 33.2% - 44.1% in flexors. This study observed that the decrease of torque caused by fatigue may predispose the female indoor soccer players to knee muscle injuries in the kicking limb. **Financial support:** CNPq (Proc. n°: 131728/2011-3 - 304989/2009-6 - 472755/2008-0).

Keywords: Fatigue index, torque, isokinetic.

Metabolic syndrome in rats at different ages

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The Metabolic Syndrome is associated with risk factors for cardiovascular diseases and diabetes. A lot known about Metabolic Syndrome comes from studies with animals, and an important factor that leads to the manifestation of metabolic syndrome is aging. Glucose tolerance was analyzed through an oral glucose tolerance test (GTT) and serum concentrations of glucose in Wistar rats, albino variation, in different ages. The rats were fed with balanced standard rodent food and kept in groups in plastic cages. They were evaluated when they were two (young age), four (medium age), six (adult age) and twelve (maturity) months old according to: glucose tolerance (GTT) and serum concentrations of glucose fasting. GTT was analyzed after 12 hours of fasting. Blood samples were collected before and after 30, 60 and 120 minutes from the administration of oral glucose (2 g/kg) to determine the glucose concentrations in order to calculate the area under the curve of glucose. After the rats were sacrificed, serum was used to measure glucose. Two-Way ANOVA ($p < 0.05$), and Newman-Keuls Post-Hoc were used when necessary. Glucose (mg/dL) in rats aged: 2 months old – 98 ± 14^a ; 4 months old – 109 ± 8^a ; 6 months old – 119 ± 29^a ; 12 months old – 152 ± 29^b . Area under the glucose curve (mg/dl 120 min): 2 months old - 9768 ± 3326 ; 4 months old – 10670 ± 2094 ; 6 months old - 11205 ± 1004 ; 12 months old - 12314 ± 1122 . Different letters indicate statistically significant differences (Two-way ANOVA and Newman-Keuls post hoc, $P < 0.05$). Serial glucose varied according to the age of the animals. However, it was not certified as glucose intolerance through the glucose tolerance test.

Keywords: Metabolic syndrome, Wistar rats, age.

Effects of supplementation with sugar cane in oxidative stress markers in the blood of rats submitted to nine weeks of training on a treadmill

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Sugar cane juice is rich in water and sucrose also containing some antioxidants. Thus, it could be a good candidate to be used in the recovery after training to restore glycogen and to minimize the deleterious effect caused by increasing free radicals production. Our purpose was to investigate the effect of sugar cane supplementation in markers of oxidative stress in rats submitted to nine weeks of training which increased in intensity and volume until 25m/min and 60min. The rats had been divided in the following groups: sedentary, trained, trained supplemented with sugar cane juice, maltodextrin and quercetin through gavage after the exercise in the 7^a, 8^a and 9^a weeks. The performance tests were made before and after 4^a, 8^a and 9^a weeks. Sample collection and analyses were made 24h after the performance test. All groups presented significant performance increases at nine weeks of training compared to sedentary, without differences between the trained and supplemented groups. We found significant increased muscular glycogen (25.44 ± 5.23 ; 33.70 ± 8.92 ; 31.87 ± 8.47 ; 34.77 ± 5.86 ; 29.12 ± 4.08 mmol/100g tissue), increased catalase activity and a reduction in the total antioxidant capacity in all trained groups. There was no significant difference in TBARS concentrations. These results indicate that all animals were well adapted to the training protocol and presented a good recovery after 24h of the last training session even without supplementation. Sugar cane juice can be used as a practical food option after training without interference with the adaptive process.

Keywords: Sugar cane juice, training, oxidative stress, adaptation.

Phasic muscles respond promptly to eccentric training after immobilization than tonic muscles

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The maintenance of skeletal muscle cytoarchitecture requires a minimum amount of repetitive loads. The aim of this study was to evaluate the recovery of rat soleus and plantaris muscles submitted to disuse and later rehabilitated with eccentric training using lesser diameter and proportion of different fiber types as quantitative variables. Twenty-seven female Wistar rats were divided into six groups: Immobilized, Immobilized Control, Immobilized and trained by eccentric exercise during 10 days, Control 10 days, Immobilized and trained by eccentric exercise during 21 days and Control 21 days. Fragments of soleus and plantaris muscles were frozen and processed by the mATPase method. The immobilization procedure in soleus induced significant reduction in lesser diameter of the type I, type IIA and type IIAD fibers, increased the proportion of type IIC and decreased the proportion of type I fibers. Eccentric training recovered those modified values just after 21 days of training. The plantar muscle seems to be restored in a shorter period of training, whereas this muscle was less affected by immobilization. The rehabilitation protocol based on eccentric exercise showed that tonic muscles require long period of training to reestablish the variables adopted here.

Keywords: Soleus and Plantaris muscles, type fibers, lesser diameter, immobilization, eccentric exercise.

Analysis of the classification of body mass index, fat percentage and physical activity level in boys of public and private school in Santa Barbara d'Oeste

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In recent years, the number of children and adolescents overweight has been increasing. Thus, the objective of this study was to compare the classification of body mass index (BMI), fat percentage and physical activity level (PAL) in boys from 11 to 14 years old in Santa Barbara d'Oeste / SP, according to the type of school attended. 64 boys were evaluated, 15 belonged to the public school and 49 belonged to private school and were measured on body mass and height to calculate BMI, while fat percentage was estimated using the protocol of Slaughter and to assess the level of physical activity the International Physical Activity Questionnaire (IPAQ), short version was administered. BMI was classified according to the criteria proposed by Cole et al. and percentage of fat was classified according Lohman, Roche and Martorell. We used the chi-square and significance level was set at $p < 0.05$. Among all variables difference was found only for BMI classification for classifying overweight, which was higher in the private school (45%). There was no difference in the percentage of fat, but it was observed that both the public (53%) and our private school (71%) most of the boys belong to the classification above recommended. As for the PAL, an important part of boys in private school (26%) were considered inactive. The results indicate that there are large numbers of students with percentage of fat above the recommended level in both schools, and that being overweight was higher in the private school students, where many children were classified as inactive. **Financial Support:** PROSUP-CAPES

Keywords: Boys, body mass index, physical activity.

Prevalence of self-related non-communicable diseases in workers

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The number of people with non-communicable diseases has been growing all around the world due to the elevated number of sedentary people. The aim of this study was to analyze the prevalence of self-related non-communicable diseases in the workplace. Four companies, which had predominantly inside office job positions of were randomized in Londrina, Paraná, Brazil. 190 workers participated in the research during their working hours. They filled in The Quality of Life and Health questionnaire (QVS-80) validated in Brazil. The workers average age was 25.56 ± 6.00 , an average weight of $68.72\text{kg} \pm 14.85\text{kg}$, an average height of $1.70\text{m} \pm 11.81\text{cm}$ and an average BMI of $23.86\text{kg/m}^2 \pm 7.70\text{kg/m}^2$. In the present study there were no cases of diabetes; high cholesterol prevalence observed was 5.3% (10); the prevalence of asthma was 15.8% (30); prevalence of high blood pressure was 0.01% (2); and thyroid gland problems prevalence was 3.7% (7). Comparing this study with national numbers, it was observed that just asthma had a higher number than the national scale, and every other variable seemed to be underestimated. This research shows the importance of using objective measures, such as blood samples, to assess worker's risks factors for developing non-communicable diseases. As it is called a silent illnesses, sometimes the late discovery of these diseases can complicate the treatment.

Keywords: Non-communicable disease, workplace, risk factors.

Correlations between maximal oxygen uptake and cardiovascular risk factors after 16 weeks of aerobic training in low risk middle-aged men

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A large number of cardiovascular (CV) events occur on asymptomatic or low risk individuals. C-reactive protein (CRP) has been shown as an alternative for risk prediction especially in a low risk population. Aerobic Training (AT) has been recommended for the prevention of CV diseases. This research has the goal verifying the effects of AT on correlations between Maximal Oxygen uptake (VO_{2max}) and CV risk factors. Eight healthy and non-physically active men (47.1 ± 4.3 years) were part of AT composed by 16-training wks (3 d.wk^{-1}) of 60 min running at 60 to 80% of the maximal velocity achieved on the treadmill test. All the analyses were assessed before and after the 16 wks, consisting of: waist circumference, arterial pressure; full lipid profile, glucose, high sensitivity CRP assessed according to the specifications of the kits manufacturers and VO_{2max} by maximum effort protocol in a treadmill with gas exchange data collected. Spearman's correlations were calculated and the significance was set at $p < 0.05$. The correlation coefficients before AT were: Triglycerides vs. VO_{2max} ($r = -0.83$; $p = 0.01$), Waist Circumference vs. VO_{2max} ($r = -0.85$; $p = 0.01$), Glucose vs. VO_{2max} ($r = -0.78$; $p = 0.02$), CRP vs. VO_{2max} ($r = -0.75$; $p = 0.03$) and after AT: CRP vs. VO_{2max} ($r = -0.71$; $p = 0.04$). The aerobic fitness level of sedentary individuals are strongly correlated with risk factors including CRP, however, after AT these correlations disappear or at least slowed, suggesting that improvements on VO_{2max} can decrease CV risk even for low risk individuals.

Keywords: Aerobic Training, cardiovascular disease, risk factors, inflammatory biomarkers, C-Reactive Protein.

Preliminary study of influence of functional fitness levels on risk profile of cardiovascular disease in elderly people: effect on blood pressure.

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Hypertension has been considered the main risk factor of cardiovascular disease and physical exercise is strongly recommended to prevent individuals from having high blood pressure (BP). However, there is no consensus about the best combination of type, intensity and frequency to achieve such benefits. The evaluation of multicomponent functional fitness seems to be more appropriate for general fitness instead of a specific training program. The purpose of this study was to investigate the relation between general functional fitness index (GFFI) and BP levels. All participants (66 adults and elderly) answered the *International Physical Activity Questionnaire* (IPAQ – short version) and performed the indirect maximal oxygen uptake (VO₂max) by 1 mile walk test and the AAHPERD Functional Fitness Battery as described previously. The GFFI was calculated using the sum of the percentile score of each test and then used to categorize participants (G1 – regular GFFI / G2 – good GFFI / G3 – very good GFFI). Resting BP was measured on three separate days. Pearson correlation coefficient showed correlation between GFFI and VO₂max ($r=0.7 / p<0.01$) and correlation between GFFI and systolic blood pressure (SBP) ($r= -0.4 / p<0.01$). No correlation was found with IPAQ results. ANOVA showed that VO₂max (G1 - 21.7, G2 – 30.9 and G3 – 37.7 ml/kg/min) and SBP (G1 – 129.9, G2 – 123.3 and G3 – 114.4 mmHg) were different among groups. This finding strengthens the hypothesis that utilizing GFFI seems to be more appropriate than assessing only the exercise performed and the relation to BP may be mediated by GFFI.

Keywords: Elderly, functional fitness, blood pressure, physical exercise.

Muscle damage and inflammatory responses to resistance-training with eccentric overload

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The time course of muscle damage and inflammatory responses to resistance-training with eccentric overload (EO) was observed. Eight subjects (3♀; 5♂-23.8±2.6 years; 70.9±12.7kg; 1.7±0.08m; %body fat: 23.6±4.3) underwent 13 training sessions (4x8-10 eccentric-only repetitions-80% eccentric 1RM, 1' rest, 2xweek⁻¹, for three large muscle group exercises). Blood samples (BS) were collected at Pre, post two (P2), four (P4), seven (P7), nine (P9), eleven (P11), and thirteen (P13) sessions, and 96h after the last session. Significant and biologically relevant differences between consecutive BS were verified by the reference change value and reference interval (RI). Significant individual variation from previous analysis were observed for CK: four subjects at P2 (+1719%, +1250%, +1281%, +312%), and two at P13 (+391%, +139%); CRP: six at P2 (+1100%, +243%, +3800%, +2500%, +1400%, +2400%), one at P4 (+567%), other at P9 (+3200%), three at P11 (+300%, +3400%, +3900%), and other at P13 (+1500% from P11); NEUTR: one at P2 (+90%) and P4 (-71%) and other P13 (+60%); WBC: one at P2 (+53%), P4 (-57%), P7 (+71%) and P9 (+49%); LYNF: one at P7 (+344%), P9 (+57%) and P13 (-44%); PLT: one at P4 (-25%). EO induced muscle damage in the initial phase of the program with subsequent attenuation. CRP responses did not correlate to CK, emphasizing that CRP response may be associated to damage in non-skeletal muscle tissue. Few subjects presented inflammatory responses, but others may have expressed an early acute-phase process not detected 96h after. Comparisons with RI were not useful since significant changes were within the normal limits.

Keywords: Creatine kinase, C-reactive protein, neutrophils.

Functional Core Training and Body Composition

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The name of Functional Core Training has emerged as a new source of high-performance sports training in the early 90s, with techniques from rehabilitation, athletics, weightlifting, gymnastics and strategies of conditioning found in many sports modalities, aiming to increase power production and stability. In view of the conceptual evolution of functional training which is intended not only for athletes, but for all individuals, the main objective of this study was evaluate the influence of a functional training program using the core methodology on body composition of physically active adults. Participants were 10 individuals, 2 males and 8 females, with mean age of 31.69 ± 10.32 years, residents of the city of Maringá/ PR. They were followed for 1 month, having weekly frequency of three sessions lasting about 60 minutes. Variables measured were the levels of body weight, Body Mass Index (BMI) and body fat percentage (%BF) before and after the training period. The obtained data were submitted to descriptive and inferential statistics. The average rates achieved in the first assessment were 65.36 ± 17.11 Kg in body weight, 22.86 ± 3.84 Kg/m² BMI and 26.51 ± 3.52 %BF. In the second evaluation was obtained 64.58 ± 16.70 Kg in body weight, 23.10 ± 4.00 Kg/m² of BMI and 24.54 ± 3.88 %BF. There was no statistical difference between the assessments ($p > 0.05$). It is possible to conclude, therefore, that Functional Core Training can be effective for reducing the rates of relative body fat.

Keywords: Functional, core, training.

Lipid profile of rats subjected to high intake of sucrose and swimming training.

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To study the impact of sucrose supplementation associated or not to swimming on the lipid profile, Wistar male rats (n=10 per group) were divided in Control (C), Sucrose (S), Exercise (E) and Sucrose+Exercise (SE), and, the E and SE groups were submitted to swimming training (3 sessions at 60 min/week during 12 weeks nearly the anaerobic threshold intensity). We evaluated the daily consumption of water, sucrose, food, caloric intake and changes in body mass during 12 weeks. After this period, we analyzed the biometric parameters and blood determination of total cholesterol, HDL-cholesterol and triglycerides by spectrophotometry. Data were analyzed using ANOVA and Tukey post-test. Our results show that the volume of aerobic exercise induced by swimming proposed in this study was effective to decrease in triglycerides, total cholesterol and an increase in HDL-cholesterol when compared to groups C and S, and suggest that swimming and sucrose supplementation are a good model for the link between exercise and nutrition studies. **Financial Support:** CAPES.

Keywords: Swimming training, sucrose intake, lipid profile.

Influence of a personalized training program on the body composition of adults.

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Epidemiological studies conducted recently found changes in lifestyle and eating habits in the past decades. So individuals have given great importance to their quality of life, resulting in an increased demand for personalized exercises, which is a form of training which may vary according to interests, goals, previous experiences and initial levels of fitness. Thus, keeping in view the growth of approximately 25% of demand for personal training per year and the benefits gained from the practice of that activity, the present study possessed as a main objective to analyze the influence of a personalized training program on body composition of adults. Participants were 12 individuals, physically active, entering a systematic personal training program at a gym for a 3 month period with a weekly attendance of 3 sessions for 60 minutes each, in the city of Maringá - PR. Descriptive (mean and standard deviation) and inferential (*t* test) statistics were used to analyze the data. The obtained results showed that the female population had increased Weight, Body Mass Index (BMI), Total Fat (TF), Muscle Mass (MM), and a reduction in rates of Body Fat % (BF%) and Waist-Hip Ratio. The male population increased the MM values and the values of Weight, BMI, BF% and TF reduced when compared to the first assessment. No significant difference among the analyzed variables was found ($p>0.05$). It is possible to conclude that a personalized program of resistance exercise provides improvements in body composition, being effective for reducing body fat indexes and increased muscle mass levels.

Keywords: Personalized training, body composition.

The success rate in the determination of lactate minimum intensity using glucose and lactate concentration in basketball players

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The lactate minimum test (LM) has been considered an important protocol to determine aerobic capacity and represents the maximal exercise load in which the lactate/glucose production rate is the same as the lactate/glucose removal rate. The purpose was to verify the success rate in the determination of LM using glucose and lactate concentration in basketball players using second order polynomial fit. Eleven basketball players were evaluated by LM using glucose and lactate concentration. The success rate in the determination of LM was obtained, using as criteria the presence of the fit in form of “U” and between lactate/glucose versus intensity (Km/h). The lactate/glucose elevation consisted of 6 maximum sprints of 35 m separated by 10 s recovery each. The progressive phase consisted of 4 periods (3 min). Each period velocity progressive was controlled by the electronic metronome (8, 10, 11 and 12 Km/h) in a 20 m distance. After lactate/glucose elevation phase and progressive periods, 25µL samples of blood were collected to determine lactate and glucose concentration and relative lactate and glucose minimum concentration. The LM intensity using glucose and lactate concentration were 9.05 ± 0.16 (Km/h) and 8.97 ± 0.51 (Km/h) respectively. The success rates were 18% and 54% for glucose and lactate respectively. The LM obtained from lactate protocol showed better assurance than glucose for basketball players.

Keywords: Anaerobic threshold, lactate minimum test, glucose, basketball.

Ability of practical parameters proposed to assess the hydration status after exercise

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The hydration status of an athlete can be one of the factors that influence the performance decrement mainly during long-duration exercises. The determination of this status through urine analysis can be made by osmolality (gold standard) or by indirect measurements such as specific gravity and color, associated with body weight variation. The goal of this study was to analyze the ability of hydration status determination through these indirect measures, compared to urine osmolality after a 10km road race. Urine samples and anthropometric measurements of 38 runners were taken before and after the race to determine the hydration status of individuals. We observed a correlation between the urine osmolality and specific gravity before and after the run ($R=0.75$; $p<0.0001$). Only five subjects had differing hydration state between the methods. These results may be associated with the presence of heavy molecules in the urine of these volunteers, such as bilirubin, hemoglobin, leukocytes, which may influence the outcome of urine specific gravity sorting these athletes as dehydrated. Our data suggest that the analysis of urine density and color associated with the variation in body weight are practical and reliable ways of assessing the hydration status of athletes. Nevertheless, it is important to take caution in the results interpretation when the dipstick indicates the presence of heavy molecules, which can generate a false result for dehydration.

Keywords: Hydration status, urine osmolality, urine specific gravity, variation of body weight, urine color.

The action of branched-chain amino acid in soleus muscle of rats denervated and immobilized

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Research shows that Branched Chain Amino Acids (BCAA) are able to promote protein anabolism, assisting in insulin secretion, especially in the reduction of muscle damage caused by the practice of physical activity of high intensity. Its objective is to analyze histologically the effect of BCAA in the soleus muscle of rats immobilized and denervated. Thirty rats male Wistar (250 - 300g) were divided into six groups (n = 6): control (C), immobilized with acrylic resin orthosis for 7 days (I), denervated (sciatic left) for 7 days (D), 7 days supplemented with BCAA (BCAA), immobilized 7 days supplemented with BCAA (I + BCAA) and denervated 7 days supplemented with BCAA (D + BCAA). Soleus muscles were properly treated for staining with hematoxylin and eosin (HE). Areas of the transverse sections of the soleus were obtained by Software Image-Pro Plus 6.0. We used the Shapiro-Wilk and Kolmogorov-Smirnov test to verify the normal distribution of data and Kruskal-Wallis test followed by Dunn for comparisons between groups, considering a significance level of 5%. Group I showed significant reduction ($p < 0.05$) 53% fibers area and group D, 66.5%. However, this reduction was attenuated with the use of BCAA, so, the group I + BCAA recovered 74.9% of the area of its fibers, in relation to group I and group D + BCAA, and recovered 50.3%, compared to group D. It is concluded that supplementation with BCAA may be an important treatment, aimed at mitigation of fiber atrophy of the soleus muscle denervated or immobilized.

Keywords: Branched chain amino acids, denervation, immobilization, muscle, rats.

The action of valine in skeletal muscle denervated in rats

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Nutritional supplementation is a viable resource when seeking to improve relations between metabolizable substrate concentration and performance. The aim of this study was to evaluate the behavior of glycogen reserves (G) in soleus (S), white gastrocnemius (WG) and red gastrocnemius (RG) of denervated rats supplemented with valine, as well as the weight of S. Wistar rats (3-4 months) were divided into 4 groups (n = 6): control (C), 7 days denervated (sciatic left) (D), treated with valine (7 days, 0.25 mM/100g VO) (V) and treated denervated with valine (DV). Statistical analysis applied the normality test followed by ANOVA and Tukey (p <0.05). The results showed that D was reduced in G (30% in S, 20% in WG and 43% in RG). The V group presented an increase in G (7% in S, 6% and 5% in WG RG). In comparison with the DV D showed that the latter had higher G (16% in S, 18% in WG and 20% in RG). With respect to the weight of S was found to be reduced in D (22%) and no difference in V and DV indicating inefficiency of the amino acid to minimize the atrophy. The results show that modulation of the nutritional status is one of the sites linked to more incisive action of valine, expressing action in the strongest when energy sources are compromised, as is the case of denervation, however, did not express anti-catabolic action, reason by which this amino acid is accompanied by other complex in the BCAA.

Keywords: Valine, denervation, glycogen, muscle, rats.

Action of resistance training and raloxifene on markers of bone metabolism in rats acyclic

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Important advances have occurred in the understanding of bone cells and interactions with local and systemic factors that regulate the activity of these cells. The estrogen deficiency that affects women during menopause is essential in the development of osteoporosis. Thus, this study aims to examine whether resistance training (RT) and raloxifene (RLX), as well as their association, improves bone quality of acyclic rats. RT was conducted in steps and consisted of 4 sets of 5 reps three times a week for 4 months in rats from 14 to 18 months who received RLX (1mg/kg bw/day) or saline by gavage. For the RT protocol was tested for maximum strength using steel balls in tubes attached to the animal's tail until it reached the concentric failure, then it was estimated 20% of the maximum force of animals and weekly load was increased by 10% to 80% of maximum force. Earlier the 3^o and 4^o month the maximum strength test was revised to suit the load. After 120 days of the RT and/or RLX, the animals were anesthetized and blood was collected, separated by centrifugation at 2^oC and stored frozen until the day for analysis of the markers of bone metabolism. Serum levels of osteocalcin in rats with a combination of RLX / RT were decreased, suggesting decreased bone turnover, which was also evidenced by decreased serum tartrate resistant acid phosphatase in intact rats that received RLX / RT. **Financial Support:**CAPES 2010/03112-6; FAPESP2010/09393-7

Keywords: Raloxifene, bone, resistance training, estropause.

Influence of resistance training protocols on bone mineral density in intact rats acyclic

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Exercise has been shown to be a great ally in the prevention of osteoporosis, particularly resistance exercise, since strength training causes osteogenesis due to increased mechanical stress. The process of bone remodeling induced by overload is accomplished by the action of osteocytes, which act as mechanical receptors of the applied stress and send signals to recruit osteoblasts and osteoclasts, resulting in a gain or bone loss. This study aims to evaluate two different resistance training protocols on the ladder. For this study twenty female Wistar rats were randomly divided into two groups, the first group held a four-month climb on the ladder with 80% of maximum force and the second group held ladder climbing for four months with a gradual increase of the load of 20 to 80% of maximum force. The maximum force of animals is achieved through a test where they are engaged in these animals two tail pipes load (steel balls) and they begin climbing the ladder, each adds to rising steel balls (10 in 10 grams) until there is concentric failure, the maximum force is considered prior to failure. The images of the bones were captured and analyzed with specific software for testing in small animals, obtaining the following variables: bone mineral content (BMC), area and bone mineral density (BMD) in densitometer DPX-ALPH. The results did not show statistical differences between the two training protocols, suggesting that the second protocol may have wider applicability due to the gradual adaptation to the proposed training. **Financial support:** CAPES 2010/03112-6 FAPESP2010/09393-7

Keywords: Bone, osteoporosis, estropause, exercise, resistance training.

Resistance training reduces the hyperphagia and obesity induced by estrogen absence in ovariectomized rats

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Aim: To analyze the effects of the resistance training in food intake and visceral adipose tissue in rats subjected to ovariectomy, *wistar* rats were randomly assigned to 4 groups, treated with chow diet and submitted or not to resistance training (RT)/ovariectomized (OVX). The training consisted of climbing sessions that were performed three times a week for 10 wks. It consisted of 4-8 ladder climbs while carrying progressively heavier loads attached to the tail. The rats were killed 70h after the last session of training and the mesenteric and parametrial adipose tissue was immediately weighed. ANOVA two way was applied with *Fisher* pós hoc tests ($p \leq 0.05$). Comparing Sham sed with OVX sed, the ovariectomy increased food intake (20.58 ± 0.18 versus 23.15 ± 0.18); parametrial fat (8.52 ± 0.89 versus 11.03 ± 1.84) and mesenteric fat depot (4.28 ± 0.34 versus 6.72 ± 0.81). In relation to OVX sed the exercise decreased the food intake in the OVX RT (23.15 ± 0.18 versus 21.44 ± 0.19) and mesenteric fat (6.72 ± 0.81 versus 5.18 ± 0.27). What caught our attention in the results was that the exercise protocol was able to reverse both the hyperphagia and increase of fat depots promoted by ovariectomy, being equal to the values observed in intact rats. Thus, the results suggest that resistance training can be also used in the reduction and control of unwanted effects promoted by the absence of estrogen.

FAPESP, CNPq and CAPES.

Keywords: Resistance training; ovariectomy; adipose tissue; rats

Relationship between aerobic fitness and running anaerobic sprint test (RAST) in young soccer players

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The purpose of the study was to examine the relationships between RAST parameters and variables related to aerobic power, maximal oxygen uptake (VO_{2Prsk}), velocity correspondent to VO_{2Peak} (iVO_{2Peak}) and aerobic capacity (OBLA) in young soccer players. Eight under-17 (U17) soccer players (16.25 ± 1.16 years, 174.5 ± 3.7 cm and 64.8 ± 4.7 kg) took part in the study. The participants were submitted to an exhaustive progressive test on a treadmill to determine VO_{2Peak} absolute (VO_{2PA}), relative (VO_{2PR}), iVO_{2Peak} and OBLA. The OBLA was expressed as a percentage of iVO_{2Peak} ($OBLA_{\%iVO_{2Peak}}$) and intensity corresponding to 3.5 mM lactate ($vOBLA$). After at least 24 hours, subjects performed six maximal sprints of 35m with 10 seconds of passive recovery (RAST) to determine peak, mean and minimum power (PP , PM , $Pmin$, respectively), absolute ($_{ABS}$) and relative ($_{REL}$), fatigue index (FI), peak, mean and minimum velocity (V_{PEA} , V_{MEA} , V_{MIN} , respectively). Pearson correlations were used to assess the relationship between aerobic variables and RAST parameters ($p < 0.05$). There was no significant correlation between $vOBLA$ (11.55 ± 2.38 km.h⁻¹), $OBLA_{\%iVO_{2Peak}}$ ($74.32 \pm 11.39\%$), VO_{2PR} (52.53 ± 6.23 ml.kg⁻¹.min⁻¹) and RAST parameters. However a significant negative correlation was found between VO_{2PA} (3.39 ± 0.452 L.min⁻¹) and IF ($34.07 \pm 6.63\%$) ($r = -0.71$). Moreover a significant correlation was found between iVO_{2Peak} (74.32 ± 11.39 km.h⁻¹) and PM_{ABS} (555.92 ± 74.73 W, $r = 0.80$), $Pmin_{ABS}$ (441.70 ± 77.92 W; $r = 0.54$), PP_{REL} (10.34 ± 1.39 W.kg⁻¹, $r = 0.72$) $Pmin_{REL}$ (6.83 ± 1.12 W.kg⁻¹, $r = 0.85$), PM_{REL} (8.61 ± 1.21 W.kg⁻¹, $r = 0.83$), V_{MAX} (7.12 ± 0.28 m.s⁻¹, $r = 0.73$), V_{MED} (6.67 ± 0.33 m.s⁻¹, $r = 0.84$) and V_{MIN} (6.19 ± 0.34 m.s⁻¹, $r = 0.86$). The results of this study demonstrated that aerobic power is determinant for performance in intermittent efforts like RAST.

Keywords: Aerobic fitness, RAST, soccer players.

Combined events: which disciplines to train

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Combined events require the limit of human performance in several disciplines, like triathlon, decathlon and multiathlon. Doing science for these sports is a complex task. So how do the coaches train their athletes? Our purpose is help teams to improve the results of their athletes under an inferential statistical point of view, enabling the creation of semi-automatic procedures to point the direction of training. The data are the few results available on the official websites. The method estimates the probability distributions of the performances through parametric techniques (after tests for normality). Points propensity is defined as the product of points in the gradient of scoring by the probability of improve an individual performance. We provide three examples using the method to maximize performance. 1. For Bryan Clay, last Olympic decathlon champion, the strategy that would minimize the effort to increase his mean score by 100 points is: 10.40/7.73/15.70/2.07/48.25-13.90/53.65/5.00/70.70/4'45. 2. Also it is possible make the reverse question: how likely was the result of the last contest of Carolina Klufft, heptathlete who reigned doubtless for several years and gave up the Olympic heptathlon after achieving its best mark: the propensity of about 0.80 points from a maximum of 1. 3. It's showed that the last five years training of the current champion of the Multiathlon worked well, surprisingly strengthening disciplines with low gradient scores but with large points propensity. The overall conclusion is that access to lots of individual data makes possible point disciplines which must be trained.

Keywords: Combined events, decathlon, multiathlon, scoring tables, performance.

Effects of different rest intervals in high-intensity intermittent training on endurance performance and lactate removal kinetics

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The aim of this study was to observe the changes in aerobic capacity and lactate removal kinetics (LRK) in response to high-intensity interval training (HIT) with different rest intervals. Twenty physically active subjects were divided into two groups (G1-2 min rest; and G2-5 min rest) and underwent 14 HIT (8 sprints of 40" with 2 or 5 min rest). Sprints volume was gradually increased through the sessions (4 from 1st to 3rd; 6 from 4th to 6th; and 8 from 7th to 14th). Performance was evaluated through the 40"test (40s) and changes in the ventilatory threshold (vLV), respiratory compensation point (vPCR) and maximal oxygen consumption (vVO_{2max}) velocities. LRK was evaluated by the time to maximal concentration after the 40s (Tmax). All parameters were accessed one week before (Pre) and one week after the end of the program (7D). vLV, vPCR, vVO_{2max}, and 40s were accessed also 14 days after (14D). Significant changes in 40s were observed for both groups at 7D and 14D. Considering the typical error for the vLV (0.62km/h), vPCR (0.35km/h) and vVO_{2max}(0.43km/h) protocol, the number of subjects with significant increases at 14D was greater when compared to 7D. The magnitude of performance increases for G2 was significantly higher for G1 at 7D and 14D. Despite G2 present a tendency for decreases, no significant changes in Tmax were observed for both groups. The results suggest that HIT with 5 min rest may induce higher magnitudes of performance changes.

Keywords: ventilatory threshold; respiratory compensation point; maximal oxygen consumption.

Comparison of body composition, strength and maximum power in two protocols of strength training series and circuit for multiple different muscle groups

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The objective of the present study was to compare the effect of the training between the protocol of multiple series (MS) and of circuit for different muscular groups (CGM) in the exercises: plane supine (PS), slanting supine with dumbbell (SSD), direct screw at standing (DSS), Scoot banc at sitting (SB), extensor chair (EC) and leg press 45° (LP) in 28 sessions of divided training in four days a week. Ten physically active subjects (20.4 ± 1.89 years old, weight of 73.4 ± 11.69 kg, height of 178.5 ± 7.66 cm) with experience greater than six months of strength training were divided in the groups MS and CGM. Maximum dynamic strength (1 RM) was performed pre-and post-training the test in SP and LP exercises, muscular potency in throwing the Medicine Ball (TMB) exercise and power of inferior members (CMJ), using a diving platform. After seven weeks of training, comparisons were made through analysis of variance (ANOVA), showing a relevant difference (P<0.05) only in the test of 1 RM, where the MS group showed a superior gain than the group CGM. The main discovery of this study was that there are no significant differences in the morphological adaptations between the two protocols for the reporting period, except for the superior increase of maximum strength in the MS group. So, the subject that cannot find enough time to complete a longer training session on a day to day basis (MS), could do a faster training session (CGM) and obtain the same results in muscle potency and body composition, but not maximum force.

Keywords: Strength training, multiple series, circuit for different muscular groups.

Metabolic characterization in elite Brazilian basketball referees

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Basketball is an important kind of sport on the Brazilian collective context, however, fewer evidences reported the metabolic responses in referees. Therefore, the aim of this study was to characterize the metabolic parameters by means of maximum oxygen consumption ($VO_2\text{max}$) and basal and post-exercise lactate in elite Brazilian basketball referees. Thirty-seven Brazilian referees (international level $n=17$; national level $n=20$) with 41.94 ± 6.71 and 37.30 ± 7.13 years respectively were recruited. Aerobic capability was performed by the multistage 20-meter shuttle run test (LÉGER et al. 1988). Lactate was collected at rest and five minutes after the end of the aerobic test. The comparisons between metabolic parameters in international and national referees were performed by Student T-test (independent samples). The findings of the international referee level were 47.07 ± 5.22 ml/kg/min $VO_2\text{max}$ and 4.51 ± 1.28 mmol at rest and 11.54 ± 4.99 mmol after the cardiorespiratory test for lactate. National referee's displayed 45.35 ± 4.22 ml/kg/min for $VO_2\text{max}$ and 4.37 ± 1.72 mmol at rest and 12.78 ± 3.59 after test. In spite of no significant differences between the variables, the results contribute as important indicators to determine, monitor and control training programs for basketball referees.

Keywords: Referees, basketball, aerobic capability, metabolic performance.

Resistance training increases the explosive force of upper limbs

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Resistance training (RT) has been recommended to prevent muscle force and power decrease induced by aging. Neuromuscular tests are important tools to analyze muscle force function. The objective of the present study was to analyze the behavior of upper limb muscle power of elderly women submitted to 12 weeks of periodized RT. 16 women aged 65.5 ± 3.6 years with a minimum of one year of previous experience in strength training were selected, they performed 24 sessions of RT divided in 3 mesocycles (MA, MB and MC), of 8 sessions each, with a session frequency of twice a week. The intensity of MA with light intensity, MB moderate and MC was high intensity. Upper limb muscle power was measured by seated medicine ball throw. For statistical analysis a $p < 0.05$ was assumed. There was a significant increase in medicine ball throw after four ($T_2 - 2.16 \pm 0.25$), eight ($T_3 - 2.23 \pm 0.26$) and 12 weeks ($T_4 - 2.21 \pm 0.30$) as compared with baseline ($T_1 - 2.00 \pm 0.23$). Periodized RT induced positive effects on upper limb muscle power in elderly women. These results are very important for aging, since higher losses in muscle force are observed in upper limb. Periodization is an important tool to prolong the results of muscle power increase induced by RT.

Keywords: Aging, periodization, resistance training.

Periodized resistance training increases the electromyographic activity of lower limb muscle

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Resistance training (RT) is recommended for elderly with the objective to increase muscle strength and power through neuromuscular adaptations, inducing increased motor and functional capacities. Electromyography (EMG) is an important instrument to analyze muscle function after diverse exercise training protocols. **Purpose** - The objective of the present study was to analyze electromyographic activity of vastus lateralis oblique muscle (VLO) during maximal voluntary isometric contraction of elderly women submitted to 12 weeks of periodized RT. 16 women aged 65.5 ± 3.6 years with a minimum of one year of previous experience in strength training were selected, they performed 24 sessions of RT divided in 3 mesocycles (MA, MB and MC), of 8 sessions each, with a session frequency of twice a week. MA was with light intensity, the MB moderate and the MC was with high intensity. Training intensity was measured by the Borg perception scale. For statistical analysis a $p < 0.05$ was assumed. **Results** - There was a significant increase in root mean square (RMS) at 30° of knee flexion after 12 weeks (T2) compared with T1 (baseline), measured by VLO muscle EMG (right lower limb $52 \pm 16.4 \mu\text{v}$ to $71.8 \pm 19.4 \mu\text{v}$ and left lower limb $60.1 \pm 22.7 \mu\text{v}$ to $77.5 \pm 15.8 \mu\text{v}$). Periodized RT in elderly women is efficient in increasing muscle force, induced by an increase in muscle fiber depolarization.

Keywords: Electromyography, elderly women, periodization, resistance training.

Influence of exercise, high-fat-diet and body fat composition on the early biomarkers of colon cancer in wistar rats.

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The purpose was to evaluate the effects of diet, exercise and body fat composition on the early biomarkers of colon cancer in rats, comparing the effects of control diet (CD), and high-fat-diet (HF) (14.6% fat). The carcinogen 1,2dimetilhidrazine (d) was used. Rats swam 5 days/week for 20' (E20) or 90' (E90), for 8 weeks. The animals (n=96) were randomly assigned in 12 groups (n=8): control diet (CD, CDd, CDE20, CDE20d, CDE90, CDE90d) and high fat (HF, HFd, HFE20, HFE20d, HFE90, HFE90d). All results were compared with the CD group. Weight was increased in HF and reduced in CE20d, CE90, CE90d. Abdominal total fat area was reduced in CDE20, CD90, CD90d and increased in HF, HFd, HFE20, HFE20d, HFE90. Visceral fat area was reduced in CDE20, CDE20d, CDE90, CDE90d and increased in HF. Liver fat was reduced in CDE20d, CDE90, CDE90d and increased in HF, HFE20, HFE90. Total cholesterol was reduced in CE90, CE90d and increased in HF. Triglycerides were reduced in CDd, CDE20, CDE20d, CDE90, CDE90d. Glucose was increased in HF. Colon MDA was increased in HF, HFd. Colon and liver GSH was reduced in HF, HFd, HFE20, HFE20d, HFE90, HFE90d. PCNA-Li was increased in CDd, CD20d, CD90d, HFd, HFE20d, HFE90d. Cyclooxygenase-2 was increased in CDd, CD20d, HF, HFd, HFE20, HFE20d, HFE90d. 20' of exercise is associated with a reduction of early biomarkers of colon cancer. 90' of exercise is associated to a further decrease of these biomarkers and abolishes the majority of the carcinogenesis stimulus of high fat diet.

Keywords: Colon cancer, body composition, exercise, high-fat-diet.

The expression of myostatin in skeletal muscle differs in diabetic and obese insulin resistant rats subjected to exercise

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The objective of this study was to determine the influence of exercise on the expression of myostatin (MSTN) in rats with obesity and insulin resistance and diabetic rats. Adult male *Wistar* rats were housed under controlled conditions and were allowed free access to standard rodent chow (control group, CG) or HF diet (58% Kcal from fat, high-fat group, HG) during 12 weeks. Glucose tolerance test (GTT) and insulin tolerance test (ITT) were performed. After 12 weeks, CG and HG rats were randomly assigned to a swimming training group (CGE and HGE) or a sedentary group (CGS and HGS). In the second study, *diabetes mellitus* was induced by streptozotocin (60mg/Kg). After 2 weeks, control (C) and diabetic (D) animals were randomly assigned to a swimming training group (CE and DE) or a sedentary group (CS and DS). Exercised animals swam individually in water tanks (50x30cm) at 34⁰ C, for 45 minutes at 0900h and 1700h, 5 days week⁻¹, for 4 weeks. After this period, rats were decapitated. White gastrocnemius muscle was immediately frozen in liquid nitrogen and stored at -70⁰ C. MSTN mRNA and protein were quantified by real time RT-PCR and western blotting, respectively. MSTN mRNA and protein expression was significantly higher in DS compared to CS. Unlike, high fat diet did not alter MSTN expression. Swimming training resulted in a significant reduction of MSTN mRNA levels in gastrocnemius in CGE compared to CGS. However, in EC (second study), swimming training did not alter MSTN expression in muscle. These data suggest that the expression of MSTN in muscle may be involved in the metabolic response of high-fat fed and diabetic rats to exercise.

Keywords: Obesity, insulin resistance, *diabetes mellitus*, exercise, myostatin.

Effects of withdrawal of ovarian hormones on food intake and weight of the femur and the uterus

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The purpose of this study was to verify the effects of ovarian hormone withdrawal on femur and uterus weight and food intake in an experimental model. The ovariectomy procedure of was chosen because it meets the needs this study. Ovariectomy and sham operations were performed when the rats reached 250 g body mass, according to the technique described by Kalu (1991). For surgery, rats were anesthetized with a mixture of ketamine-xylazine (61.5-7.6 mg/kg, intraperitoneally). The sham-operated rats underwent the surgical procedure but did not have their ovaries removed. The ovariectomized (OVX) animals had their ovaries removed. All animals that underwent surgery procedures had 3 weeks of recovery. All animals had the same exposure time to surgical procedures until the date of sacrifice (92 days). Wistar adult female rats were grouped into two groups (n = 6 per group): sham-operated (Sham); Ovx (Ovx). The food intake was monitored daily and over the whole experimental period the animals had free access to water. Food intake in OVX rats increased significantly compared with the Sham group 23.15 ± 0.18 and 20.58 ± 0.18 , respectively. Femur weight was lower in OVX compared to SHAM animals 0.22 ± 0.00 and 0.26 ± 0.00 respectively, weight of the uterus 0.18 ± 0.01 and 0.68 ± 0.02 OVX and SHAM respectively. All values were significant ($p \leq 0.05$). These results corroborate with data that were found in research in literature, where the increase in food intake and decreased weight in femur and uterus are due to deleterious effects of the ovariectomy.

Keywords: food intake; uterus; femur; ovariectomy.

Lactate and ventilatory thresholds on leg press exercise

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The aim of this study was to identify and to compare the lactate threshold (LT) and ventilatory threshold (VT) during an incremental leg press exercise. Ten men (25.6 ± 3.1 years) performed a maximal incremental test on the leg press at relative intensities of 10, 20, 25, 30, 35, 40, 50, 60, 70 and 80% of 1RM with 1-minute stages. During the 2-minute interval between stages, capillary blood was collected for blood lactate analysis. Minute ventilation (VE) was continuously measured by a gas analyzer and was evaluated in the average of one minute at rest and one minute in the performed intensities. The LT and VT were defined as the intensity where blood lactate concentration and VE, respectively, begin to increase in an exponential manner, identified by the algorithmic adjustment method. Briefly, a computerized 2-segment regression analysis was performed to locate the intersection point of the segments in the blood lactate concentration versus work-load and VE versus work-load. Paired t-test, Pearson correlation and Bland and Altman analysis were used to compare LT and VT intensity. The intensity of LT and VT was 27.1 ± 3.7 and $30.3 \pm 7.9\%$ of 1RM, respectively, with no significance difference between these. There was a significant correlation between the two methods ($r = 0.64$; $p < 0.05$) and the bias $\pm 95\%$ limits of agreement for LT versus VT were $-3.2 \pm 12.3\%$ of 1RM, with all subjects within the limits of agreement. Thus, the VT occurs at the same intensity of LT, allowing for the determination of the anaerobic threshold in resistance exercise using blood lactate concentration and VE.

Keywords: resistance exercise; anaerobic threshold; incremental exercise

Effect of diet control and carbohydrate supplementation on immune function during rugby training

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Carbohydrate (CHO) intake during exercise has been associated with lower disturbance in blood immune cell count and salivary immunoglobulin-A (IgA-s). However, the need of CHO supplementation for athletes eating a high-CHO diet (HCD) before training and competition remains to be clarified. The aim of this study was to evaluate the effect of HCD in immune cell count and concentration of S-IgA, salivary flow rate and salivary S-IgA secretion rate in athletes supplemented with CHO or placebo (PLA) during rugby training. Twenty male recreational athletes (19.9 ± 3.5 years and 84.5 ± 13.4 kg body weight) received individualized guidance from a nutritionist to consume HCD (70% carbohydrates, 12% proteins and 18% fats) three days before the rugby training. The athletes were randomly allocated into CHO (n=10) and PLA (n=10) groups. Additionally, the athletes participated in two rugby training sessions (120min), with 7 days interval. In the second session, the treatments were inverted. Blood samples and saliva were assessed at rest (Pre-E), immediately after the training session (Post-E) and one hour after the training session (1 h Post-E). The results showed that there was no significant interaction between times (Pre-E vs. Post-E vs. 1 h Post-E) vs. treatment (CHO vs. PLA) ($P > 0.05$) for subclasses of leukocyte, concentration of S-IgA, salivary flow rate and salivary S-IgA secretion rate after intervention. It was concluded that HCD before rugby training reduced the need of CHO supplementation for the immune system variables analyzed. It suggests that such nutritional strategy protected the athlete's immunological health.

Keywords: diet, carbohydrate, immune function, rugby, training.

Metabolic aspects of chromium picolinate denervated skeletal muscle: a study in rats

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The nutritional aspect has become an excellent resource for improving human performance, suggesting that under conditions of disuse nutritional strategies can compete with deleterious effects. The aim of this study was to evaluate the behavior of glycogen reserves at denervated muscle and the tissue sensitivity to insulin and glucose in rats supplemented with chromium picolinate. 24 Wistar rats (3-4 months), kept under ideal conditions of vivarium were used. The animals were divided into four groups (n = 6): control (C), 7 days denervated (D) treated with chromium picolinate (T) and denervated treated with chromium picolinate (DT). Sciatic nerve denervation occurred in the left hind leg. Both denervated and supplementation occurred within 7 days. Propylene glycol was used to dissolve the picolinate, administered by gavage at 0.2 mg / kg for 7days. The data passed a normality test followed by ANOVA and Tukey (p <0.05). In soleus, gastrocnemius white and red muscles, the D group showed an average reduction of 31% in glycogen content, while in DT was observed average reduction of 6% compared to the control and 25% higher compared to D. In tests of glucose tolerance or insulin, the T group had significantly higher results. The data showed that the improvement in energy terms obtained by treatment with chromium picolinate, it is suggested that their use during periods of functional restriction facilitated early recovery while minimizing catabolism.

Keywords: Chromium picolinate, denervation, metabolism, muscle, rats.

Factors associated with the components of fitness and physical activity level of users of a family health strategy

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Aiming to diagnose physical activity level and fitness and related factors in users of the Family Health Strategy (FHS) was evaluated daily physical activity levels (DPAL-IPAQ-8), body composition (BMI and waist circumference-WC), flexibility trunk (FLEX) and handgrip (IHG) of 394 users (35-85 years) agreement with the principles of research. We performed descriptive statistics, chi-square and logistic regression with $\alpha < 0.05$. We found low DPAL 17% of the sample and association with age, WC, IHG and individuals with better health showing 57% less likely to have high DPAL. 48.4% were unfit for IHG and those with high school or college and good health showed 3.2 and 2.6 times more likely to poor IHG. Men and normal WC showed seven and 2.4 times more likely to good/excellent IHG. Knowing the physical activity and fitness profile in FHSs and their associated factors may contribute to plan actions and public policies that minimize the deleterious effects of inactivity on the health of the basic healthcare network users.

Keywords: Physical activity level, physical fitness, questionnaire, family health strategy.

Utilization of lactate concentrations as a performance predictor in elite cyclists

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Lactate concentrations in athletes can be determinant in performance in competitions that require a high glycolytic potential to provide quick energy. The aim of this study was to determine and relate the lactate peak [$\text{[Lac}_{\text{peak}}]$] and the lactate accumulated rate (LAR) with performance in test time trial to 4km in Brazilian elite cyclists. The sample consisted of 14 professional elite national male cyclists aged $28,5 \pm 4,7$ years, height $175,4 \pm 6,7$ cm, body mass $72,4 \pm 9,6$ kg. The field performance test was realized in running track cemented 400m. After heating for 10 minutes, the subjects cycled more two laps to reach the necessary speed (output launched) for realization of the test time trial of 4km. At the end of the 4km test were collected 25 μl of blood from the ear lobe in 1st, 3rd and 5th minute of passive recovery of athletes for blood lactate analysis. A Pearson correlation test was used and software by *STATISTIC 7.0*, with a significance level of 5%. There were found no correlation between [$\text{[Lac}_{\text{peak}}]$] ($r = -0,27$ $p = 0,32$) e LAR ($r = -0,45$ $p = 0,08$) with the performance of 4km time trial. Therefore, it can be concluded that [$\text{[Lac}_{\text{peak}}]$] and LAR were not able to predict performance in this sample of elite cyclists.

Keywords: Lactate concentrations, performance, cyclists.

Influence of maturation on the performance of speed in young soccer players.

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Soccer is an intermittent sport which requires quick and short movements like squats, sudden stops and changes of direction. Therefore, to understand how these capacities behave during maturation is an important factor. The aim of this study was to investigate the influence of maturation on the performance of speed of 20m in young soccer players. For this study 19 youth soccer players were selected (14.47 ± 0.51 years, 61.46 ± 7.41 kg, 173.47 ± 8.13 cm). To analyze maturation the Tanner's (1962) procedure was used for genitals and pubic hair. Speed was analyzed using photocells positioned at a distance of 20 meters. The relationships between speed and maturation's degree were verified by Pearson's Correlation Linear. Also was used descriptive statistics to characterize the sample. There was a moderate positive correlation between speed and maturation by the pubic hair ($r = 0.55$, $p \leq 0,0140$). We conclude that the maturation is related with the speed to these athletes.

Keywords: Maturation, speed, soccer

Determination of maximal lactate steady state in soccer specific test: a pilot study

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Aerobic assessments in soccer players are usually performed in the laboratory with continuous and nonspecific running. The aim of this study was to determine the maximal lactate steady state (MLSS) during progressive exercise with a ball using the Hoff test. Five players were subjected to five progressive efforts in the Hoff test with intensities of 7 to 11 km.h⁻¹ to determine the anaerobic threshold (Lan_{Hoff}), which corresponded to 3.5mM velocity. Subsequently they were submitted to three random efforts with duration from 30 min to 100, 105 and 110% of Lan_{Hoff} to the determination of the MLSS in the Hoff test (MLSS_{Hoff}). At rest and every 5 min blood samples were collected (25µl earlobe). It was observed an average concentration from 4.31±0.97, 5.37±1.08 and 6.78±1.70 mM to 100, 105 and 110% of Lan_{Hoff} respectively. The 100% of Lan_{Hoff} four players presented blood lactate stabilization ($\Delta 100\% = -0.35 \pm 0.21 \text{mM}$) and one showed variation greater than 1mM ($\Delta 100\% = 1.08 \text{mM}$). 105% (Lan_{Hoff}) three presented stabilization ($\Delta 105\% = -0.60 \pm 0.15 \text{mM}$) while two didn't show stabilization ($\Delta 105\% = 2.23 \pm 0.01 \text{mM}$). 110% Lan_{Hoff} blood lactate stabilization was not observed in any of the individuals. In addition, two participants reached the exhaustion in minutes 15 and 20 respectively. Despite the need for a greater number of participants, the results of this investigation suggest that Lan_{Hoff} may estimate the MLSS of soccer players.

Keywords: Soccer, lactate, aerobic capacity, specific test.

Circuit resistance training reduces blood glucose levels in fasting women

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Exercise can elicit benefits to carbohydrate metabolism. **PURPOSE:** To analyze the effects of circuit resistance training (CRT) on blood glucose levels (GLU) in fasting sedentary women. **METHODS:** Fourteen women (39.71 ± 3.8 years old) participated in this research. The protocol consisted of 3 sessions/week of a circuit training of 9 stations with alternating muscle groups. In each session, the subjects performed the circuit 2 times with one set of 8-12 maximal repetitions (RM) in each station, during 10 weeks. For analysis of plasma glucose levels, blood samples were collected from the antecubital vein at rest and fasting before and after the training period. The plasma glucose levels were analyzed by Enzymatic colorimetric method. The plasma glucose levels of the sample before and after training period were compared by Wilcoxon's test ($\alpha=0.05$). **RESULTS:** There was a reduction in the GLU after the training period from 92.0 ± 8.53 (median \pm SD) to 74.0 ± 3.51 mg/dl. **CONCLUSIONS:** The proposed CRT reduces the blood glucose levels in fasting women, improving the carbohydrate metabolism in this population.

Keywords: Circuit resistance training, blood glucose levels, women.

Circuit resistance training in women: body composition, cardiac morphology and serum cytokines levels

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Exercise can elicit benefits to the heart and body composition, and benefit or damage the immunologic system. **PURPOSE:** To analyze the effects of circuit resistance training (CRT) on body mass (BM), free fat mass (FFM), fat mass (FM), left ventricular mass (LVM), rest final diastolic volume (FDV), rest final systolic volume (FSV), rest systolic volume (SV), relationships LVM/body surface (BS), LVM/BM, LVM/FFM, and serum cytokine levels in sedentary women, 39.71 ± 3.8 years old (n=14). **METHODS:** The CRT consisted of 3 sessions/week of 2 rounds in 9 stations with one set of 8-12 maximal repetitions during 10 weeks. In pre and post experimental period, the variables analyzed were body composition by DXA, the heart parameters by EchocardiDoppler and the serum cytokines levels by flow cytometry (IL-1 β ; IL-6; IL-8; IL-10, IL-12p70 and TNF, using blood samples collected from the antecubital vein in rest, and 5 min, 24h and 48h post-second-session of training; and 5min, 24, 48 and 96h post-last-session of training). Student's *t* tests were applied for body composition and cardiac morphology variables and Friedman's with Tukey post hoc tests for cytokines ($\alpha=0.05$). **RESULTS:** There was an increase in the FFM and LVM with maintenance of LVM/FFM; increase in LVM/BS and LVM/BM with maintenance in others heart parameters; increase in FFM with reduction of FM and maintenance of BM and without alterations of serum cytokines levels. **CONCLUSIONS:** CRT improved the corporal composition and cardiac morphology without to cause inflammation in women.

Keywords: Circuit resistance training, body composition, DXA, Echocardi Doppler, cytokines, women.

Relationship between body composition and motor performance of soccer players

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The aim of this study was to investigate the relationship between body composition and motor performance in soccer players. 23 professional soccer players (age = 21.9 ± 3.8 years, weight = 76.5 ± 7.6 kg, height = $179, 2 \pm 5.9$ cm) underwent three tests, at first, was used a diving platform sensitive to small pressure AXONJUMP model connected to a computer with specific software Axonjump 4.0 and 2 tests were made Vertical Squat Jump (SJ) and Countermovement Jump (CMJ), two procedures were performed in three jumps with intervals of 30 seconds among them and 2 minutes between the modalities. Only the best jump was recorded for analysis. Then was performed a speed test using photoelectric barriers (CEFISA 6.0) which were arranged by telemetry to the beginning and end of the journey on the grass with cleats. For analysis of body composition, fat free mass (FFM), leg fat free mass (LFFM) and percent body fat (% BF), was used the dual x-ray absorptometry (DEXA) GE Lunar model - DPX-NT. Checked for normality and homogeneity of data, the descriptive analysis was performed followed by Person's correlation to determine the relationship between variables. The level of significance was ($p < 0.05$). Correlations were found in the %BF with CMJ ($r = - 0.49$), and %BF with T30 ($r = 0.47$). In this study, FFM and LFFM were not decisive to change in performance, however the percentage of fat seems to influence negatively to the CMJ and T30.

Keywords: Body composition, soccer players, motor performance.

Effects of an acute bout of slow velocity eccentric exercise on mechanical and metabolic stress in young women

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Maximal eccentric exercise can induce stress to muscle fibers promoting muscle damage and hormonal responses. Muscle damage can be induced by metabolic or mechanical stress. The aim of this study was to analyze the mechanical and metabolic stress (through creatine kinase (CK) and cortisol responses) after an acute bout of slow maximal eccentric contractions for elbow flexors in nine sedentary, healthy young women (23.89 ± 2.03 years, 57.81 ± 7.01 kg, 160.06 ± 4.94 cm). The slow eccentric protocol consisted in five sets of six maximal isokinetic eccentric actions for elbow flexors at $30^\circ \cdot s^{-1}$. Cortisol concentration were assessed by blood samples collected pre-exercise (Pre), post-exercise, 5, 15 and 30 min after exercise, and measured by Chemiluminescence (Unicel® DXi 800, Beckman Coulter, Brea, CA, USA). CK activity was assessed also by blood samples collected Pre, 24, 48 and 72 hrs after exercise, and determined by an UV Spectrophotometer (Biospectro, SP-220, SP, Brazil). Data were compared over time by a one-way ANOVA, followed by a Tukey's *post hoc* test. It was found significantly greater CK activity for 72 hrs compared to Pre ($P = 0.002$), 24 ($P = 0.004$) and 48 hrs ($P = 0.0101$). For cortisol, similar values ($P = 0.057$) were found over time. At least for young women, there was no significant metabolic stress after maximal slow eccentric contractions of elbow flexors, demonstrated by the absence of cortisol responses. Consequently, increases on CK show that muscle damage was probably due to important mechanical stress induced by the protocol.

Keywords: Lengthening contractions, hormonal responses, muscle damage, contraction velocity, elbow flexors.

Continuous and intermittent exercises decreased visceral adipose tissue and hepatic esteatosis in rats fed with high-fat diet

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Physical activity is important for corporal mass control and improved health. The aim of this study was to analyze the effects of continuous and intermittent exercise on body weight gain and percentage of lipid content in the liver and visceral fat depot in obese exogenous rats. *Wistar* rats were assigned to 4 groups, treated with chow diet (C) or high-fat diet (H), submitted to continuous training (CT) or intermittent training (IT) or remained sedentary (S). For development of exogenous obesity, the animals were fed with high-fat diet for 3wks before training. The training groups swam 5 days/week/90min/day (CT) or 3x30min/day (IT) for 8wks. Percentage of lipid content, body weight gain and caloric intake were analyzed. Both training were effective in decreased weight gain in animals due to high fat diet. All groups fed with high-fat diet presented an increase in percentage of lipid content in visceral adipose tissue and liver compared to chow diet sedentary group ($p < 0,001$). Both kinds of exercises reduced the effects of high-fat diet in relation to percentage of lipid content in the liver and in visceral adipose tissue, where the decreased was by about 8% ($p < 0,001$). The proposed physical activity was an important intervention for controlling in the obesity and non-alcoholic hepatic esteatosis whereas reducing the adverse effects of high-fat diet. CNPq

Keywords: Exercise training, obesity, visceral adipose tissue, non-alcoholic hepatic esteatosis.

Exhaustion related blood markers responses to unspecific maximal exercises in weight and endurance trained men.

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The aim of this study was to verify the blood exhaustion-related marker response after unspecific exhaustion tests in weight and endurance trained men. For this, six weight trained men (WT, 29.7 ± 4.5 years old) were submitted to exhaustive test in a treadmill (ramp protocol) until voluntary exhaustion, and seven endurance trained men (ET, 39.4 ± 7.7) were submitted to exhaustive resistance test performed in two different muscle groups with initial load of 80% of one maximal repetition (1MR) and progressively reduced, until exhaustion. In a day before tests, anthropometric assessment (BMI, body muscle and fat mass) was realized using bioelectric impedance method. Pre and immediately post-tests, blood samples were collected to determine markers of hemoconcentration (hematocrit, hemoglobin and albumin), acidosis (lactate, pH, HCO_3^-), hemogasimetric (pO_2 , pCO_2) and hydroelectrolytic (Na^+ , K^+) parameters. ET was older than WT, and had higher body fat and lower BMI and body muscle mass. Both groups after test had significant and characteristically changes in all analyzed parameters, however ET had reduced K^+ ($\Delta\%$ ET= -22.1% vs. $\Delta\%$ WT= -4.2%, $p<0.05$) and elevated Na^+ ($\Delta\%$ ET= 0.91% vs. $\Delta\%$ WT= 0.71%, $p<0.05$) compared with WT. In conclusion, besides similar responses in hemoconcentration, acidosis and hemogasimetric parameters, there is an enhanced electrolytic imbalance related to the unspecific maximal exercise for endurance trained men. **Financial support:** CAPES; CNPq.

Keywords: Athletes, exhaustion, blood markers.

Endurance, resistance and combined exercise training on oxidative stress parameters in mice liver.

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Different exercise training modalities can exert specific chronic adaptations on oxidative stress. Our aim was to evaluate the effects of endurance (E), resistance (R), and the combination of both modalities of exercise training (C) on oxidative stress markers in mice liver. Twenty-four male BALB/c (25-30g) were assigned into 4 groups (n=6) - sedentary (S) endurance exercise (E) consisted of swimming, 5d/w, 60min per session; resistance exercise (R) consisted of overload climbing, 3d/w, one set of 8 sub-maximal repetitions, and combined exercise (C) consisted of 3d/w endurance protocol and 2d/w resistance protocol, underwent 8-weeks training. 48h after the end of exercise protocol, the animals were sacrificed and liver samples were collected. Liver reduced glutathione (GSH), thiobarbituric acid reactive species (TBARS) and the ratio of reduced glutathione to oxidized glutathione (GSH/GSSG) were assayed by spectrophotometry technics. Statistical analyses was performed by Kruskal-Wallis test followed by pos-hoc Dunns test ($p < 0.05$). Results showed an increase in the level of TBARS in the C group. Moreover, the ratio of GSH/GSSG was reduced in the referred group. E and R groups expressed similar results on oxidative stress. These data provide evidence that endurance and resistance exercise performed in sequential days may be less effective than separate modalities on oxidative stress adaptations in the livers of trained mice.

Keywords: Endurance training, resistance training, oxidative stress, liver, mice

Physical capacities index of middle age women and elderly women inserted in a physical activity program of dance, gymnastic and water gymnastic

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The aim of this study was to evaluate the physical capacities of old women that practice regular physical exercise, using the benchmarks of the ACSM and WHO. The sample was composed by 57 women (62.1 ± 7.7 yrs), regular practitioners physical activities (dance, gymnastics and water gymnastics) in a Social program promoted by the Center of Urban Ourinhos-SP. The physical activity questionnaire (IPAQ) was applied to confirm the physical activity level of these participants. The volunteers were divided into two groups according age (G1=50-59 yrs and G2 = upper 60 yrs). The evaluation procedures included the measurements of body weight, height, body girth and the physical capacities tests of flexibility, hand grip strength, abdominal strength and upper limb strength. The results obtained were calculated according to the absolute and relative frequencies of each subgroup. The results were compared with tables of results of tests. There was a regular classification of both groups (G1 and G2) regarding the grip strength. The abdominal strength and limb strength were considered mean for two groups. In G1 and G2, the flexibility levels were considered low. These results showed that the physical activities program was not able to modify the reduced levels of flexibility promoted by aging. These results suggest the lack of specific flexibility activities during the physical activity program.

Keywords: physical capacities, dance, gymnastic, water gymnastic

The aerobic pathway could contribute at velocity maintenance in repeated sprint bouts

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The aim was to investigate the influences of the aerobic parameters of the 20-m multistage Shuttle Run Test (MSR) on the anaerobic results in the Running Anaerobic Sprint Test (RAST). Seventeen male young basketball players (Age 13.71 ± 0.47 years; Body Mass 67.04 ± 13.27 kg; Height 1.78 ± 0.11 meters; %Body fat 13.19 ± 3.38) participated of the study. The RAST variables were maximal velocity (MAV, m/s), mean velocity (MEV, m/s), fatigue index ($FI = [(MAV - \text{lower velocity}) / MAV] * 100$, %) and the mean deceleration during the total effort (AD, m/s^2). The MSR was expressed as the maximal velocity of the last stage (LV, m/s) until exhaustion. Additionally to investigations with all the scores, the sample was separated in two groups: the ones above the mean (MSR_{higher}) and below the mean (MSR_{lower}). The results were presented in $\text{mean} \pm \text{SD}$ and were used Pearson's correlation and Anova one-way for repeated measures with Tukey-Kramer post-hoc. For all the subjects, RAST's $MAV = 6.33 \pm 0.42$ m/s, $MEV = 5.96 \pm 0.38$ m/s, $FI = 17.89 \pm 4.22\%$ and $AD = 0.03 \pm 0.01$ m/s^2 . MSR's $LV = 3.24 \pm 0.24$ m/s. Was found no significant correlation between RAST results and the MSR's LV. In separated groups, no significant difference was found between RAST scores. For MSR_{lower} significant differences ($p \leq 0,05$) were found between subsequent RAST's sprints velocity, but for MSR_{higher} not. AD was not different between the two groups. Despite no correlations found between RAST and MSR parameters, for individuals with lower aerobic levels the velocity decrements occurred markedly among consecutive sprints. However, based in velocity kinetics in RAST's sprints, the aerobic parameter could have influenced anaerobic maintenance of velocity for those athletes.

Keywords: Anaerobic velocity, aerobic fitness, basketball.

Effect of the dance therapy at elderly women

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Different proposals have been described in the literature to minimize the effects of aging. Dance combines features of conventional physiological strain and the pleasures of activity. It is a choice to obtain physical quality and emotional well-being. This study aimed to determine the influence of dance on balance, on sleep, flexibility and quality of life of elderly women. Nine volunteers (70 ± 7 old years) were invited in a convenience sample. The procedure was conducted 2 days/wk lasting 50 minutes and covered a total of twelve sessions. The dance sessions had been composed of different rhythms; Brazilian (samba and forró), salsa, country, free dance, years 60's. The level of demand was adjusted according to the response of participants. Before procedure the participants were evaluated in flexibility by on the Wells bench, quality of life using the Short-Form Health Survey (SF-36), sleep quality by the Post-Sleep Inventory (PSI) and balance the Berg Balance Scale (BBS). The Wilcoxon test showed significant differences between conditions before and post the experimental procedure for the BBS (53 ± 3 , 56 ± 0 ; $p = 0.011$), PSI (181.77 ± 31.99 , 216.55 ± 35.59 ; $p = 0.032$) as well as flexibility (26.77 ± 8.27 , 31.88 ± 5.71 ; $p = 0.033$), respectively. The SF-36 showed significance difference only two domains Emotional role functioning (ERF, $p = 0.008$) and Social role functioning (SRF, $p = 0.01$). Despite the small sample, the dance proved effective as a therapeutic agent in improving balance, flexibility and quality of life and sleep.

Keywords: Quality of life, sleeps disorders, flexibility.

The effects of different bouts of maximum strength exercise on blood exhaustion-related markers.

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The aim of this study was to analyze the effects of different bouts of maximum strength exercise on blood markers related to exhaustion. 13 strength trained men were recruited, 21-32 years old, divided in two groups according to the number of executed exercises in an exhaustion protocol: G1 (n=7) four maximal exercises (bench press, hack squat, pulley triceps and arm curl) and G2 (n=6) five maximal exercises (bench press, hack squat, deadlift, pulley triceps and military press). They were submitted to an overload exercise at initial load of 80% of one maximum repetition (1MR) with 20% of reduction of weight after every lost of movement, until exhaustion. Blood samples were collect before and immediately after the test to analyze hemogasometric (pO_2 , pCO_2), acidosis (pH, HCO_3^-), hemoconcentration (Hct) markers and glucose. For statistical analyzes were used Student's t test, with $p < 0.05$ as significance. The exhaustion test resulted in increase of, Hct, glucose and pO_2 and reduction of pH, pCO_2 e HCO_3^- in both groups, however G1 showed higher variation (*delta*) in HCO_3^- concentrations than G2, but there were no significance changes between the groups. Our results suggest that both training protocols were maximal and had similar responses on exhaustion blood markers. **Financial Support:** FUNDAP, CAPES, CNPq.

Keywords: Exhaustion blood markers, maximum strength exercise, muscle damage.

Pilates method as an additional resource on quality of life and on the treatment for hypertensive women.

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Aiming to compare the Pilates exercises and general exercise the on quality of life and blood pressure of hypertensive women, 12 volunteers aged 71 + /- 6 years were selected. That sample was selected from the Life Quality Program in Arterial Hypertension, Diabetes and Obesity, held by the Physiotherapy School students from University Center Hermínio Ometto - Uniararas- Araras – São Paulo. The participants were divided into two groups: GP – Pilates Group and GE – General Exercises (control) and were realized 22 interventions of both proposed. Hypothesis test used (parametric or nonparametric) was performed after verification of normality of the sample through the test-Wilk Shiparo in BioEstat 5.0. Comparison pre and post procedure intra-experimental were performed by the software StatSoft / Statistica 7 by means of factorial ANOVA test. It could be observed that there was no difference between the two therapeutic methods proposed (Pilates and General Exercises) to the systolic blood pressure (SBP) and diastolic pressure (DBP) as well as in Life Quality through SF 36; however there was difference between preoperative and post-experimental procedure in SBP and DBP in both therapies. We concluded that both exercise programs: Pilates Method and general exercises decreased the blood pressure and not interfered in Life Quality of hypertensive elderly women.

Keywords: Hypertension, quality of life, exercises.

Effect of the physical training in the intensity of the maximal steady state lactate on the aerobic capacity in swimming rats

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The objective of the present study was to verify the effect of four weeks of aerobic swimming training at the intensity of the maximal lactate steady state on aerobic capacity in swimming rats. Male Wistar rats (29 rats) were submitted to the glucose minimum test (GLUCmin) and maximal lactate steady state (MLSS) pre and post - training. The GLUCmin consisted of two 13% (body weight - bw) load swimming bouts, (1st, 30s, 2nd tlim), separated by a 30s interval. After 9 minutes of recovery the animals began a incremental exercise test which consisting in swimming with loads of 3.0, 3.5, 4.0, 4.5, 5.0, 5.5 and 6.0% bw every 5min. The training period was of four weeks, five days/week, two weeks of 30 min/day and two of 45 min/day at MLSS intensity. Physical training did not alter the GLUCmin intensity (4.96 ± 0.72 vs $4.86\%PC$) and MLSS intensity (4.93 ± 0.64 vs $5.05 \pm 0.66\%PC$). On the other hand, there were no significant alterations in the glucose concentration during GLUCmin test ($82.74 \pm$ vs 76.51 ± 12.79) and in the lactate concentration during MFEL (4.68 ± 0.49 vs 4.62 ± 0.86) with the training. It was concluded that aerobic swimming training adopted was unable to promote alterations on aerobic capacity of the animals. **Financial Support:** CAPES

Keywords: swimming training, maximal lactate steady state, glucose minimum test, rats

Protocols hyperglycemia induction in the glucose minimum test adapted to swimming in rats

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The objective of this study was to determine the best swimming protocol to induce hyperglycemia during the glucose minimum test (GLUCmin) in rats. Male Wistar rats (60 rats) were used in four different protocols (P). P1: incremental test with initial load of 5% (body weight - bw) and increment of 1% bw every minute until exhaustion; P2: two 13% bw load swimming bouts until exhaustion (tlim) both separated by a 1 min rest; P3: one tlim 13% bw load swimming bout; and P4: two 13% bw load swimming bouts (1st 30s, 2nd to tlim), separated by a 30s interval. After 9 minutes of recovery the animals began an incremental exercise test which consisted of swimming with loads of 3.0% and increased 0.5% bw every 5min. The maximal lactate steady state (MLSS) was determined in all the animals. Peak glucose concentration of P4 ($92.15 \pm 12.25 \text{ mg/dL}^{-1}$) was different to the other protocols P1 ($113.80 \pm 36.88 \text{ mg/dL}^{-1}$), P2 ($119.41 \pm 14.92 \text{ mg/dL}^{-1}$) e P3 ($120.72 \pm 19.28 \text{ mg/dL}^{-1}$). The GLUCmin determining success rates were 87, 67, 80 and 60% in P1, P2, P3 and P4 protocols respectively. The GLUCmin did not differ from MLSS in any protocol. The different adopted protocols did not influence the determination of the intensity of GLUCmin, however, P1 presented the highest success rate for GLUCmin determination. **Financial Support:** CAPES

Keywords: Glucose minimum test, hyperglycemia, maximal lactate steady state, rats.

16-weeks of endurance, strength and concurrent training improves running economy on sedentary middle-aged men

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Improvement in running economy (RE) is dependent on greater recruitment of motor units and reduced ground contact time, causing less energy expenditure and hence increasing performance. The aim of this study was to analyze the effects of 16 weeks of endurance training (ET; n=16), strength training (ST; n=14) and concurrent training (CT; association of ET and ST; n=17) on peak oxygen uptake (VO_{2peak}), total exercise duration (TED), and RE, determined by the velocity obtained at VO_{2peak} , throughout a maximal incremental test to exhaustion on a treadmill with expired gas analysis amongst sedentary middle-aged men before and after the training period. Also a not-trained control group (n=15) was analyzed. The training protocol consisted of a 3 non-consecutive sessions per week with duration of one hour each. ET was performed either walking or running with intensities corresponding to 50-85% VO_{2peak} ; ST consisted of 10 exercises with 3 sets of 10 maximum repetitions separated by one minute of rest; CT combined both ET (30 minutes, same characteristics of ET) and ST (6 exercises with the same number of sets, repetitions and rest period). Normality test was applied before ANOVA and Tukey *post-hoc* test. *P* adopted was <0.05. RE and TED increased significantly after ET (mean $\Delta\%$ of 14,7 and 20,7, respectively), ST (8,9; 10,4) and CT (12,7; 16,9) protocols. GC showed non-significant change (2,9; 2,0). VO_{2peak} increased after ET (20,4) and CT (12,1), but not for ST (5,9) and GC (-0,6). It is concluded that proposed training protocols are effective in improving RE.

Keywords: Endurance training, strength training, concurrent training, running economy, peak oxygen uptake, middle-aged men.

The influence of ovariectomy and resistance training on the circumference of adipocytes in the parametrial adipose tissue.

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Physical exercise is proposed as a nonpharmacological alternative to minimize the symptoms of post menopause. The aim of this study was to investigate if resistance training affects parametrial adipocytes in ovariectomized rats. *Sprague dawley* female rats were separated into 4 groups (n=5 each): sham sedentary (SHAM), sedentary ovariectomized (OVX), sham trained (SHAM TR) and OVX trained (OVX TR). Rats were adapted to climbing in a vertical ladder for 3 times/week, for 10 weeks. The rats were killed 72h after the last session. Parametrial adipose tissue was removed and fixed with osmium tetroxide. The circumference of adipocytes (60 cells per animal) were measured using the Image Pro Plus 3.0 software. Results are presented as mean \pm standard error (SE) average. The Kruskal-Wallis One Way Analysis of Variance on Ranks was applied ($p \leq 0.05$). Resistance training was not effective in reducing the circumference of adipocytes group SHAM TR (500.800 ± 29.553) compared to SHAM (490.800 ± 32.298). On the other hand ovariectomy increased circumference compared to SHAM (SHAM versus OVX). Besides the resistance training was not effective in reducing the circumference of adipocytes in the OVX TR (564.800 ± 41.467) compared to OVX (623.800 ± 39.37). Conclusion: Our results suggest that resistance training reduces the effects of menopause induced by ovariectomy on the parametrial adipose tissue.

Keywords: Rats, resistance training, ovariectomy, parametrial adipose tissue.

Exercise performance at maximal lactate steady state ameliorates systolic blood pressure monitored for 24 hours in postmenopausal women

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Women after the menopausal period are more susceptible for cardiovascular diseases development, such as hypertension and atherosclerosis. Thus, the aim of this study was to evaluate arterial blood pressure after a single bout of exercise performed at the maximal lactate steady state (MLSS) in postmenopausal women. Six postmenopausal women non-sedentary and non-hypertensive (56 ± 6 yrs, 28 ± 4 kg/m² of BMI) took part of this study. They arrived at the laboratory around 7:00 am, after their usual breakfast in two different days separated by at least 72 hours from each other, in random order. Resting blood pressure was measured and after that they performed a 30 min exercise on treadmill at MLSS intensity (EXE day) as previously determined. Blood pressure was measured each 15 min during 90 min after the exercise performance, at the laboratory, and during 24h during their daily activities using the ambulatory blood pressure measurement (Dyna-mapa+). In another day, the volunteers were submitted to the same procedures, but did not perform exercise (CON day). Paired student *t* test showed a lower incremental area under the curve (AUC) in the systolic blood pressure (SBP) in the EXE day (-251 ± 203 mmHg/90min as compared to CON group (540 ± 253 mmHg/90min). Moreover the mean systolic blood pressure (SBP) during 24h was lower during the EXE day (107 ± 4 mmHg) comparing with the CON day (112 ± 4 mmHg). We can conclude that the exercise performed at MLSS can decrease the SBP during the following 24 hour in postmenopausal women. **Financial support:** Fapesp, Capes

Keywords: Post exercise hypotension, Postmenopausal women, Ambulatory blood pressure measurement

Analysis of the body composition of high performance swimmers and cyclists from the city of Ribeirão Preto – SP

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In many sports, the individual body composition of an athlete plays an important role in performance during a competition. The objective of the present study was to assess and compare the body composition of high performance swimmers (n = 15, mean age = 20.07±2.6 years) and cyclists (n = 08, mean age = 25±5.4 years). Body composition (android and gynoid distribution, lean mass (kg), fat mass (kg) and fat mass % were assessed by DXA (Hologic 4500W). The SAS software version 9.0 and the Wilcoxon test were used for statistical analysis. No significant difference was observed among athletes regarding android and gynoid fat distribution. The swimmers presented a greater lean mass in the left arm (p<0.01) and trunk (p = 0.03) compared to the cyclists. No significant difference was observed between swimmers and cyclists regarding fat mass expressed in (kg, %) of the left arm, left leg and trunk. Body composition is known to vary in different sports, but in the present study we observed that swimmers had a better distribution of body composition.

Keywords: Body composition, swimmers, cyclists, high performance.

Comparative Analysis of Vertical Force Impulse Children between 9-12 years

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The practice of physical activity and sports is one of the factors that contribute to health, quality of life and development of children. The aim of this study was to determine the average strength of vertical impulse between students in a school with students who are part of a sports initiation. Participated in this study 46 children aged 9-12 years, 21 students from the club with an average age of 11.24 (± 0.77) years and 25 school students, mean age 9.44 (± 0.65), all of town of Mococa / SP. The acquisition of kinetic data was performed using a force platform brand EMG System. For statistical analysis, we used descriptive analysis software in Excel 2007 for Windows. The average forces found were 71.86 (± 16.78) kgf for students of the club and 59.53 (± 9.47) kgf for school students. We conclude that the students of sports initiation has a strength of vertical jump higher than average primary school children, probably due to being older and participate in sports training, where they do exercises that work strength and coordination. Another fact is that the analysis of data generated by the force platform, we observed that the contact time was greater for students from the club. Students at the school probably did not have specific guidance on the technique of jumping; uncoordinated and perhaps more than others.

Keywords: kinetic analysis, vertical jump, kids.

Glycogen synthesis after acute exercise at 80% (Endurance 1) and 100% (Endurance 2) of the lactate minimum intensity in rats

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The purpose of this study was to characterize glycogen turnover in soleus (S), white gastrocnemius (WG) and liver (L) after Endurance 1 (END1) and Endurance 2 (END2) series of training in experimental swimming. The END1 and END2 series were based on intensities corresponding to the Lactate Minimum Test (LM): END1 was equivalent to 100% of LM (60 min) and END2 was equivalent to 120% of LM (30 min). The experimental period lasted 3 days: 1st - twenty-one rats were submitted to individual END1 load and twenty-one rats were submitted to individual END2 load; seven rats of END 1 and seven rats of END 2 were euthanized immediately (I) after the effort; 2nd - seven rats of END1 and seven rats of END2 were euthanized after 24 h (A24) of the effort in rest; 3rd - seven rats of END 1 and seven rats of END 2 were euthanized after 48 h (A48) of the effort in rest. The S, L and WG were excised for determination of glycogen concentration (mg/100mg). A control group (CG) was killed in rest ($n=10$) for determination of glycogen stores (WG: 0.609 ± 0.095 ; L: 3.435 ± 0.790 ; S: 0.432 ± 0.161). Immediately after the END1 series, the glycogen stores in S muscles (0.214 ± 0.075) reduced in relation to CG but unchanged in L (2.418 ± 0.891) and WG (0.529 ± 0.052). A24 and A48, the glycogen stores in WG and L unchanged in relation to CG respectively for both intensities. The glycogen depletion in S was higher than WG and L immediately after the END1.

Keywords: Glycogen, depletion, rats, swimming.

Acute cardiovascular responses during resistance exercise in the lactate threshold intensity in elderly

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The aim of this study was to analyze the acute cardiovascular responses during constant-load resistance exercise at lactate threshold (LT) intensity in elderly. Eleven healthy elderly men [68.6 (4.3) years] performed two protocols on leg press machine. The maximal incremental test was performed to determine the intensity of the LT. After 48h, the subjects performed 15 sets of 20 repetitions lasting 1 minute with 1 minute rest intervals during a constant-load resistance exercise in the LT intensity. The heart rate, systolic (SBP) and diastolic (DBP) blood pressure and rate-pressure product were evaluated during the sets 1 (S1), S3, S6, S9, S12 and S15 of the constant-load resistance exercise. It was observed significant ($p < 0,05$) increase in the heart rate from S1 (94,5 (6,2)b/min) to S6 (103,4 (6,0) b/min) and no significant differences from S6 until the S15 (111,5 (7,3) b/min). The SBP and rate-pressure product showed significant increase from S1 (148,5 (14,6) mmHg; 14011,9 (1504,6) b/min/mmHg, respectively) to S3 (167,5 (16,4) mmHg; 16836,5 (1671,3) b/min/mmHg, respectively) and no significant differences from S3 until the S15 (186,1 (24,3) mmHg); 20741,6 (3057,3) b/min/mmHg, respectively). There are no significant differences in the DBP during the exercise. These outcomes showed that there is a stabilization of cardiovascular parameters during resistance exercise at lactate threshold intensity.

Keywords: Leg press exercise; hear rate; blood pressure;aged people

Effect of different rest intervals on cardiovascular responses in resistance exercise

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The cardiovascular system is the most submitted to overload during exercise practice. However, there is a lack of knowledge about heart response under different rest intervals (RI). The purpose of this study was to analyze the heart overload, using as cardiovascular parameter, the heart rate (HR), systolic blood pressure (SBP) and rate pressure product (RPP) under different rest intervals, delimited in 60 (R1) and 90 (R2) seconds. The study analyzed 10 volunteers, age 21.5 ± 6.04 years, weight 77.5 ± 10.62 kg and height 179 ± 007 cm. The protocol was composed by three sets of 12 repetition of 60% 1RM in Leg Press 45° apparatus. T-student test was used to comparing hemodynamics variables at the end of each serie. There was no significant difference of SBP in the first (145 ± 8 vs 142 ± 6), second (154 ± 9 vs. 151 ± 8) and third set (159 ± 8 vs 152 ± 7), with RI1 and RI2 respectively. The HR did not show difference between RI, being the first 131 ± 18 vs 127 ± 15 , second 139 ± 15 vs 133 ± 14 and third set 143 ± 14 vs 136 ± 15 . The RPP was no different in first 19.286 ± 3.674 vs 18.240 ± 2.247 , second 21.529 ± 3.654 vs 20.273 ± 2.630 and third set 22.945 ± 3.552 vs 20.806 ± 2.536 . We conclude that different RI applied on an exercise held at 60% 1RM do not interfere on cardiovascular response on this exercise.

Keywords: Resistance exercise, rate pressure product, rest intervals.

Impact of 10 minutes of running exercise at different intensities on blood pressure and cognitive performance in pre-pubertal children

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This study investigated the acute effects of 10 min of running below and above lactate threshold (LT) on cardiovascular and cognitive parameters. Seven physically-active children volunteered for this study (10.6 ± 0.8 yr; 35.8 ± 7.8 kg; 1.44 ± 5.3 m). They performed five sessions: a) Twelve minutes running test (VT12); b) Incremental test (6x500m at 80, 83, 86, 89, 92 and 95% of VT12 for LT determination; c) Control; d) 10 min of running at 90% LT; e) 10 min of running at 110% LT. The following variables were recorded: HR, Systolic, Diastolic and Mean Arterial Pressure (SBP; DBP; MAP) at rest and during 60 min of seated recovery (rec). Additionally, various cognitive tasks (memory, attention, and logical performance) were applied at 20, 25, 35 and 40 min of rec. It was observed a high effect size (Cohen's D) in MAP lowering at 30 (6.4%), 45 (10.6%) and 60 min of rec (11.7%) for 110%LT; and at 45 (4%) and 60 min of rec (6%) for 90%LT. The logical performance was higher after the two exercise intensities while only the 110%LT positively influenced memory performance. It was concluded that 10 min of running exercise could be sufficient for lowering MAP and enhance some cognitive parameters in pre-pubertal children with the higher intensity exhibiting the higher benefits.

Keywords: Lactate threshold, cognitive performance, cardiovascular parameters, pre-pubertal children.

Case study of twelve weeks of strength training on muscle strength of lower limbs, functionality and pain symptomatology in a subject with total knee arthroplasty.

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This study showed the effects of strength training on a subject (male, 56 years) with total knee arthroplasty (TKA), on functionality and pain symptomatology. The patient was submitted to a resistance training program (knee extension and flexion) during 12 weeks. On first week he performed one set of 15 repetitions without load, on second week of the program he performed one set of 15 reps but with a 1kg load, from the third week he performed two sets of 15 reps with an increase of 10% of load and the load continues to increase by 15% and 20% after the sixth and ninth weeks respectively. To assess quality of life the SF-36 questionnaire was used and to assess strength and lower limb functionality a goniometer was used. Results showed an improvement of up to 90% in the postoperative TKA related to reported pain and articular function and, mainly, with an improvement of 80% of the strength. The quality of life increased by 15% compared with previous assessment and 85% increase in performing activities of daily living. The program of strength training for patients with TKA is recommended for improved functionality and strength of the knee as well as improving quality of life.

Keywords: Pain, strength, functionality, knee arthroplasty.

The relationship of supplementation branched-chain amino acid associated to neuromuscular electrical stimulation in immobilized skeletal muscle

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Musculoskeletal immobilization as a treatment method has wide practical applicability in the field of traumatology and sports medicine. To minimize the harmful effects, both supplementation with branched chain amino acids (BCAA) and neuromuscular electrical stimulation (NMES) are resources that can be used for the rehabilitation of athletes. This study aimed to investigate the effects of BCAA with or without NMES in the glycogen reserves of disused muscle tissue. 24 Wistar rats, kept under ideal conditions of vivarium were used. The animals were divided into four groups (n = 6): control (C) supplemented with BCAA (B), BCAA associated with NMES (BN) and NMES (N). Supplemented groups received the combination of amino acids in the BCAA concentration of 9.2 mg/100g/day. For statistical analysis the data passed the normality test followed by ANOVA and Tukey ($p < 0.05$). The B group showed an increase in glycogen reserves reaching 19% in the soleus muscle, 18% in white gastrocnemius and 12% in red gastrocnemius muscle in relation to the C. The N group showed an increase of 37% in the soleus muscle, 38% in white gastrocnemius and 37% in red gastrocnemius in relation to the B. However the best result was in the BN group, featuring an increase of 21% in soleus, 21% red fibers in the gastrocnemius and a 23% increase in soleus weight in relation to the N. BCAA supplementation was effective in maintaining the nutritional status of the immobilized muscles, evidenced in the presence of neuromuscular electrical stimulation.

Keywords: Amino acids, supplementation, immobilization, atrophy, rehabilitation.

Relationship of body composition and anaerobic capacity with vertical jump performance after muscular exhaustion in professional soccer players.

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The aim of this study was to investigate the relationship of body composition (BC) and anaerobic capacity (AC) with the countermovement vertical jump performance (VJ) after muscular exhaustion (ME) in professional soccer players. Twenty two male athletes performed the VJ test (VJ1) then, they performed a test of maximum intensity (7.5% of body weight) for 30s in cycle ergometry (Wingate). Immediately after completion of the Wingate test the athletes were submitted to a second VJ test (VJ2). Statistics used were t-test and correlation ($p < 0.05$). The height of the VJ decreased significantly ($p = 0.003$) after the Wingate (43.4 ± 4.9 cm to 41.3 ± 4.8 cm). There was no significant correlation between BC and AC with VJ1. However, VJ2 was significantly correlated only with lean mass ($r = 0.42$, $p = 0.048$) and muscle mass ($r = 0.50$, $p = 0.018$), indicating that the amount of muscle affects positively the performance of VJ after ME. AC indicators obtained in the Wingate test, minimum watts ($r = 0.46$, $p = 0.021$), minimum watts adjusted by body weight ($r = 0.55$, $P = 0.005$) and average watts adjusted by body weight ($r = 0.46$, $p = 0.020$), were correlated with the changes ($VJ = VJ2 - VJ1$) in the VJ. It was concluded that AC and muscle mass partly explain the interindividual variation in the performance of VJ after ME.

Keywords: Anaerobic capacity, muscular exhaustion, vertical jump, soccer players.

Futsal training improves flexibility in university athletes.

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Introduction: Flexibility is an important physical capacity associated with health and performance. In futsal athletes, flexibility is important to the economy of the movement, the high amplitude of movements, injury prevention and others. There are many studies about futsal and physical capacities, but we have few studies about flexibility and university futsal. **Aim:** The present study aimed to investigate the futsal training effects in the lower limbs flexibility in college male athletes. **Methodology:** 12 university athletes underwent futsal training and their flexibility (fleximetry method) was rated before (T1) and after (T2) 60 days of specific training 3 times a week during 2 hours per session. Paired Test t were utilized to observe the difference between T1 and T2 ($p < 0.05$). **Results:** The data demonstrates the significant improvement in flexibility after training in right elbow ($T1=95.41 \pm 11.77$; $T2=122.08 \pm 16.34^*$), left elbow ($T1=100.33 \pm 10.12$; $T2=128.50 \pm 14.46^*$), right knee ($T1=116.92 \pm 13.47$; $T2=145.92 \pm 14.57^*$), left knee ($T1=114.83 \pm 12.30$; $T2=141.42 \pm 14.60^*$), right dorsiflexion ($T1=17.83 \pm 20.92$; $T2=22.25 \pm 2.30^*$) and left dorsiflexion ($T1=17.92 \pm 2.31$; $T2=22 \pm 2.45^*$). **Conclusion:** Specific futsal training 3 times a week, 2 hours a session, improves flexibility in university male athletes.

Keywords: Futsal, flexibility, university athletes.

Correlation between explosive power and speed in young swimmers.

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Introduction: Athletic performance in speed has a high correlation with other physical capacities like explosive power. Aim: the present study aimed to observe the correlation between explosive power and speed in young swimmers. Methodology: 16 swimmers (9 male and 7 female) with 14.06 ± 1.22 years old. They performed vertical jump (explosive power of lower limbs), medicine ball pitching (explosive power of upper limbs) and speed in 25 meters in pool. All of the tests were performed in maximal effort. After three attempts, the best performance was noted. The collected data were treated in excel program calculating the correlation between the data. Results: The results show the negative correlation between the explosive power and speed. The upper-body has a positive correlation with lower-body explosive power ($r = 0.81$), the higher correlation was between speed and upper-body explosive power ($r = - 0.87$) and the correlation between speed and lower-body explosive power was ($r = - 0.78$). Conclusion: The correlation between explosive power and speed demonstrates the necessity to improve the power and plyometric training in swimmers.

Keywords: Explosive power, speed, swimming.

Assessment of health status in female futsal player of São Carlos

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Research suggests a strong relationship between physical activity in perceived life satisfaction in high schools adolescents. In general, the athlete population scored better on all subscales (except bodily pain). The aim of this study was to investigate how self-reported futsal training affects health-related quality of life in athletes. All participants (n=7; Age 22 ± 4.94) completed a self-administered brief health status questionnaire and the ShortForm-36 Health Survey Questionnaire (SF-36). Dependent variables included 8 subscale of the SF-36 physical functioning (PF), physical aspects (PA), bodily pain (BP), general health perceptions (GH), vitality (VT), social functioning (SF), emotional aspects (EA), mental health (MH) and two composite score, physical composite (PCS) and mental composite (MCS). Responses were converted to scores and mean and standard deviation were calculated. On SF-36 the group demonstrated high scores on PF (93.6 ± 9.45), PA (78.57 ± 30.37), SF 85.9 ± 4.72), EA (87.5) and MH 76 ± 5.98). Intermediate scores were showed on BP (60.75 ± 13.69), GH (61.13 ± 14.68) and VT (63.12 ± 6.36).). In general, PCS (73.50 ± 15.75) and MCS (78.14 ± 11.23) were all positively scored. In conclusion, the adolescent athletes self-reported good values for all variables, except for BP agreeing with that reported by high performance athletes.

Keywords: SF-36, futsal athlete, bodily pain.

Status evaluation health in rafting athletes

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In general, people who engage in physical activity report feelings of well-being. Moreover, the athlete population scored better on all subscales (except bodily pain). The aim of this study was to investigate how self-reported rafting training affects health-related quality of life in athletes. All participants (n=9; age 27 ± 2.97) completed a self-administered brief health status questionnaire and the ShortForm-36 Health Survey Questionnaire (SF-36). Dependent variables included eight subscale of the SF-36 physical functioning: (PF), physical aspects (PA), bodily pain (BP), general health perceptions (GH), vitality (VT), social functioning (SF), emotional aspects (EA), mental health (MH) and two composite score, physical composite (PCS) and mental composite (MCS). Responses were converted to scores and mean and standard deviation were calculated. On SF-36, the group demonstrated high scores on PF (85.6 ± 17.93), EA (77.8 ± 37.27) and MH (78.7 ± 37.27). Intermediate scores were showed on GH (68.4 ± 17.29) and VT (67.8 ± 13.94). Rafting athletes self-reported lower scores on PA (61.1 ± 37.73), BP (50.07 ± 23.61) and SF (61.1 ± 29.61). In general, PCS (66.44 ± 14.68) and MCS (71.33 ± 8.4) were all positively scored. In conclusion, the athletes had good values for all variables, except for BP agreeing with that reported by high performance athletes.

Keywords: SF-36, rafting athletes, bodily pain.

Effects of endurance exercise on the oxidative markers of rats

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The beneficial effects of physical exercise are the aim of many studies. This study aims to analyze serum catalase, superoxide dismutase and TBARs in rats subjected to endurance training. 24 male Wistar rats (120 days old) were randomly separated into two groups with eight rats in each: C (control sedentary) and E (endurance exercise). The animals of E group performed a minimum lactate test (ML) to identify the individual aerobic/anaerobic metabolic transition during swimming exercise and were subjected to swimming endurance training at 80% of ML intensity, one hour/day, five days/week. At the end of the experiment, they were killed by sodium thiopental administration to determine: Catalase (U/ml), SOD (U/ml) activities and TBARs (μM) concentrations. The results were statistically analyzed by *test-t*. Catalase activity was higher in E compared to C groups C= 42.2 ± 10.4 , E= $82.1 \pm 12.2^*$. SOD activity was higher in E compared to C: C= 1.66 ± 0.36 , E= $4.2 \pm 1.2^*$. TBARs concentrations were higher in group E to group C: C= 16.4 ± 2.0 , E= $23.9 \pm 5.2^*$. Statistical difference to C group $p \leq 0.05$ ($p \leq 0.05$). The endurance training produced more TBARs compared to C group but improved the Catalase and SOD activities (anti-oxidant enzymes) of the rats. Further studies are required in order to understand all alterations caused by the physical exercise in the anti-oxidant mechanisms. **Financial Support:** FAPESP (2009/15336-9).

Keywords: Exercise training, oxidative stress, rats, endurance training.

Relationship between physiological, morphological and mechanical parameters and performance of 200-m crawl

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The aim of this study is to investigate the relationship between morphological, physiological and mechanical parameters and the performance of 200-m crawl. Eleven swimmers (58.03 ± 15.41 Kg; 167.25 ± 12.66 cm; 16.5 ± 2.9 years) were submitted to a 200-m (V_{200}) front crawl maximal-sprint swimming. During the effort, swim time (t), total number of strokes (NS) and average speed were registered. After three, five and seven minutes, an ear lobe blood sample ($25\mu\text{L}$) was collected to determine the peak lactate concentration ($[\text{Lac}]_{\text{peak}}$) and lactate accumulated rate ($\text{LAR} = [\text{Lac}]_{\text{peak}} \cdot t^{-1}$). Also, frequency ($\text{FS} = \text{NS} \cdot t^{-1}$), length of stroke ($\text{LS} = \text{NS} \cdot 200^{-1}$) and stroke index ($\text{SI} = \text{SL} \cdot V_{200}$) were determined. Total lean mass (TM) of trunk (TTM), arms (TAM) and legs (TLM), total fat percentage (%TF) of trunk (%TFT), arms (%TFA) and legs (%TFL), and body mineral density (BMD) were estimated by Dual Energy x-Ray Absorptometry (DEXA). Pearson's product moment was used for the associations between V_{200} and the morphological, physiological and mechanical parameters ($p < 0.05$). V_{200} was significantly correlated with TM (43.4 ± 12.9 ; $r = 0.82$), TTM (19.9 ± 5.6 ; $r = 0.84$), TAM (5.2 ± 2.2 ; $r = 0.76$), TLM (17.1 ± 5.1 ; $r = 0.82$), BMD (1.1 ± 0.1 ; $r = 0.89$); $[\text{Lac}]_{\text{peak}}$ (10.6 ± 3.3 ; $r = 0.71$), LAR (0.07 ± 0.03 ; $r = 0.87$) e SI (2.01 ± 0.53 ; $r = 0.83$). The findings suggest that combined evaluation of morphological, physiological and mechanics parameters is important for performance prediction of 200-m front crawl swim.

Keywords: Swimming, training, lactate, swimming performance, morphological, mechanical indexes.

Analysis of changes in body mass and hydration of competitors during a multiathlon

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Multiathlon is a combined events competition held in a single day. Forty disciplines were contested in 2008, including sports from most varied characteristics and technical skills. Adequate hydration ensures that the body works efficiently and is essential for good performance. The difference in body mass before and after exercise can lead to great changes in hydration, because the fluid intake should be consistent with the variation in body mass. This study aimed to determine the variation in body mass due to the fluid intake of participants of Multiathlon 2008. The event lasted 21 hours and the hydration was observed in nine consecutive intervals. The study included 12 males, 32.92 (9.13) years, 74.39 (5.59) kg, 1.79 (0.06) m, 17.03 (2.94) % body fat. The correlation between body weight and fluid intake is negative ($p = 0.08$). We took a sample of the best athletes (the cutoff was who scored at least 30 disciplines). It was proved that the best six athletes were the most hydrated ($p = 0.004$) when compared to the others. However, the hydration amount was not sufficient, maybe because the great physical effort demanded. We conclude that the rehydration during the event was a bit different to both groups, but insufficient for individuals that scored at least 30 disciplines, for who the weight loss was statistically significant.

Keywords: Body water, body mass, dehydration, exercise performance, multiathlon, hypohydration, hyperhydration, rehydration, temperature regulation, combined events.

Correlation between direct and indirect (cooper) VO_{2peak} in long distance runners

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The number of people practicing road running is increasing more and more each day. However, not all runners have access to a direct analysis of their cardiopulmonary capacity. One of the alternatives are indirect tests. The aim of this study is the comparison between the peak oxygen uptake (VO_{2peak}) in a direct laboratorial test and the estimated values in the Cooper test. The descriptive values of the sample of 18 long distance runners are: 47.56 ± 5.70 years, 67.06 ± 10.37 kg, 1.71 ± 0.07 m, training experience 14.39 ± 8.44 years, 57.72 ± 19.85 km weekly distance and timing for 10 km $45:36 \pm 6:32$ (min:sec). The VO_{2peak} was accessed in a treadmill connected to a gas metabolic analyzer (51.81 ± 6.02 ml.kg⁻¹.min⁻¹) and it was also estimated by the 12-minute test carried out on a 400-m-running track (55.73 ± 7.70 ml.kg⁻¹.min⁻¹). A linear regression was made and it detected a correlation of 0.74, $R^2=0.55$ and $p=0.0004$ between the direct and indirect values. The relation between the values obtained indirectly and directly is of a mild underestimation (difference of 3.92 in the mean and of 3.90 in the median), showing that for this population the direct analysis can be approximately replaced by the running track test via $19.4561 + 0,5805 I$, where I is the result of the indirect test.

Keywords: Maximum oxygen uptake, prediction of maximum oxygen uptake, field tests.

Hypotensive response after acute session of strength training in older women

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This study aimed to determine the acute response of the blood pressure systolic (BPS), diastolic (BPD), and pressure arterial mean (PAM) by means of auscultation method in three different intensities of the maximum dynamic strength. Were selected eight older hypertensive women (60-78 old years, BPS = 140±10 mm.Hg, BPD = 90±10 mm.Hg). The scheme of manipulation the volume and intensity was 4 sets of 8-10 repetitions (80% 1-RM), 4 sets of 4-6 reps (90% 1-RM), 3 sets of 15 -20 repetitions (40% 1-RM). Eight exercises for the whole body was used. The exercises selected: leg press, bench press, triceps pulley, leg extension, vertical pulley, biceps curl, leg curl, shoulder press , were followed this order during the strength tests and trial sets exercise. The arterial blood pressure was obtained before (PRE) and immediately after each session exercise (P0), 10 min (P10), 20 min (P20) and 30 min (P30) on position sitting. ANOVA test for repeated paired measurements showed significant differences for the effect of time on the BPS response (F [8, 210] = 8.9914, p = 0.00001). This effect was independent of training intensity. The Fischer's test found the differences between pre and post trial sets: P0 (p <0.0003), P20 (p<0.04), and P30 (p<0.008) respectively for SBP. Significant difference was observed for PAM (p<0.02 between PRE and P0). Our data suggest that a bout of resistance exercise was effective in acutely reducing systolic blood pressure and that this fact is independent of the intensity of resistance training.

Keywords: Hypertension, strength training, aging.

Pre-knowledge influences on hydration status of street runners

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The hydration status of an athlete during a sports competition is a factor that influences performance and can be changed by liquid ingestion up to 24 hours before the run. The goal of this study was to analyze how the habits and knowledge that street running athletes have about hydration may have influenced their hydration status before and after a 10km run. Thirty eight runners answered a questionnaire before the competition about their knowledge and habits related to their fluid and food intake during the 24 hours before the competition. The athletes' urine was collected before and after the trial, and its specific gravity determinate to access the hydration status. Of the 38 runners, 60% have never had guidance on how to hydrate themselves. Half of them started the competition hydrated (1.013 ± 0.004) and the other half dehydrated (1.025 ± 0.004). Fifteen of the dehydrated ones ingested diuretics liquids in the 24 hours before the run. At the end of the running, 12 athletes remained dehydrated (1.025 ± 0.004) and 26 hydrated (1.013 ± 0.003). The lack of knowledge of athletes about the cautions with hydration can be a factor that influenced in their dehydrated state pre-test. The supply of water during the run leads many athletes to drink some fluid, which forced the athlete's rehydration or remains them hydrated throughout the competition. The results suggest that is necessary a nutritional orientation about the adequate fluid for hydration since athletes reported to use diuretic liquids like liquid stockers.

Keywords: Hydration status, urine density, knowledge about hydration, street runners.

Effect of Jiu-Jitsu practice in bone density

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Bone tissue is dynamically responsive to functional demands imposed on it, which leads to changes in its mass and stiffness. These changes result from the gravitational force and the intense action of the muscles attached to bones. In many sports, as in Jiu-Jitsu, the hands are used in certain situations, with movements of high degree of skill, strength and muscular endurance. Objective of this study was to analyze the effect of the practice of Jiu-Jitsu on the bone density of second metacarpal of practitioners of this martial art. A total of 54 males, with 25.56 ± 8.46 years old, being 29 practitioners of Jiu-Jitsu and 25 in the control group, had their hands radiographed with routine technique for analysis of radiographic density with the software Image J[®] (free online). Individuals of both groups had the stature of 178.88 ± 5.75 m and 174.38 ± 4.10 m, and body mass of 88.88 ± 15.73 kg and 82.10 ± 9.88 kg, respectively. Among practitioners of Jiu-Jitsu, 55.17% were white belt, 27.59% were blue belt, 10.34% were brown belt and 6.90% were purple belt. Statistical analysis was performed by Student t test ($p < 0.05$). There was a highly significant difference ($p < 0.0001$) for bone density between the groups where, the group practitioner of Jiu-Jitsu had a mean and standard deviation of 6.50 ± 0.40 mmAl and the control group of $5.13 \pm 0, 40$ mmAl. The practitioners of Jiu-Jitsu have bone density significantly higher than the individuals of control group, thus emphasizing that bone density is increased by the mechanisms of load imposed by this sport.

Keywords: Athletes, bone, exercise, mineral density.

Stabilization of blood lactate concentration and rate of perceived exertion during leg press exercise at lactate threshold intensity

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The aim of this study was to analyze blood lactate concentration (BLC) and rate of perceived exertion during constant-load resistance exercise (CRE) on leg press at lactate threshold (LT) intensity. Ten healthy men [25.6 (3.1) years] performed three exercise sessions in different days with 48h between sessions: (1) a test to determine 1RM on leg press 45°; (2) a maximal incremental test to determine the intensity of the lactate threshold and a CRE at LT intensity. During the CRE, the subjects performed 15 sets of 20 repetitions lasting 1 minute with 1 minute rest intervals. During the rest and at the final of S3, S6, S9, S12 and S15 of CRE, capillary blood was collected for blood lactate analysis. Furthermore, BORG and OMNI scales were applied in the end of S1, S3, S6, S9, S12 and S15. The LT intensity was 27.1 (3.7) %1RM. The BLC was not significantly different from S6 (2.8 (0.8) mmol.L⁻¹) until S15 (4.1 (1.4) mmol.L⁻¹). The BORG and OMNI scales increased significantly between S1 (7.8 (1.8) and 1.5 (1.2), respectively) and S3 (8.8 (2.0) and 2.3 (1.4), respectively) compared to S15 (13.0 (3.5) and 5.2 (2.6), respectively; p<0.05). Although the perceived exertion was increased in both scales, there was no significance difference from S6 (10.2 (2.6) and 3.4 (2.1), respectively; p>0.05) until S15. Thus, the study demonstrates that there is a stabilization on BLC and rates of perceived exertion during resistance exercise performed at LT intensity.

Keywords: Constant-load resistance exercise, Anaerobic Threshold, perception of effort.

Verification of methods: classic stretching, strength training and isostretching in women with low back pain

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Low back pain affects about 80% of adult population and presents a varied etiology. Nowadays several strategies of exercises and physical therapies have been proposed to relieve or reverse deficits of low back pain. The objective of this study was to investigate the influence of classic stretching, strength training and the Isostretching method in the treatment of low back pain. We studied 30 female subjects complaining of back pain at the age of 21 ± 3 years. The volunteers were submitted to an evaluation of pain for the Visual Analog Scale (VAS), of flexibility for the bank of Wells, abdominal strength and lumbar paraspinal muscles for the test of ten maximum repetitions (RMs) before and after the interventions. After that the volunteers were subdivided randomly in three groups (GF, strength training group), (GISO, Isostretching group) e (GA, stretching group). All the three groups were submitted to sixteen sessions of the exercises just mentioned. The statistical analysis was carried through with $p < 0.05$. By the end of the study a significant difference between the conditions pre and post treatment for the low back pain index was verified ($p = 0.0005$), It can be concluded that all described physical therapy had been efficient in the reduction of the low back pain, after sixteen treatment sessions.

Keywords: Low back pain, resistance training, muscle stretching exercises.

Plasmatic concentrations of aspartate aminotransferase, uric acid, albumin and glucose from sedentary rats subject to intense physical exercise

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The workload during physical activity damages muscle fibers and biomolecules, changing activity of muscle enzymes and plasma components. This study aims to test the hypothesis that strenuous exercise influences plasma activity of aspartate aminotransferase (AST) and levels of uric acid, albumin and glucose in sedentary rats. To this end, 14 sedentary Wistar rats were submitted to 50 minutes of swimming. Plasmatic biomarkers were measured before (baseline), immediately after and three hours after exercise. Using commercial reagents and automated biochemical analyzer, plasmatic activity of AST (UV enzymatic method) and levels of uric acid (uricase/peroxidase method), albumin (bromocresol green reaction) and glucose (glucose oxidase/peroxidase method) were analyzed. The increase in the plasmatic activity of AST was highly significant ($p=0.0001$) immediately after (535.07 ± 310.21 IU/L) and three hours (579.29 ± 331.75 IU/L) after exercise when compared to baseline (111.27 ± 34.27 IU/L). No significant differences ($p=0.8805$) were observed in the levels of the antioxidant uric acid in all time periods. Immediately after exercise, plasmatic concentration of albumin (32.14 ± 2.5 g/L) increased significantly (37.43 ± 2.31 g/L, $p=0.001$) and glucose levels (233.5 ± 47.8 mg/dL) decreased (172.64 ± 33.3 mg/dL, $p=0.0001$), both returning to baseline values three hours after the swimming. It was concluded that strenuous physical exercise in sedentary rats induces muscle damage associated with hypoglycemia and dehydration, even when there are normal plasmatic concentration of the antioxidant uric acid.

Keywords: Intensive physical activity, swimming, muscle enzymes.

Jump training into water performed daily does not induce soleus hypertrophy in rats

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It has already been shown that the experimental protocol of jump training into water, carrying an overload (50–70% body weight), performed on alternate days, induces soleus muscle hypertrophy in rats. However, it is unknown which are the adaptations induced by daily training. The aim of this study was to evaluate the effect of this training protocol on cross-sectional area of muscle fiber (CSAMF) and expression of myosin heavy chain (MHC) isoforms on soleus muscle of rats. Male Wistar rats (60 days old) were divided into two groups: trained and untrained, with three subgroups each one (n=8/subgroup), corresponding to weeks 1, 3 and 5 of training protocol. Trained animals performed 4 sets of 10 jumps in water, 30 seconds of rest between sets, 50-70% body weight-load, 5 days/week, 5 weeks. Forty-eight hours after the last session animals were killed. CSAMF and MHC isoform analysis were performed using hematoxylin-eosin staining and sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE). Data were analyzed by two-way ANOVA and Tukey test (Means±SEM; p<0.05). Physical training decreased CSAMF in the third (2362±144 vs 3031±132 μm^2); and fifth weeks (2385±104 vs 2918±128 μm^2) and also decreased MHCI (90.3±1.8 vs 99.2±0.8%) and increased MHCII content (9.8±1.8 vs 0.8±0.8%) in the fifth week, in comparison to untrained animals. Jump training, performed daily, did not induce soleus hypertrophy, but it promoted an important muscle fiber type transition. **Financial Support:** FAPESP, CAPES, CNPq.

Keywords: Physical training, muscle fiber area, MHC isoforms, soleus.

The blood-gas and acid-base profile of elite and amateur runners

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Elite long-distance runners (ER) show better performance when compared to amateur long-distance runners (AR). However, the electrolyte and acid-base profile in these populations has not been well described. The aim of this study was to compare the blood-gas and acid base parameters between ER and AR. Twenty five AR ($VO_{2max} = 38.3 \pm 6.3 \text{ ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$) and twenty ER ($VO_{2max} = 54.0 \pm 9.0 \text{ ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$) participated in this study. Blood samples were collected at rest through digital puncture (Clinitubes®, Radiometer, Copenhagen®) and analyzed immediately in the blood gas analyzer Stat Profile® pHox®Plus L (Nova Biomedical®, USA). Significant higher values were found in ER compared to AR for bicarbonate (ER = 28.5 ± 1.8 ; AR = $25.7 \pm 1.7 \text{ mmol} \cdot \text{l}^{-1}$), chloride concentration (ER = 104.4 ± 3.83 ; AR = $100.1 \pm 3.89 \text{ mmol} \cdot \text{l}^{-1}$), base excess (ER = 5.6 ± 1.6 ; AR = $3.21 \pm 1.43 \text{ mmol} \cdot \text{l}^{-1}$) and pCO_2 (ER = 36.9 ± 3.7 ; AR = $33.9 \pm 2.9 \text{ mmHg}$) ($p < 0.05$). Anion gap (ER = 16.9 ± 5.68 ; AR = $26.6 \pm 6.05 \text{ mmol} \cdot \text{l}^{-1}$) and sodium concentration (ER = 140.0 ± 4.1 ; AR = $143.5 \pm 3.3 \text{ mmol} \cdot \text{l}^{-1}$) were lower in ER in comparison to AR ($p < 0.05$). Hemoglobin, potassium and lactate concentrations, pH and oxygen saturation were not different between ER and AR ($p > 0.05$). In conclusion, all blood parameters that showed significant differences at rest are in some way related to buffering capacity that can justify different performance levels in AR and ER.

Keywords: Capillary samples, blood-gas analyses, acid-base parameters.

Effects of mate-tea in exhaustive exercise in rats

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Exhaustive exercise can cause oxidative stress in response to increased oxygen consumption and imbalance between the pro and antioxidants systems. Plasma antioxidant capacity is positively modulated by *Ilex paraguariensis* (mate-tea) polyphenols. The aim of this study was to analyze the effects of treatment with mate-tea on antioxidant defense and lipid oxidative damage after single exhaustive swimming test. Twenty four Wistar male rats (50 days old) were divided into (C) control group, (MT) mate-tea (50 mg/kg b.w., gavage, seven days), (E) exercise and (EMT) exercise treat with mate-tea. The animals were not submitted to training before the test. Time for exhaustion was defined as the time when rat failed to rise to the surface to breather after 10 seconds. Water temperature was 31°C. At the end of swimming test blood was collect to determine plasma lactate (L), uric acid (UA) and thiobarbituric acid reactive substances (TBARS). ANOVA and Tukey tests were applied. Swimming time was 92min (EMT) and 23min (E). Lactate was 3.27 mg/dL (EMT) and 11.28 mg/dL (E). Uric acid was higher in EMT than E (7.55 mg/dL versus 6.40 mg/dL). No statistically significant difference was found in TBARS. The increase in the resistance exercise may be related methylxanthines. Uric acid and polyphenols may be involved in adaptive and protective mechanisms against oxidative stress.

Keywords: Oxidative stress, mate-tea, exhaustive exercise.

Correlation between the performance of 200 meters front crawl with indicators of training loads

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The purpose of the present study is to correlate the performance in the 200 meter front crawl with indicators of training loads (global session load, monotony and strain). Fifteen swimming athletes composed the child to senior categories, 10 female and 5 male with an average age of 14.9 ± 1.4 years. The indicators of training loads were obtained during 5 weeks of the general preparatory period, while the performance of the athletes was obtained at the end of this period in official competition at regional level. For the indicators of training loads measurement, the subjective scale of effort perception following the methodology proposed by Foster (1998) was used. The prescription of daily training as to the quantity and intensity was the same for all swimmers. For static analysis, the Pearson method was used observing monotony (0.20), strain (-0.01) and training loads (-0.24) correlating to the performance after 5 weeks. The results did not show significant changes in athletes' performance after the mesocycle workout.

Keywords: swimming, training, performance

Onset of blood lactate accumulation in slalom kayaking

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The anaerobic threshold determined by onset of blood lactate accumulation (OBLA) is an applicable evaluation method to determine the aerobic capacity of athletes. The aim of this study was to suggest a specific anaerobic threshold (AT) test to slalom kayak athletes using the fixed blood lactate concentration. Eleven evaluations with well trained kayakers (17±2yrs old) were accomplished on a lake. The AT was determined by a progressive kayak “shuttle” exercise (50-m course, 3min/stage) until exhaustion. The test velocities were 5,6,7,8,9 and 9.5Km/h, with blood sample collection after each stage. Individual curves ‘intensity vs blood lactate’ were plotted and the AT was obtained using two mathematical methods: visual inspection and intersection of the bi-segmental linear regression (AT_i) and by fixed lactate concentration using the inflexion point value obtained in first procedure (AT_{obla}). The AT_i and AT_{obla} were analyzed by t-Student test and Pearson correlation (p<0.05). The AT_i was obtained in 6.98±0.16Km/h, at 2.53±0.25mM. Due to blood lactate equivalent to AT_i to occur at 2.5mM, the AT_{obla} was determined using this value. The AT_{obla} was 6.95±0.28Km/h, observed in similar intensity of the AT_i (p=0.90). AT_i and AT_{obla} were significantly correlated (r=0.75). The AT_{obla} using 2.5mM seems to be applicable to slalom kayak athletes. **Financial Support:** FAPESP and CNPq.

Keywords: Aerobic capacity, blood lactate, specific test, slalom kayak.

Nutritional intake evaluation in professional soccer players

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Adequate dietary consumption in professional soccer players is essential for their maximal performance. This study aimed to analyze the nutritional intake of soccer players from professional team of Rio de Janeiro State. The descriptive study included 12 soccer players (23 ± 2.13 years) with body fat $10.8 \pm 1.52\%$. The body fat was evaluated by skinfolds and calculated by Siri equation (1961). Total energy requirement (TER) was calculated by FAO/WHO/UNO (1985) equation. For food consumption analysis, using 24 hour dietary recall were calculated in a day after the game and macro/micronutrients were calculated by AVANUTRI[®] software, version 2.0. All the athletes showed a low energy (2586.8 ± 697.7 kcal / day), and carbohydrate intakes: (4.9 ± 1.2 g/kg body weight) whereas protein: (1.5 ± 0.4 g/kg body weight) and fat intakes: ($25.3 \pm 6.6\%$ (VCT)) were adequated. It was found that only 42% of athletes had adequate intakes of protein and lipids, and none have adequate carbohydrate intake according to the recommendation values. The folate (176.5 ± 47.02 mg/d), calcium (360.5 ± 118.79 mg/d), magnesium (228.7 ± 50.82 mg/d), potassium (1956.8 ± 493.17 mg/d) and vitamin B5 (3.1 ± 0.62 mg/d) were not adequate in all players. These data show that soccer players need a special nutritional care, and a suitable nutrition intervention would be strategy for achieving the best performance.

Keywords: Soccer, macronutrient, diet.

Identification of the anaerobic threshold in resistance exercise with weight by inspection and bi-segmental method in young men

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The identification and quantification of the anaerobic threshold (AT) in resistance exercise with weight (REW) on different muscle groups has been currently the target of many studies. Thus, the aim of this study was to verify methods of AT determination in REW in college young men. Eight volunteers (21.5 ± 2.3 years; 81.0 ± 9.8 kg; 176.0 ± 8.6 cm) performed two incremental tests to exhaustion, randomly, separated by 24-72h rest interval, being that each one involving bench press (BP) or biceps curl (BC) exercises. The initial load was 10% 1-RM, with 5% increments in each stage and cadence of 20 rep·min⁻¹. The loads had 3 min of duration separated by 1 min rest period and blood sample was withdrawn at the end of each stage. The AT was analyzed by visual inspection and bi-segmental linear regression mathematical model. Comparison and correlation analysis were performed by t-student test for dependent samples and Pearson correlation coefficient, respectively ($P < 0.05$). AT intensities determined by visual inspection and bi-segmental methods were not significantly different ($P > 0.05$) in BP (18.5% and 18.9% 1-RM) and BC (17.1% and 18.2% 1-RM). Moreover, significant relationships ($P < 0.05$) were observed between the methods to evaluate the AT in BP ($r=0.98$) and BC ($r=0.87$) exercises. These results pointed out that both methods were comparable for AT determination in REW in young men.

Keywords: Anaerobic threshold, resistance exercise, incremental protocol.

Effects of Three Different Physical Training Protocols on Recovery Heart Rate in Middle-Aged Men

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Recovery heart rate (RHR) has been used as strong predictor of cardiovascular mortality and regular physical exercise can play a role in positively improving autonomic cardiac function modulation. The aim of this study was to analyze the influence of three different protocols of 16 weeks at physical training in non-active middle-aged men. Four groups were studied: control- non exercise (CG, n= 08); aerobic- 60 min walking or running with varying intensity (50-85% of VO_{2peak})(AT, n = 14); resistance- 10 exercises consisted of 3 sets/10 maximum repetitions (RM) to and after 8 weeks performed 8-RM (RT, n = 13); and concurrent- AT and RT in the same session, 30 min of AT, walking or running with varying intensity (50-85% of VO_{2peak}) and 30min of RT 6 exercises with 3 sets/10-RM and after 8 weeks performed 8-RM (CT, n = 16). For RHR assessment, the volunteers were tested on maximal treadmill (Quinton®, model 645, USA) pre and after 16 weeks of training. The RHR was obtained from the difference in the peak heart rate (PHR) to 4 minutes of recovery after the test end. The difference between PHR and RHR was approximately: CG=-57.6/ -46.5; AT= -58.8/ -62.6; RT= -58.1/ -62.7; CT= -52.6/ -61.5, before and after the protocol, respectively. There was a significant difference ($p < 0.05$) of RHR values after training to CT group. In this way, just CT the protocol was effective to decrease the RHR, positively contributing to the control of the cardiovascular risks of the groups submitted to this specific training protocol.

Keywords: men, middle-aged, recovery heart rate, aerobic training, resistance training, concurrent training

Analysis of ventilatory parameters during leg press exercise at lactate threshold intensity

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The aim of this study was to analyze the ventilatory responses during resistance exercise at lactate threshold intensity. Ten healthy men (25.6 ± 3.1 years) performed three exercise sessions in different days with 48h between sessions: (1) a test to determine 1RM on leg press 45°; (2) a maximal incremental test to determine the intensity of the lactate threshold and (3) a constant-load resistance exercise at lactate threshold intensity. During the constant load resistance exercise, the subjects performed 15 sets of 20 repetitions lasting 1 minute with 1 minute rest intervals. The minute ventilation (VE), oxygen uptake (VO₂), and carbon dioxide output (VCO₂) were evaluated in the average of one minute at rest and one minute during the set 1 (S1), S3, S6, S9, S12 and S15 of the constant-load resistance exercise (with gas analyzer, VO₂2000). The lactate threshold intensity was 27.1 (3.7) %1RM. There was no significant difference between VO₂, VCO₂ and VE measured at rest (0.29 (0.09) L.min⁻¹, 0.33 (0.10) L.min⁻¹ and 8.9 (2.8) L.min⁻¹, respectively) and S1 (0.48 (0.18) L.min⁻¹, 0.54 (0.15) L.min⁻¹ and 12.7 (4.2) L.min⁻¹, respectively). In the subsequent sets, ventilatory parameters were significant higher compared to rest and S1 (p<0.05). Nevertheless, the increase in VO₂, VCO₂ and VE from S3 (0.77 (0.18) L.min⁻¹, 0.84 (0.20) L.min⁻¹ and 18.1 (5.0) L.min⁻¹, respectively) to S15 (0.83 (0.16) L.min⁻¹, 0.95 (0.21) L.min⁻¹ and 22.4 (5.5) L.min⁻¹, respectively) was not significant. These outcomes showed that there is a stabilization of ventilatory parameters during resistance exercise at lactate threshold intensity.

Keywords: resistance exercise; anaerobic threshold; ergospirometry.

Life quality and the importance of health care on job

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Aiming at improving the quality of life, this study evaluated the quality of life (QOL) at workplace at two companies in the banking sector where there is a practice of physical activity, measuring the potential gains reflected in their lives. A total of 28 individuals of both sexes, with a mean age of 36 years participated. The methods included the application of the questionnaire Quality of Life and Health - QVS-80, structured in the Lickert scale, from 0 to 5, and considers objective and subjective aspects of QOL, structured in four areas: health (D1), physical activity (D2), workplace (D3) and perception of quality of life (D4). The results shows that only the D1 achieved a satisfactory score with 79.58 points out of 100 possible, and D2 (31.98), D3 (58.25) and D4 (68.90) being D4 very close to the minimum value (70 points), references to be considered good QOL. We conclude that a physical activity program at the workplace by itself is not sufficient to improve QOL. Regular monitoring should be conducted to analyze the results and implement new processes for how physical activity can contribute even more to achieve excellence in QOL in the workplace.

Keywords: QVS-80, gymnastics work, quality of life.

Estradiol is associated with muscle strength gains following resistance training in postmenopausal women

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The aim of this study was to determine the relation between muscle strength (MS) changes and estradiol levels (E_2) in postmenopausal women. Thirty two postmenopausal women (58.4 ± 8.1 years, IMC of 27.8 ± 4.5 kg/m², FSH of 84.2 ± 35.8 mUI/mL, 22.9 ± 7.5 pg/mL and 8.8 ± 5.4 years from menopause) participated in the study. The volunteers underwent resistance training (RT) with 5 different exercises (bench press, lat pull down, leg extension, triceps pulley and biceps curl) during 4 months. The MS assessment (1RM) and analysis of fasting levels of E_2 (ELISA) were performed in 2 moments, with 0 (M0) and 4 (M1) months of training. Statistics used were t-test and correlation ($p < 0.05$). RT increased significantly MS in all exercises assessed (13% -34%) after RT. No change was observed in concentrations of E_2 after RT. MS in the M0 were not significantly correlated with the concentrations of E_2 . However, changes in muscle strength (Δ = delta) showed significant correlation ($p < 0.05$) with concentrations of E_2 (Δ bench press, $r=0.38$; Δ lat pull down, $r=0.36$; Δ leg extension, $r=0.68$; Δ triceps pulley, $r=0.70$ and Δ biceps curl, $r=0.40$). Circulating E_2 has a moderate association with RT-induced increases in MS in postmenopausal women.

Keywords: Postmenopause, resistance training, E_2 .

Muscle glycogen and acute physical exercise in rats recovered from fetal malnutrition with fructose-rich diet

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Background: Many studies analyze the influence of early malnutrition on metabolic variables only at rest. Also, it is known that metabolic syndrome signs are triggered in animals by fructose-rich diets. The aim of this study was to evaluate the response of muscle glycogen to a single bout of swimming exercise at the Maximal Lactate Steady-State intensity in rats recovered from fetal protein malnutrition with a fructose-rich diet.

Methods: Wistar rats (60 days), whose mothers were fed during pregnancy with balanced (AIN-93G) or low protein diet (6% protein -L) were used. During the lactation period, the mothers received a balanced diet (B) or fructose-rich diet (60% fructose -F) composing 4 groups: B, Balanced-Fructose (BF), Low protein/Balanced (LB) and Low protein/Fructose (LF). **Results:** Muscle glycogen concentrations (mg/100mg) at rest: B: 0.44 ± 0.06^a ; BF: 0.53 ± 0.11^a ; LB: 0.51 ± 0.09^a ; LF: 0.65 ± 0.17^b (different letters show statistic significance by Anova two-way and Newnam-Keul's Post-Hoc). Muscle glycogen concentrations (mg/100mg) after 20 min of swimming exercise: B: 0.28 ± 0.09^c ; BF: 0.27 ± 0.09^c ; LB: 0.26 ± 0.09^c ; LF: 0.29 ± 0.15^c (^cdifference rest vs acute exercise). The decrease in the muscle glycogen concentrations after exercise is associated with an increase of muscle glycogenolysis, stimulated by catabolic hormones (Koh et al., 2007). **Conclusion:** The nutritional recovery with fructose rich diet influenced the muscle glycogen concentration at rest, but not after acute physical exercise. **Financial support:** FAPESP (process 08/53255-8).

Keywords: Muscle glycogen, acute physical exercise, rats, fetal malnutrition, fructose-rich diet.

Acute effect of water exercise in persons with hemophilia

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Objective: To evaluate the acute effect of aquatic exercise on haemostasis in persons with hemophilia (PWH). **Methods:** Five males with hemophilia A aged 15-31 years, with a minimum of six months of experience, underwent blood collection before and immediately after 20 minutes of an aquatic exercise session. Pre- and Post- differences were evaluated with regard to: Factor VIII (FVIII), Prothrombin Time (PT), Activated Partial Thromboplastin Time (APTT) and Fibrinogen. Subjects' heart rate (HR) was monitored during aquatic exercise. Wilcoxon signed-rank test and Cohen's D were utilized to evaluate the difference of means and effect sizes, respectively. **Results:** No significant differences were detected between the pre- and post- values. Interestingly, FVIII and TP exhibited a moderate effect, while the APTT and fibrinogen demonstrated small effect sizes after 20 minutes of aquatic exercise at 70% of HRmax. **Conclusion:** Considering the limitations, further studies are required to verify the possible benefits of moderate aquatic exercise in haemostasis of PWH.

Keywords: Haemophilia, aquatic exercise, haemostasis.

Indirect assessment of aerobic power athletes with spinal cord injury

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Introduction: The value of Aerobic Power (AP) has a different behavior in Spinal Cord Injury (SCI) and is related to the level of injury due to a lower heart rate and ventilation, as seen in the study by Lakomy, Campbell & Williams (1987). In individuals with SCI, the VO₂max is limited by the reduction of muscle mass under conditions of exercise (MORGULEC et al. 2006). There are some protocols to measure VO₂max for SCI and these can be divided into two forms of measurement, direct and indirect. **Objective:** To evaluate and compare the SCI AP sports adapted through a test of 12 minutes on court.

Methods: The sample consisted of 11 male athletes with SCI in rugby adapted C4-C7. The test for the estimation of AP was performed according to the protocol of Franklin et al. (1990). After obtaining the results of tests for miles in VO₂max was found according to the protocol. Results: The mean age of participants was 33.3 ± 3.2 years. As for weight and height of 60.9 ± 7.6 kg and 1.75 ± 0.12 m. Since BMI was 19.9 ± 2.5 kg/m². The distance traveled in meters during the 12-minute test for assessment of AP was 1576.29 ± 438.64 meters. The VO₂ max found in athletes was 18.21 ± 8.12 ml / kg / min.

Conclusion: From these results we consider that the indirect assessment of AP in the study group has an average within normal limits.

Keywords: Assessment, spinal cord injury, VO₂ max.

Changes in serum markers after routine poses in bodybuilders

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Bodybuilding is a sport in which athletes carry out isometric contractions to perform routine poses. The aim of this study was to verify serum changes in Urea, Creatinine and Total Proteins before (T0), right after (T1), 24 hours after (T2) and 48 hours after (T3) routine poses. 5 male bodybuilders participated in this study (age 27 ± 8 years old). The blood samples were collected in vacuum tubes of BD®. The values of Urea, Creatinine and Total Proteins were analyzed with the equipment Labquest®. ANOVA for repeated measures with Bonferroni's test was used during data analysis, and the significance level was set at $p \leq 0,05$. Urea values were not different among moments (T0 = 38.2 ± 3.7 mg/dL; T1 = 37.6 ± 4.8 mg/dL; T2 = 41 ± 4.9 mg/dL; T3 = 36.2 ± 7 mg/dL). Creatinine values were significantly increased only at T2 when compared to T3 (T0 = 0.95 ± 0.18 mg/dL; T1 = 0.99 ± 0.18 mg/dL; T2 = 1.03 ± 0.19 mg/dL; T3 = 0.91 ± 0.19 mg/dL). Total Proteins decreased its values in all moments of the study (T0 = 7.8 ± 0.3 g/dL; T1 = 7.6 ± 0.7 g/dL; T2 = 7.5 ± 0.2 g/dL; T3 = 7.3 ± 0.2 g/dL), although it did not reach statistical significance. It is possible to conclude that Creatinine may have been influenced by the amount of muscle mass in athletes and that the routine poses do not lead to significant changes in serum markers.

Keywords: Bodybuilding, changes, serum markers.

Changes in urinary biomarkers after an Olympic triathlon competition

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The Olympic Triathlon is an intense sport, causing changes in some biomarkers. The aim of this study was to analyze the changes in urinary markers such as creatinine, urea and total proteins before (M-1), right after (M-2) and 24 hours after (M-3) an Olympic Triathlon competition. Six male elite triathletes participated in this study (age 29.3 ± 11.4 years). The urine was collected with disposable and sterilized tubes and analyzed with the equipment Labquest®. ANOVA for repeated measures with Bonferroni's test was used during data analysis, and the significance level was set at $p \leq 0.05$. Any differences were found for creatinine values among moments (M-1 = $105.2 \text{ mg/dL} \pm 32.9 \text{ mg/dL}$; M-2 = $150.8 \text{ mg/dL} \pm 54.7 \text{ mg/dL}$; M-3 = $126.7 \text{ mg/dL} \pm 30 \text{ mg/dL}$). The values of urea at M-3 were significantly higher compared to M-1 and M-2 (M-1 = $1850 \text{ mg/dL} \pm 674.5 \text{ mg/dL}$; M-2 = $1233.3 \text{ mg/dL} \pm 713.2 \text{ mg/dL}$; M-3 = $2916.6 \text{ mg/dL} \pm 670.5 \text{ mg/dL}$). Total proteins were significantly increased at M-2 (M-2 = 133.6 mg/dL), returning to the baseline levels 24 hours after the competition (M-1 = 16.7 mg/dL ; M-3 = 6.8 mg/dL). The specific gravity increased significantly in M-2, but it was not altered at M-3 (M-1 = 1.01833 ± 0.007528 ; M-2 = 1.03000 ± 0.000000 ; M-3 = 1.02917 ± 0.002041). It is possible to conclude that the Olympic Triathlon may induce a catabolism of the proteins and a state of dehydration in athletes.

Keywords: Triathlon, urine, catabolism.

Evolution of clinical parameters in adolescent participants in a multiprofessional program for obesity treatment

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This study aims to assess the outcome of clinical parameters in adolescent participants in a multiprofessional program of obesity treatment (PMTO). The PMTO included 33 adolescents, the mean age was 13 (± 0.33) years. The PMTO lasted 16 weeks and involved professionals from the fields of physical education (PE), nutrition, psychology and medicine. The intervention of PE happened three times a week, lasting 60 minutes per session, being prioritized aerobic exercise of moderate intensity. Systolic/ diastolic blood pressure (SBP/DBP) and resting heart rate (RHR) were measured on five moments: baseline, after the 4th, 8th, 12th and 16th weeks of intervention. The Mauchly sphericity test was applied to verify the data distribution. After the result an ANOVA for Repeated Measures (ANOVAr) was applied for SBP and DBP and Greenhouse-Guisser (GG) for weight, height and BMI. Significance at 5% was adopted. The GG test indicated differences among the baseline and 4th, 8th and 12th weeks in the variable weight. In relation to BMI were verified that baseline and 4th week moments differed from week 16th. Moreover, there were no significant alterations to RHR. The ANOVAr indicated differences among the baseline moment and 4th week to 12th week at the variable DBP. It was not found significant differences in SBP indexes. The PMTO was effective in reducing variables weight and BMI, beyond promoting a significant decrease in DBP from the 4th week of intervention.

Keywords: Adolescents, obesity treatment, multiprofessional treatment.

Effects of 16 weeks of strength and concurrent training on strength and muscle areas of upper and lower limbs.

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In this study the adaptations in muscular strength and their correlation with arm muscle (AMA) and thigh muscle (TMA) areas were examined during 16 weeks of strength (ST) and concurrent training (CT) in postmenopausal women. Therefore, 21 healthy and physically inactive women (>12 months without menstruation), aged between 45 and 65 years, were randomly assigned to ST (n=12) and CT (n=9). Muscular strength was assessed by 1-RM test in bench press, leg press and arm curl. The Frinsancho (1984) and Knapik (1996) equations were used to calculate AMA and TMA, respectively. Training protocols consisted of 10 exercises for ST and 6 exercises for CT. For each exercise the volunteers performed 3x10 with 60s of rest between sets in the first eight weeks; and 3x8 with 90s of rest until 16th week. For CT, the resistance training was followed by 30 minutes of walking or running, prescribed by ventilatory threshold. Data were analyzed by paired-samples Student t-test (moments x groups); and the Pearson correlation was used to correlate variables. Both training protocols showed similar significant increase in muscular strength, AMA and TMA, with no difference between groups. Although both groups improved the variables, only TP showed a positive correlation between muscular strength and muscular areas. Therefore, according with ours findings both protocols were effective to improve strength and muscle areas, however improves in strength showed by the ST seems to be more related with hypertrophic indicators.

Keyword: Postmenopausal, strength training, concurrent training, arm muscle area, thigh muscle area.

Correlation between aerobic power and soccer lean body mass

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The guiding objective of the current study was to correlate aerobic power with soccer lean body mass. The total sample consisted of 29 soccer athletes, male, aged between 16 and 19 years (\bar{X} = 17.52 ± 1.19 years; \bar{X} = 67.57 ± 7.60 Kg; \bar{X} = 174.96 ± 6.88 cm), belonging to a junior soccer team from Minas Gerais state. The aerobic Power was evaluated by level 2 yo-yo endurance test according to Bangsbo protocol (1996). To calculate the fat percentage (%G) it was used the Faulkner equation (1968), considering the tricipital, subscapular, suprailiac and abdominal skin folds. Then it was calculated the mass of fat (Body Mass x %G / 100) thus getting the lean body mass (Body Mass – Fat Mass). After confirming the data by Shapiro Wilk test, it was used the Pearson linear correlation, with $p < 0.05$. The results showed a strong negative correlation ($r = -0.90$) between the aerobic power and the soccer lean body mass. Thus it was found that the lean mass is a significant factor to the players' aerobic performance. Any excess of weight can provide efficiency loss, besides the lean body mass be one of the factors related to the force production, important to muscle power actions. So, the study results showed that the soccer lean body mass is an important parameter for aerobic power performance, showing a need for control of players' mass body composition during the competitive season.

Keywords: Aerobic power, body composition, soccer.

Comparison of cardiopulmonary and metabolic responses to walking and running in the same distance

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Walking and running are two physical exercise modalities used to better body composition and cardiorespiratory fitness. The objective of this study was to investigate the oxygen uptake, the heart rate and the energy expenditure to walk and run two mile distance. Nine men, between 21 and 35 years old, participated of this study. All the volunteers were submitted to three cardiopulmonary exercise tests, one maximal and two submaximal. In the submaximal tests two miles were searched through in each, one test 3.0 mph walking during 40 minutes and another 6.0 mph running during 20 minutes. It was determined the oxygen uptake, the heart rate and the energy expenditure in each of the submaximal tests. The normality of the data was verified by the Shapiro-Wilks test, and the walking and running comparison was done by the test t of Student for similar data or by the Wilcoxon's test. The oxygen uptake was larger ($p \leq 0.01$) running (34.04 ± 3.37 mL/kg/min; $61.74 \pm 6.18\%$) than walking (12.92 ± 1.54 mL/kg/min; $23.34 \pm 1.89\%$); and the heart rate also was larger ($p \leq 0.01$) running (148.3 ± 14.24 bpm; $79.88 \pm 6.49\%$) than walking (86.90 ± 9.48 bpm; $46.63 \pm 4.01\%$). The energy expenditure of 20 minute running (249.02 ± 21.72 kcal) was larger ($p \leq 0.01$) than 40 minute walking (185.92 ± 13.86 kcal). In conclusion, two mile running and walking can be used for young men body composition and cardiorespiratory fitness improvement, however, running is more efficient for providing larger energy demand. **Financial support:** PIBIC-CNPq.

Keywords: Walking, running, energy expenditure.

Glucose metabolism in monozygotic twin pairs discordant for VO_{2max}

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The objective of this study was to determine if glucose and insulin concentrations and insulin resistance are regulated by VO_{2max} independent of genetic effects. Data from 38 pairs of young monozygotic twins (11 – 18 y) were used to examine cross-sectional. All subjects were underwent a progressive maximal exercise test on a treadmill to determine the VO_{2max} with gas exchange analysis (MedGraphics VO2000[®]). Blood samples were taken after fasting to determine the glucose and insulin level and insulin resistance (IR) was detected by means of the homeostasis model (HOMA-IR). Monozygosity was confirmed by the genotyping of 15 informative genetic markers. Nine pairs had at least 10 ml.kg⁻¹.min⁻¹ differences in VO_{2max} and were divided into the more (MAG) and less active group (LAG), according to their VO_{2max} . On average, MAG had 17% (or 13.5 ± 3.7 ml.kg⁻¹.min⁻¹) higher VO_{2max} compared with LAG (45.9 ± 10.0 vs 32.4 ± 10.6 ml.kg⁻¹.min⁻¹; P<0.008). No significant differences were observed between the groups MAG and LAG for fasting insulin (36.5 ± 34.6 vs 25.3 ± 13.7 mg/dL; P<0.813) and HOMA-IR (1.2 ± 0.4 vs 1.3 ± 0.4; P<0.767). However, MAG had statistically low fasting glucose than LAG (82.9 ± 7.3 vs 86.7 ± 7.6 mg/dL; P<0.010, respectively). In this study, young twins identical but who are discordant for cardiorespiratory fitness (VO_{2max}), the co-twins who were less active were characterized by major fasting plasma glucose levels. This implies that poor cardiorespiratory fitness can be associated with defects in glucose metabolism independent of genetic factors. **Financial support:** FAPESP / CAPES.

Keywords: Monozygotic, twin, VO_{2max} , case-control model.

Validity of two equations to estimate VO₂ peak by 20 meters shuttle run test

in male adolescents

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Field tests may represent an accessible and low cost alternative for the assessment of cardiorespiratory fitness in young people. The aim of this study was to verify the validity of two equations to estimate peak oxygen consumption (VO₂ peak) through the 20 meters shuttle run test in male adolescents. The study included 61 boys, mean age 12.2 ± 0.9 years, weight 47.5 ± 13.6 kg and height 150.9 ± 7.7 cm. As a reference (MR), the subjects performed an incremental test in the laboratory for the direct evaluation of oxygen consumption and, to estimate VO₂ peak test was used 20 meters shuttle run test and the original equation proposed by Léger et al. (1988), as well as the equation proposed by Mahar et al. (2006). To check the validity it was used ANOVA for repeated measures, post hoc Bonferroni test, correlation coefficient (r), standard error of estimate (SEE), agreement and trend analysis measurement ($P < 0,05$). The comparisons showed significant differences only between VO₂ peak measured by MR and predicted by the original equation of Léger et al. (1988). The values found were: $r=0.60$; $r=0.77$; $SEE=7.70$ ml/kg/min; $SEE=6.12$ ml/kg/min; limits of agreement of 8.36 ± 15.2 ml/kg/min, -0.25 ± 12.6 ml/kg/min for equation of Léger et al.(1988) and Mahar et al.(2006), respectively. There was tendency of measurement for both equations ($P=0.001$). The equation proposed by Mahar et al. (2006) showed better validity parameters when compared to that of Léger et al. (1988), in this sample.

Keywords: Cardiorespiratory fitness, field tests, validity, adolescents.

Effects of ovariectomy and resistance training on the weight of the femur of rats

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The aim of the present study was to investigate the effects of resistance training (RT) on the weight of the femur in ovariectomized (OVX) rats. Wistar adult female rats were grouped into four groups (n = 6 per group): sham-operated sedentary (Sham-Sed), Ovx sedentary (Ovx-Sed), sham RT and Ovx-RT. A 10-week RT period, during which the animals climbed a 1.1-m vertical ladder with weights attached to their tails, was used. The sessions were performed three times a week, with 4-9 climbs and 8-12 dynamic movements per climb. The animals were sacrificed 48 hours after the last session of RT. Sham-Rt group presented higher femur weight 0.28 ± 0.00 g/100 g body weight (8%, 27%, and 17%; $P < 0.05$) than Sham-Sed 0.26 ± 0.00 g/100 g body weight, Ovx-Sed 0.22 ± 0.00 g/100 g body weight and Ovx-Rt 0.24 ± 0.00 g/100 g body weight groups, respectively. The RT increased bone mass of the femur of rats. With this the RT was able to minimize the deleterious effects caused by ovariectomy. These results show the benefits of RT as a strategy for controlling the effects of ovariectomy on femoral bone mass.

Keywords: Resistance training, ovariectomy, bone mass.

Identification of anaerobic threshold during resistance exercise in healthy older men

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The effect of resistance training has been proposed as a possible strategy for improving physical fitness in the elderly. Thus, various techniques are suitable for handling training. One of them is the identification and prescription of training at anaerobic threshold (AT) intensity. The aim of this study was to identify the AT in an elderly population during resistance exercise. Fourteen elderly men [68.9 (4.0) years] performed three exercise sessions on bench press and leg press 45 °, with an interval of 48 hours between each session. In the first and second session was performed a test to determine 1RM (test and re-test). In the third session was performed an incremental test at relative intensities of 10, 20, 25, 30 35, 40, 50, 60, 70, 80 and 90% of 1RM with 1-minute stages. During the 2-minute interval between stages, capillary blood was collected for blood lactate analysis. The AT was identified by the algorithmic adjustment method. The Student t test for dependent samples was used to compare the exercises. The level of significance was $p < 0.05$. It was possible to determine the AT for all subjects. The AT in the LP was 27.9 (5.0) %1RM and in the BP was 21.5 (3.1) %1RM, with statistical differences between the exercises. Therefore, the proposed hypothesis was verified in this study. Thus, the results of this study suggested that it was possible to determine the AT in the LP and BP exercises in an elderly population and that this intensity is different between different resistance exercises.

Keywords: Resistance training, lactate threshold, aged people.

Effects of ascorbic acid on oxidative stress biomarkers in high-performance swimmers of Ribeirao Preto/SP

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Strenuous exercise alters the antioxidant system. The aim of this study was to investigate the effects of the supply of vitamin C through a dietary supplement and diet rich in ascorbic acid on exercise-induced oxidative stress. The sample was 13 elite swimmers (6 men and 7 women) aged between 18 and 26 years, average BMI 21.8kg/m². The athletes were submitted to an acute exercise load in 3 phases: control (C) diet rich in vitaminC (D) and supplement vitamin C (S), in which blood samples were collected before, immediately after and 24 hours after exercise to determine oxidative stress. Only 25% of the swimmers were taking antioxidant supplements. Food intake was not different between phases for antioxidants vitamin E, retinol, selenium and zinc. The intake of ascorbic acid was adequate for most. The use of diet rich in vitamin C favored a lower lipid peroxidation, since swimmers had lower levels of FOX and reduction of TBARS values after exercise, while plasma vitamin C increased immediately after exercise. The use of supplemental vitamin C also contained lipid peroxidation after exercise and increased the antioxidant power, due higher levels of antioxidant GSH. Without the addition of vitamin C swimmers had a greater liver and tissue damage, due higher levels of TGO, still lower levels of antioxidants (GSH and VITC) and an increase in uric acid. Thus the observed changes with the addition of vitamin C to the diet of high-performance swimmers suggest an important role of ascorbic acid and dietary supplementation in protecting against exercise-induced oxidative stress.

Key words: Oxidative stress, vitamin C, swimmers, diet, supplement.

Effects of the calisthenics and water exercises on the perceived pain, quality of life, and quality of sleep in women with fibromyalgia

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Fibromyalgia is a complex multifactor syndrome characterized by widespread chronic pain and disability, sleep disturbances and fatigue, which represents almost 25% of out patient's complaints in rheumatology in Brazil. Physical activity has been shown to be a cheap and effective action in controlling symptoms, and improving patient's functional capacity. The aim of this study was to compare the effects two physiotherapy programs (strength and endurance) on pain, quality of life and quality of sleep in these individuals. Twelve fibromyalgia women were randomly divided and submitted to a program of muscle strength in the calisthenics exercise or cardiovascular endurance in a warm pool, for 24 sessions, 2 days/wk. Evaluation consisted of the Pain Visual Analogical Scale (VAS), the Short-form Health Survey Questionnaire (SF-36), Fibromyalgia Impact Questionnaire (FIQ) and Post Sleep Inventory (PSI). Statistical analyses were realized by SigmaStat for Windows, version 3.5.2006 of SYSTAT and the level of significance was 5%. Both programs contributed to the improvement of quality of life and physical function. The volunteers benefited by the muscle strength program in relation to sleep (variability of clinical increase of 28-36%) and pain (variability of clinical increase of 24-50%). The endurance program decreased fatigue (variability of clinical increase of 39-93%), stiffness and pain intensity ($p=0.0048$). We concluded that the two therapies proposed contributed to improving the quality of life and general aspects involved in fibromyalgia.

Keywords: Pain measurement, resistance training, sleeps disorders.

Performance parameters and blood lactate concentration at three simulated race on slalom kayak

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The objective of the slalom kayak competition is to complete the distance in the shortest time. The variables as route distance, runtime, mean velocity during race (V_m) and blood lactate concentration (BLC) are directly related on final performance. The aim of this study was to analyze the distance, runtime, V_m and BLC at three different simulated slalom kayak races. Six athletes (17 ± 2 yrs) were evaluated at three different moments of the training program. The simulated races of slalom kayak were accomplished in the same river. There were registers of time race (s), distance travelled (m) and mean velocity (m/s) using a GPS (Polar G3). Blood samples were collected after each simulation (1,3,5,7 and 9min), aiming to determine the BLC on recovery. The data were analyzed by one-way Anova and Pearson correlation ($p < 0.05$). The second simulation presented a greater distance (251 ± 24 m) compared to the first (210 ± 20 m) and third race (222 ± 35 m). Consequently, the runtime of the second simulation was higher (135.17 ± 16.80 s) than the others (103.17 ± 8.66 s and 110.00 ± 7.56 s). Nevertheless, the V_m was similar in three races (2.08 ± 0.28 m/s, 1.87 ± 0.10 m/s and 2.02 ± 0.29 m/s). Due to the BLC production to be strongly correlated with exercise intensity and duration, the second simulation showed higher BLC values and the peak values were obtained at 7.54 ± 1.72 mM, 11.31 ± 3.53 mM and 7.25 ± 2.83 mM in the three races. Despite simulations conducted in the same local, differences were observed in race parameters and BLC on recovery. The last variable seems to be more dependent of simulation race runtime.

Financial support: FAPESP and CNPq.

Keywords: Slalom kayak, performance parameters, blood lactate.

Glycemic curve in 21 hours of multiathlon

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The multiathlon is a combined events competition held in a single day. Forty disciplines were performed in 2008, including different sports with many different skills and efforts. The blood sugar at normal levels is crucial to keep vital organ functions and to attain a good performance. This study purposed to determine the glycemic curve for athletes during the event. We measured the glycemic index through 21 hours for 12 males, 32.92 ± 9.13 years, 74.39 ± 5.59 kg, 1.79 ± 0.06 m, 17.3 ± 2.94 % body fat, in a set of five different instants. The values varied widely for different individuals (from a minimum of 58 mg/dl to a maximum of 182 mg/dl), but in the same subject the variation was little, falling slightly when comparing the beginning and the end of the competition. However, this decrease was not significant ($p=0.15$). We noted an interval with a peak average glucose of 130 mg/dl, corresponding to 10 hours and 45 minutes from the competition beginning (a little break before canoeing and kayaking allowing the athletes eat better). This observation was significantly higher than the average for each of the other intervals ($p=0.01$). We conclude that the glycemic curve has not changed significantly over the event, but had shown a sharp peak.

Keywords: Exercise performance, multiathlon, glycemic index, combined events.

Effect of swimming on myostatin expression in brown adipose tissue in obese insulin resistant and diabetic rats

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The objective of this study was to determine the influence of exercise in the expression of myostatin (MSTN) in rats with obesity and insulin resistance and diabetic rats. Adult male *Wistar* rats were housed under controlled conditions and were allowed free access to standard rodent chow (control group, CG) or HF diet (58% Kcal from fat, high-fat group, HG) during 12 weeks. Glucose tolerance test (GTT) and insulin tolerance test (ITT) were performed. After 12 weeks, CG and HG rats were randomly assigned to a swimming training group (CGE and HGE) or a sedentary group (CGS and HGS). In second study, the *diabetes mellitus* was induced by streptozotocin (60mg/Kg). After 2 weeks, control (C) and diabetic (D) animals were randomly assigned to a swimming training group (CE and DE) or a sedentary group (CS and DS). Animals exercised swam individually in water tanks (50x30cm) at 34⁰ C, for 45 minutes at 0900h and 1700h, 5 day week⁻¹, for 4 weeks. After this period, rats were decapitated. Brown adipose tissue (BAT) was immediately frozen in liquid nitrogen and stored at -70⁰ C. MSTN mRNA was quantified by real time RT-PCR. After training, MSTN mRNA levels were significantly increased in BAT in both CGE, HGE compared to CGS and HGC, respectively. However MSTN mRNA decreased in CE compared to CS in BAT (second study). Additionally, MSTN mRNA decreased in DS compared to CS in BAT. The results indicate that MSTN change in brown adipose tissue of rats with obesity and insulin resistance and diabetic rats and that their expression can be modulated by exercise in *diabetes mellitus*.

Keywords: Obesity, insulin resistance, *diabetes mellitus*, exercise, myostatin, brown adipose tissue.

Effects of sodium bicarbonate ingestion and high intensity intermittent training on blood lactate, stroke parameters, and performances of swimmers

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Studies still do not represent conclusions of the ergogenic effects of sodium bicarbonate (SB), due to methodological differences. The objective of this study was to investigate the effects of SB ingestion in high intensity intermittent training on blood lactate, stroke parameters, and performances of swimmers. Ten swimmers completed six maximal efforts of 100-m front crawl with six minutes of rest in both occasions (SB and placebo). The SB ($0.3\text{g}\cdot\text{kg}^{-1}$) or the placebo (dextrose) was ingested 60 minutes before the test. After each effort the rating of perceived effort (RPE) and blood sample was collected. Stroke length (SL), stroke rate (SR), and stroke index (SI) were accessed. All parameters were compared using a two-way ANOVA for repeated measures, and Tukey's Post-hoc. The significance was set at 5%. The lactate concentrations ([LAC]) in sixth effort after the SB (17.93 ± 3.8) supplementation were significantly ($p<0.05$) higher than placebo ($15.67\pm 3.29\text{mM}$). No difference was found between the total swim time of the six swimming (placebo:390.83s; SB:394.20s). The strokes parameters (placebo:SB) SL (1.38:1.37), SF (1.12:1.12) and SI (2.16:2.14) were the same in all efforts as well as RPE (18:18). We conclude that SB did not improve performance in typical swimming training, but can enhance the glycolytic source without alteration on RPE. Any intervention in swimming is difficult because of the inherent technical component, suggesting further studies to verify the effects of SB in SP and performance in elite and non-elite swimmers with a reduced rest time, which could lead to higher [LAC].

Keywords: Bicarbonate, performance, stroke parameters.

Equation to estimate the body volume of rats with 240 days of age

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The aim of the present study was to develop an equation to estimate the body volume (BV) of rats with 240 days of age from their body weight (BW). Thus, 23 rats with 514 ± 45.8 g had their BV determined by underwater weighing. Data from 13 animals were used to derive the equation by the linear regression between BV and BW. The validity of such equation was verified using the 10 remaining rats. Animals were anesthetized and suspended underwater by a specially designed bracket connected to a load cell. Force signals sampled at 1000 Hz allowed the selection of animal's end expiration, decreasing the impact of tidal volume on the hydrostatic weight from which BV was calculated. The relationship between BV and BW was highly linear ($R^2 = 0.99$; $n = 13$) and expressed by the equation: $BV \text{ (cm}^3\text{)} = 0.965 \times BW \text{ (g)} + 2.460$. No significant differences ($P > 0.05$) were found between BV and body density determined by the underwater weighing ($488.6 \pm 45.8 \text{ cm}^3$ and $1.0309 \pm 0.0090 \text{ g/cm}^3$) and those estimated by the equation ($488.4 \pm 45.1 \text{ cm}^3$ and $1.0310 \pm 0.0005 \text{ g/cm}^3$) ($n = 10$). These results suggest that the equation presented can be used to estimate the BV of rats with approximately 240 days of age. **Financial support:** FAPESP (2009/14040-9)

Keywords: body volume, rats

Influence of using different loading schemes on critical load estimation in young swimming rats

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Attention has been devoted to non-invasive estimation of rodent's aerobic capacity by the critical power construct. Thus, we analyzed the influence of adopting 2, 3 or 4 exhaustive swims at different intensities on the critical load (CL) in young rats. In four consecutive days, 9 male Wistar rats (40 days old) swam against 9, 11, 13 and 15% of their body weight (bw) in a random order. Times to exhaustion (T_{EX}) were taken from the start of exercise until all coordinated movements ceased and the animals could not return to the surface. Critical loads were estimated by the y-intercept of linear regressions relating load to $1/T_{EX}$ using 11 possible loading schemes. Three animals were excluded from the analysis given their $T_{EX} > 15$ min against 9% bw. For the remaining animals T_{EX} were respectively 391 ± 141 , 168 ± 50 , 93 ± 7 and 78 ± 9 s at 9, 11, 13 and 15 % bw swims. Significant effect of loading scheme on CL was pointed by repeated measures ANOVA ($P < 0.001$), with the Bonferroni's post-hoc test showing CL derived from 13 and 15 % bw swims (1.4 ± 4.2 % bw) to be lower ($P < 0.001$) than those derived from all other combinations (6.5 ± 1.9 to 7.7 ± 1.6 % bw). These results suggest that although CL can be estimated by a reduced number of exhaustive swims in young rats, atypical values may result from using only two efforts at very high intensities.

Keywords: Testing, rodents, aerobic capacity, critical power.

Software to assist the selection and physical athlete's monitoring

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The selection of sports teams and longitudinal monitoring of the athlete's physical condition is a challenge. The purpose of this work is to help in the selection and monitoring of sports teams through the use of a software developed in our laboratory. Five hundred five subjects, male, 18 ± 2 years participated in the study. All subjects were evaluated three times during the year 2009 at February, June and October. Each time nine physical tests were performed. On the whole 21 variables were measured, corresponding to different physical abilities like strength, speed, endurance and body composition. Initially the software was used to analyze the results of the initial tests and assist in the choice of individuals with the potential to integrate teams for soccer, volleyball, basketball, swimming, judo and athletics through the cross of two variables. In the other moments the same variable may be plotted as a function of different months and the software can be used to monitor individual changes in performance caused by the training, increasing the opportunities of carry out specific and individualized interventions on the athletes.

Keywords: Large databases, athletes monitoring, talent identification.

Creatine supplementation reduces oxidative stress biomarkers after acute exercise in rats.

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Objective. To evaluate the effect of creatine supplementation on muscle and plasma markers of oxidative stress after acute aerobic exercise. **Methods.** A total of 64 Wistar rats were divided into 2 groups: Control group (n = 32) and creatine supplemented group (n = 32). Creatine supplementation consisted of the addition of 2% creatine monohydrate to the diet. After 28 days, the rats performed an acute moderate aerobic exercise bout (1 h swimming with 4% of total body weight load). The animals were sacrificed before (pre) and at 0, 2 and 6 h (n = 8) after acute exercise. **Results.** As expected, plasma and total muscle creatine concentrations were significantly higher (p < 0.05) in the creatine supplemented group compared to control. Acute exercise increased plasma tiobarbituric acid reactive species (TBARS) and total lipid hydroperoxide. The same was found to soleus and gastrocnemius muscle. Creatine supplementation decreased these markers in plasma (TBARS: pre 6%, 0 h 25%, 2 h 27% and 6 h 20%; plasma total lipid hydroperoxide: pre 38%, 0 h 24%, 2 h 12% and 6 h 20%, % of decrease). Also, acute exercise decreased GSH/GSSG ratio in soleus muscle, what was prevented by creatine supplementation (soleus: pre 8%, 0 h 29%, 2 h 30% and 6 h 44%, % of prevention). **Conclusion.** Creatine supplementation inhibits increased oxidative stress markers in plasma and muscle induced by acute exercise. **Financial support:** FAPESP (07/08099-5) and CNPq.

Keywords: Creatine supplementation, acute exercise, oxidative stress markers.

Morphological analysis of the medial head gastrocnemius muscle of rats subjected to eight weeks of concurrent training

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The stimuli in different types of physical training are unique and may conflict according to their specificity. Thus, the purpose of this study was to analyze morphological changes on medial head of gastrocnemius muscle (GM) of Wistar rats underwent eight weeks of concurrent training (IGR). We used eight male Wistar rats with 90 days and divided into control (three animals) and trained (five animals). The IGR consisted of an aerobic endurance training (TRA) and strength training (ST), three times a week for eight weeks. The TRA was formed by 30 minutes of swimming with load corresponding to anaerobic threshold (AT), while the ST was composed of four sets of 10 aquatic jumps with overload of 50% of body weight (bw) of each animal. The AT determination consisted of an induction to hyperlactacidemia with overload of 13% of bw of each animal. After the induction, we collected blood samples (25 µl) at 1, 3, 5, 7 and 9 minute of rest. Then, the animals underwent an incremental test consisting of six stages with five minutes. After eight weeks of training, the animals were euthanized and retired the ventral part of GM. The samples were cut on rotary microtome cryostat (LEICA ®), stained with hematoxylin-eosin and observed under light microscope (PRIMO STAR, ZEISS ®). We observed the increase of the average cross section area of the GM-trained animals (4905.5 µm²) compared with the control group (4699.9 µm²). This indicated that IGR was effective in promoting hypertrophy in GM.

Keywords: Concurrent training; cross section area of muscle fiber; morphological analysis

Evaluation of the vascular composition of calcaneous tendon in rats

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The calcaneous tendon is frequently injured by micro-traumas and overuse, especially during sports practice due the poor blood supply in the central part. Nevertheless, the literature does not offer a good scientific support that explain the composition and the vascular dynamic of animal's tendons, what has a great relevancy to observe if the animal's tendon suffers the same process of vascularization in different regions, as occurs in humans. This study evaluated the vascular constitution of healthy calcaneous tendons. Were used 7 males rats Wistar, weighing 300 ± 40 g. The tendon from each animal was processed to be included in Paraplast and after that, they were divided in 3 portions – proximal, medial and distal. Afterwards, they were re-included and slices of 6 μm were made, than they were stained with Hematoxylin and eosin. Using a reticulated ocular (Carl Zeiss KF 10x/8) with magnification X400, were analyzed with morphometric methods, the number and the area density of the blood vessels, which ones were processed with Shapiro Wilk test, followed by Tukey, considering $p < 0.05$. The area density and the number of blood vessels in the proximal part were respectively 36% and 42% greatest ($p \leq 0.05$), comparing with medial part. In the distal part, the number of vessels was 64% and the area density 52.8% greatest ($p \leq 0.05$) compared to the medial part. It is concluded that vascular composition of calcaneous tendon in rats is similar to humans, constituting a good experimental model to injury studies and regeneration.

Keywords: vascular composition, calcaneous tendon, rats

Discrimination of deviances in body composition of adults by physical fitness in strength exercise.

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This study aimed at discriminating deviances in skeletal and adipose muscle composition by means of specific strength exercises for adults' body segments. Four hundred and sixty individuals, males and females aged 40 years or older were evaluated. They were voluntary participants in the lifestyle change program "*Mexa-se Pró-Saúde*". Body mass and stature were measured for later estimation of body mass index, waist circumference, muscle mass, muscle strength by the one repetition maximum test in various exercises and hand grip (HG) strength. Data were expressed by means and standard deviations. The analysis of variance (ANOVA) was used to evaluate differences between groups, and it was followed by Tukey's test. Percentile distribution was performed for muscle mass and abdominal circumference in order to form the four anthropometric groups (Hypotrophy, Hypertrophic, Obese hypotrophy and Obese hypertrophy). The chi-square test for associations between muscle strength and the groups, followed by a logistic regression model for predicting the odds ratios. The exercises for upper limbs and, individually, all the exercises performed in women and only three in men were sensitive for such discrimination. The greatest protective power for not belonging to the hypotrophic group was increased muscle power (P75) at elbow extension (OR 0.75), elbow flexion (OR 0.85) and HG (OR 0.85). Inversely, these indicators constituted a risk factor for belonging to the hypertrophic obese group for higher muscle strength values (P75). It is concluded that the hypertrophic and the obese hypertrophic groups were discriminated with high sensitivity by upper limb exercises.

Keywords: Muscle mass, Body segment, Muscle strength

Is overtraining associated with heart damage induced by oxidative stress?

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Periods of intensified training (overtraining-OT) can increase the performance previously achieved (FOR) or may result in loss of the performance level (NFOR). We hypothesized that the NFOR state would be associated with cellular structure damage of cardiac tissue induced by increased levels of local oxidative stress. *Wistar* rats (n=19) underwent a protocol with 11-week duration: 8 weeks of daily exercise followed by 3 weeks of OT, characterized by an increased daily frequency (two, three and four times) with decreased recovery between sessions (4, 3 and 2h). Six performance tests were performed: before the beginning of the protocol, after the 4th, 8th, 9th, 10th and 11th week. After the 11th week eleven rats showed increased performance compared to the 10th week (functional overreaching [FOR] $700 \pm 73 \text{kg} \cdot \text{min}$ x $592 \pm 87 \text{kg} \cdot \text{min}$, $p < 0.01$) and eight showed decreased performance (nonfunctional overreaching [NFOR] $361 \pm 87 \text{kg} \cdot \text{min}$ x $578 \pm 78 \text{kg} \cdot \text{min}$, $p < 0.001$). The histological analysis (HE/Sirius Red); the quantification of apoptotic cells (TUNEL); dosage of TBARS and the activity of catalase, superoxide dismutase and glutathione reductase were made. The cardiac tissue of NFOR group showed increased activity of SOD and CAT associated with increased apoptosis, suggesting a greater reactive oxygen species production in NFOR compared to FOR group. However, we found no increase in TBARS concentrations or structural changes of the cardiomyocytes compared to FOR, suggesting that this tissue is less susceptible to oxidative stress. However, the increased apoptotic cells in NFOR animals indicate caution during periods of high-volume endurance training.

Key words: Overtraining, *Wistar* rats, myocardium, oxidative stress, performance, training.

Correlation between markers of muscle damage and inflammation in young and postmenopausal women.

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Unaccustomed eccentric exercise changes markers of muscle damage and inflammatory response. In addition, age may interfere with the magnitude of these markers. The aim of the present study was to correlate the influence of age variables in creatine kinase (CK), muscle soreness (MS) and prostaglandin E2 (PGE2), and also correlate the MS with PGE2 and DM with the CK after fast eccentric actions in young and postmenopausal women. Ten young women (YW) aged 22.20 ± 3.94 and 10 post-menopausal women (PMW) aged 52.10 ± 6.52 participated in the study. All subjects performed 6 sets of 5 lengthening actions of the elbow flexors, with 60 second intervals between sets. Assessments were performed in the pre, 24, 48 and 72 hours after the protocol. For statistical analysis it was performed Pearson's correlation. The results showed a significantly negative correlation in the variables age and MS at 24 and 48h ($p < 0.016$, $p < 0.002$, respectively). Similarly, for age and CK a significantly negative correlation was showed at 48h ($p < 0.002$). However, the correlation with age and PGE2 was significantly positive correlation in the pre, 48 and 72h ($p < 0.001$, $p < 0.001$, $p < 0.001$). Correlations between MS x PGE2 and MS x CK have not obtained significant results. Our results suggest, at least for this sample, that age affects both variables. It is also plausible that MS is not related with CK and PGE2, markers of muscle damage and inflammation, respectively.

Keywords: Eccentric exercise, creatine kinase, delayed-onset muscle soreness, progtaglandin E2, muscle damage.

Influence exercise anaerobic in muscle tissue of rats after 14 weeks of training

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The history of physical training (PT) has been known since ancient Greece. Over the years, PT has been increasingly used in sports to improve performance. Among the various types of PT, the aquatic training has is a way to increase muscle tone. Thus, the purpose of this study was to analyze the effect of water jump training in muscle tissue of mice. Twenty 20 rats were used, 10 trained (Group 1) and 10 sedentary (Group 2). The PT program consisted of four sets of ten aquatic jumps three times a week for 14 weeks. Load increase took 14 to 42 days. The animals were sacrificed after an overdose of sodium pentobarbital (100mg/kg) applied intraperitoneally. The ventral portion of the gastrocnemius muscle was removed for histological processing. The muscles were frozen in liquid nitrogen and cut on a rotary microtome. The sections were stained with hematoxylin-eosin for a general analysis of the muscle structure and analysis of the muscle fibers, which were observed by microscope (Leica ®) and photomicrographed. Measurement of muscle fibers was performed with Zeiss AxioVision software. Statistical analysis was performed by Student t test for analysis of a sample average. It was observed that Group 1 had an average of 707 μm^2 area over those animals in Group 2. It can be concluded that 14 weeks of training with aquatic jumps had been effective in increasing muscle area.

Keywords: aquatic training, muscle area, gastrocnemius.

Modulations of muscle and liver glycogen by hyperthyroidism and exercise in rats

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The aim was to analyze the modulations in liver and muscle glycogen stocks in rats with hyperthyroidism submitted to swimming exercise. Were employed 26 Wistar rats, being 13 induced to hyperthyroidism by daily injection (10 days) of levothyroxine sodium intraperitoneally (25µg/100g body weight). The animals were distributed in two control groups (euthanized in rest (CR) and after exercise (CE)) and two hyperthyroidism groups (HR and HE). After adaptation routines the exercised groups underwent one bout of 20 minutes duration and load of 5% body weight being euthanized immediately after exercise (CE and HE) or in rest at the same hour (CR and HR). Samples of gastrocnemius and liver were collected for glycogen determination. Were used ANOVA *two-way* with *Newmann-Keuls* post Hoc as statistical procedure. Data are presented as mean ± standard deviation. Muscle Glycogen (mg/100mg): CR = 0.111 ± 0.045; CE = 0.105 ± 0.022; HR = 0.201 ± 0.051*; HE = 0,093 ± 0.017. Liver Glycogen (mg/100 mg): CR = 3.617 ± 0.961*; CE = 1.963 ± 0.717; HR = 2.305 ± 0.758; HE = 2.314 ± 1.135. *p<0.05 for all groups at same variable. We concluded that glycogen mobilization at acute exercise condition seems to be dependent of previous storage in tissue. Hyperthyroidism inducts high concentration in muscle, and this muscular availability favored his mobilization during exercise swim.

Keywords: Rat, hyperthyroidism, glycogen, swimming.

The effects of exhaustive weight training protocol involving three or four muscle groups on biochemical markers of stress.

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This study aimed to analyze the effects of two weight training exercise protocols involving three (G1) and four (G2) muscle groups on exhaustive biochemical markers. For then, 26 male weightlifting athletes (18-35 years) were recruited to participate in the exhaustive test protocol for two different groups (G1: n=12 and G2: n=14). Blood samples were collected before and immediately after exercise to determine markers of muscle damage (CK), hemoconcentration (hematocrit and osmolarity) and hormones both anabolic: GH, total and free testosterone (TT and FT), and catabolic: cortisol. For data analysis, two-way ANOVA was performed with repeated measures ($p < 0.05$). The number of exercises did not presented influence on elevations of CK, hematocrit, osmolarity or total testosterone (TT). The number of exercises showed influence on increased levels of FT (pré: $18,0 \pm 1,9$, post: $25,4 \pm 5,2$ pmol/L), GH (pré: $0,2 \pm 0,3$, post: $4,0 \pm 1,9$ U/L) and cortisol (pré: $16,4 \pm 2,9$, post: $31,0 \pm 12,4$ U/L), in G2, whereas increased TT/C (pré: $30,1 \pm 7,9$, post: $38,6 \pm 12,0$) and FT/C (pré: $0,9 \pm 0,3$, post: $1,1 \pm 0,4$) ratios was observed in G1. Thus, both tests were exhausting, with similar biochemical characteristics; however, G2 showed a hormone pattern with more catabolic characteristics than G1.

Keywords: Muscle fatigue, weight training exercises, metabolic stress, hormonal response.

Effects of aerobic exercise in rats treated with sucrose supplementation on regenerative factors of skeletal muscle tissue.

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A high intake of sucrose is linked to metabolism modifications. The aim of this study was to verify the effect of sucrose intake and exercise upon the regenerative factors (RF) in skeletal muscle tissue (SM) of rats. The groups were divided in Control (C), Sucrose (S), Exercise (E) and Sucrose+Exercise (SE). The E and SE groups were submitted to 36 swimming sessions. Through RT-PCR analysis, the vascular endothelial growth factor mRNA expression was higher in the SE group in relation to E ($73.33 \pm 3.283/42 \pm 3.606$) and to S ($73.33 \pm 3.283/22.33 \pm 3.180$), and the E to S ($42 \pm 3.606/22.33 \pm 3.180$). The transform growth factor beta mRNA expression was increased in the SE group in relation to E ($9331 \pm 40,083/1335 \pm 38.082$) and to S ($9331 \pm 40,083/725.7 \pm 20.079$), and E group to S ($1335 \pm 38.82/725.7 \pm 20.079$). The collagen type 1 mRNA expression was higher in the SE group in relation to E ($10202 \pm 62.094/2774 \pm 61.055$) and C ($10202 \pm 62.094/1462 \pm 83.038$), and the E to S ($2774 \pm 61.055/1462 \pm 83.038$). Sucrose supplementation promoted an increase in the expression of RF of SM. This increased expression is related to the effects promoted along with aerobic exercise. **Financial support:** FAPESP and CAPES.

Keywords: Swimming, sucrose, skeletal muscle regeneration.

L-arginine decreases the production of TNF- α , myeloperoxidase and metabolic stress markers produced by resistance training in skeletal muscle tissue of rats.

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The resistance training (RT) practice promote the release of inflammatory mediators. The aim of this study was to investigate the possible protective role of L-arginine (L-arg) in the skeletal muscle after RT. Male Wistar rats was divided into four groups (control, 8, 24 and 48 hours post-exercise (n = 10), with L-arg or Aminoguanidine (Amino) supplementation. The animals were submitted to RT during four days, through a staircase and an overload apparatus. Plasma peripheral blood and skeletal muscle (EDL) was collected for evaluation of Myeloperoxidase (MPO), Reactive C protein (CRP), and TNF- α by ELISA. The L-arg supplementation diminished the production of MPO in comparison to Amino groups at 24 (5.269 \pm 0.8814/11.41 \pm 1.138; g/tissue, p<0.001) and 48 (5.212 \pm 13.98 \pm 0.6567; g/tissue, p<0.001) hours post-exercise. L-arg pre-treatment was able to reduce CRP in the RT group at 8 (33.78 \pm 3.573/9.953 \pm 1.906; mg/dl, p<0.001) and 24 (22.26 \pm 1.730/11.97 \pm 0.8076; mg/dl, p<0.001) hours post-exercise. The L-arg supplementation reduced the TNF- α production, in the peak moment, at 24 hours-post exercise (2043 \pm 63,1082/1243 \pm 25; g/ml, p<0,05). In conclusion, the L-arginine supplementation promoted a protective role in the skeletal muscle, reducing the TNF- α and metabolic stress markers post a high intensity RT session. **Financial support:** FAPESP and CAPES.

Keywords: L-arginine, inflammatory mediators, skeletal muscle, resistance training.

Effects of 16 weeks of concurrent training and resistance training on peak oxygen uptake and ventilatory threshold in postmenopausal women

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The maximum oxygen consumption ($\dot{V}O_{2peak}$) decline is among the main physiological changes that occur with the aging process. The aim of this study was to compare the alterations of concurrent (CT; n=9) and resistance (RT; n=13) training in $\dot{V}O_{2peak}$ and ventilatory threshold (VT) in postmenopausal women. The protocols consisted of 16-training weeks (3 d.wk-1). CT was 3 sets of 8-10 maximal repetitions with 60-90s of rest between sets, 6 exercises, followed by 30 min jogging at 55-85% $\dot{V}O_{2 peak}$. And the RT was 3 sets of 8-10 maximal repetitions with 60-90s of rest between sets, 10 exercises. Aerobic fitness evaluation was performed using a maximum effort test on a treadmill, using metabolic gas analyzer, from where the values of $\dot{V}O_{2peak}$ (ml/kg/min) and the VT (ml/kg/min) were obtained. A repeated-measures ANOVA was used to compare, between- and within- groups, the variables before and after study, and t- test to compare percentage variations ($\Delta\%$). The significance level was $p < 0.05$. $\dot{V}O_2$ values were 26.44 ± 2.91 before and 28.12 ± 2.45 after; 29.30 before ± 3.33 and 29.87 ± 2.83 after for CT and RT respectively. There were no significant changes in VT and $VO_{2 peak}$ until week 16 for both groups and no difference in $\Delta\%$ for both measures between groups. The improvement in $VO_{2 peak}$ and VT in postmenopausal women was not effective in both training programs.

Keywords: Resistance training, women, postmenopausal, oxygen consumption.

Effect of rats handling on success rate for determination of lactate minimum intensity

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The purpose of this study was to assess the effect of rats handling by several researchers on success rate for lactate minimum intensity (LMi) determination. Therefore, fifteen male Wistar rats with 90 days old were assessed. After a period of 2 weeks of adaptation to the aquatic environment, the lactate minimum test (LMT) was performed according de Araujo et al. (2007), with initial load corresponding to 3.5% of body weight. The success rate in the determination of LMi was obtained, using as criteria the presence of the second order polynomial fit in form of “U” and the coefficient of determination of the curve lactate versus load greater than 0.80 ($R^2 > 0.80$). Rats handling during bioterium routines, adaptation and LMT procedures (i.e. remove and return the cage, weighting, placing of load, blood withdraw, etc.) were randomly performed by six researchers. It was observed that LMi ($4.98 \pm 0.14\%$ of body weight) and lactate concentration at LMi (5.01 ± 0.39 mM) were similar to found previously by studies conducted in our laboratory, which rats handling is normally made by only one researcher. However, the success rate for LMi determination at present investigation (33%) was pronounced reduced compared to the aforementioned studies (~ 80-90%). Therefore, rats handling performed by several researchers promoted decrease on success rate for LMi determination, which denotes that adequate rats handling play fundamental role in methodology of research involving animal model.

Keywords: Lactate minimum, swimming, rats.

Exercise intensity responses during 217-km mountain foot race

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Target individual exercise intensity constitutes important component to exercise performance, however, it has been scarcely studied in ultramarathon foot races. Thus, the aim of this study was verify individual exercise intensity during 217-km mountain foot race. It was studied 11 athletes (43±3 years; 170.4±1.9 cm height; 70.7±3.1 kg body weight; 16±3 years of race training; 122±18km/week of training volume) that participated of the "BAD 135 World Cup" mountain race called "Brazil 135 Ultramarathon". One week before the competition and in subsequent days, the athletes individually determined the critical velocity (CV) from 4 maximal running of 800, 1200, 1600, 2000m. Race time was taken by official race reports. All data were expressed by mean ± SEM and repeated measures ANOVA was used to investigate data comparisons (statistical significance $P < 0.05$). The volunteers completed the race in 46.6 ± 3.1 h, an average at 4.9 ± 0.3 km/h corresponding to 34.5 ± 1.9 % of CV. Significant ($P < 0.05$) highest velocity (6.2 ± 0.5 km/h; $44.7 \pm 2.8\%$ CV) was performed from 0 to 84-km compared to 84 to 177-km (4.2 ± 0.3 km/h; $29.9 \pm 1.9\%$ CV) and 177 to 217-km (4.8 ± 0.4 km/h; 31.1 ± 2.2 % CV). In conclusion, running intensity of full race occurred at the moderate exercise intensity domain (29.9 - 44.7% CV) and the highest intensity levels was observed at first 84-km during 217-km mountain foot race. **Financial support:** FAPESP, CNPq ad CAPES.

Keywords: Ultramarathon, exercise intensity, critical velocity.

Aerobic exercise and malondialdehyde (MDA) in rats undergoing to chronic stress

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The animal model of chronic stress has been reported to induce anhedonia, which mimics the symptoms of endogenous depression in humans. The study aimed to evaluate the impact of physical training (PT) on the MDA concentration in rats undergoing to stress by restriction of movement (RM). The animals were divided into 4 groups, trained plus RM (TRM), trained control (TC), sedentary plus RM (SRM) and sedentary control (SC). Stress by RM was applied in sessions of two hours a day for four cycles of 5 consecutive days with 2 days interval between each cycle. The depressive state was characterized by anhedonia, through the sucrose preference test. We applied three weekly sessions of 60 min swimming loaded with 2% body mass, this below the anaerobic threshold (AT). One way Anova and post hoc Tukey test ($p < 0.05$) was used. After sacrifice and tissue analysis, the serum concentrations of MDA between the groups showed no statistical variation. With regard to liver, the TC showed MDA higher significantly ($p < 0.05$) compared to SC. The restriction of movement did not induce oxidative stress in exposed animals, what happened with the physical training.

Keywords: Aerobic training, oxidative stress, restriction of movement.

Are the rest bicarbonate and base excess concentrations related to the respiratory compensation point velocity in runners?

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Recently we found that performance for 10-km runners can be predicted by the values of the running speed corresponding to the respiratory compensation point (sRCP). Moreover, we found significant higher values in elite (ER) compared to amateur long-distance runners (AR) at rest for bicarbonate and base excess concentrations (ER = 28.5 ± 1.8 ; AR = 25.7 ± 1.7 mmol·l⁻¹ and ER = 5.7 ± 1.5 ; AR = 3.3 ± 1.4 mmol·l⁻¹, respectively). The aim of this study was to verify if there exist relationship between rest bicarbonate and base excess concentrations with sRCP. Participated in this study twenty-five AR ($VO_{2max} = 38.3 \pm 6.3$ ml·kg⁻¹·min⁻¹) and twenty ER ($VO_{2max} = 54.0 \pm 9.0$ ml·kg⁻¹·min⁻¹). Blood samples were collected through digital puncture (Clinitubes®, Radiometer Copenhagen®) at rest and analyzed immediately in the blood gas analyzer Stat Profile® pHOx® Plus L (Nova Biomedical®) to determine the acid-base parameters. After that, the runners underwent a VO_{2max} test in a treadmill to determine sRCP. As expected we found higher values also for sRCP (ER = 19.4 ± 1.3 ; AR = 13.6 ± 1.9 km·h⁻¹) ($p < 0.001$). Linear regression analysis showed significant relationship between these acid-base parameters and sRCP ($p = 0.0008$). These data suggest a higher buffering capacity as an adaptation to endurance training, which can enhance achievement of sRCP at higher intensities.

Keywords: Acid-base, runner, respiratory compensation point speed.

Relation between index SJFT and maximal isometric strength in young male judo players

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Judo is an Olympic sport of great acceptance in the country. The specificity of physical assessment in this modality can guarantee more reliable parameters to verify the real status and physical fitness of the athlete. Therefore, the aim of this study was to correlate the index obtained through the Special Judo Fitness Test (SJFT), which is a specific test for judo, with isometric muscle strength, widely used during the fight. 14 judo athletes male, aged 15.86 ± 1.92 years, weight 59.45 ± 7.75 kg, height 1.70 ± 0.05 m, of SESI-Limeira and fighting in second division FPJ participated in this study. The athletes were submitted to the protocol proposed by Sterkowicz (1995) of SJFT and test of isometric strength on the bar with kimono (FRANCHINI; DEL VECCHIO, 2008). Then, Pearson's correlation was done between the SJFT index and time obtained in the test of isometric strength. The judokas obtained an index of 16.29 ± 1.61 and time of isometric strength on the bar with kimono of 39.71 ± 14.94 seconds. The correlation between the index and isometric strength was -0.14. According to the data, to the lower the SJFT index to greater the time isometric strength of upper limbs by athletes studied.

Keywords: Judo, SJFT, muscular strength.

TW 20 metros: specific test for assessing anaerobic capacity of athletes in volleyball

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Due to the particular characteristics of the sport of volleyball, it is necessary to search for tests that better evaluate the overall performance of these athletes. Thus, the aim of the study was to assess the anaerobic capacity of athletes for the volleyball and Wingate tests TW20 and to correlate and compare the results of the tests. The study included nine volleyball athletes from 22.11 ± 1.52 years, of adult female team Piracicabana Volleyball Association (APIV). The athletes performed the test TW20 (18.80 meters race interspersed with jumps of 0.20 meters at an average distance of 6.26 meters from each other) and Wingate test. Then blood samples were performed serially during recovery to determine the lactate peak, and analysis performed by enzymatic method. Were confirmed data normality by Shapiro Wilk test, we used the coefficient of correlation to perform the correlations and Student t test for paired data for the lactate values. There was no significant correlation ($p > 0.05$) between the maximum and average variable powers of the Wingate test with the variable maximum distance walked during TW20metros. A significant correlation ($r: 0.89$ $p \leq 0.001$) between the concentrations of lactate peak Wingate test (6.56 ± 0.96 mmol / L) with TW20metros test (6.56 ± 2.49 mmol/L) without a significant difference ($p > 0.05$). The results indicate that the protocols have different specificities, but the lactate values achieved demonstrate that both tests can be applied to evaluate the anaerobic capacity of athletes in volleyball.

Keywords: Volleyball, fitness assessment, anaerobic capacity.

Electromyographic assessment of rectus femoris during the isometric wall slide squat in different degrees of knee flexion

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Body movements are achieved by the action of different muscles in synergy with one of these as the prime mover. The wall slide squat is used in gyms and clinics with the main objective of strengthening the quadriceps, especially the rectus femoris and, therefore, the aim of this study was to correlate the electromyographic isometric activity of rectus femoris in inferior position of the exercise with the angular position of the knee in college students who carried out the exercise at different degrees of knee flexion. It was selected 10 volunteers, five men and five women aged 22.4 ± 2.17 which stayed on isometrics for about 3 seconds. The electrodes were placed at the midpoint between the anterior superior iliac spine and the basis of patella of the right leg with 1 cm interelectrode and the electrogoniometer was placed in medial side of the knee. The signal amplitude was normalized by the maximum and correlated using Pearson's coefficient with the position ranged from 75 to 108 degrees of knee flexion. The amplitude ranged from 0.1085 to 0.2845 μV . It was expected that the smaller the angles of the knee, the greater would be the activity rectus femoris. However no correlation was found between angle of the knee and activity of this muscle. This result may demonstrate that different movement strategies were adopted during the exercise and in this type of squat the most requested muscles depends on the individual movement strategy.

Keywords: wall slide squat, rectus femoris, electromyography

Resistance training regulates the obesity in ovariectomized rats

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The aim of this study was to verify if the resistance training is able to reverse the obesity promoted by estrogen lack. *Sprague-dawley* adult female rats were divided into 4 groups (n=6 per group): sham-sedentary (S-sed), ovariectomized-sedentary (OVX-sed), sham-trained (S-tr) and OVX-trained (OVX-tr). During a 10-week resistance training, the trained animals climbed an 1.1-m vertical ladder with progressive overload attached to their tails. The sessions were performed 3 times a week, 8-12 dynamic movements per climb and 4-9 climbs until exhaustion. The rats were weight and killed 48h after the last session. Immediately, mesenteric adipose tissue was weighed and 100mg of this tissue was prepared for morphological analyses in colidina and osmium tetroxide. Ovariectomy increased total body mass (20%), mesenteric visceral fat mass (57%) and the circumference of mesenteric adipocytes (26%) compared to sham group (p <0.05). The resistance training was able to decrease total body mass (23%), mesenteric visceral fat mass (9%) and the circumference of mesenteric adipocytes (9%) in OVX-tr group compared with OVX-sed (p <0.05). These results show that resistance training can help to control obesity induced by estrogen deficiency, providing benefits for health. **Financial support:** FAPESP, CNPq and CAPES.

Keywords: Adipose cells, mesenteric adipose tissue, osmium tetroxide, exercise.

Correlation between cardiorespiratory variables and ID polymorphism of the ACE gene in men with and without coronary artery disease

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Introduction: Studies have shown that insertion/deletion polymorphism of the angiotensin converting enzyme (ID polymorphism of the ACE gene) can affect the functional aerobic capacity of healthy and coronary patients. However, the impact of this genetic variation on the expression of aerobic capacity is still controversial. Objective: Evaluate the correlation between ID polymorphism of the ACE gene and the cardiorespiratory variables in healthy men and in men with coronary artery disease (CAD). Methods: 73 men (54±8 years) were divided into 2 groups: a CAD group, confirmed by coronariography, and a control group composed of healthy volunteers. Experimental protocols: Clinical evaluation, cardiopulmonary exercise test with ramp-type protocol, with a load increment rate of 15 W/min up to the sub-limit, using the values obtained at the anaerobic threshold. Genotyping of the volunteers as homozygotes for D and I alleles or as heterozygotes (D/I). Statistical analysis: One-way ANOVA and chi-square tests, with $\alpha=5\%$. Results: No differences in the values of the cardiorespiratory variables were observed among individuals with DD, DI and II genotypes in the two groups ($p>0.05$). The two groups showed similar frequencies of D allele and I allele (CAD: 53.9% and 46.0%, and Control: 57.3% and 46.6%, respectively). Conclusion: The cardiorespiratory variables of the CAD and control groups with DD, DI and II genotypes were similar. Hence, it was concluded that ID polymorphism of the ACE gene and the aerobic performance of the two groups under study were uncorrelated.

Keywords: Coronary artery disease, anaerobic threshold, polymorphism.

Relation between cardiorespiratory fitness and indicators of body composition in adolescents.

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Unsatisfactory indices of cardiorespiratory fitness (CRF) and inappropriate values indicators of body composition are associated with risk factors for several diseases in young people. The aim of this study was to investigate the relation between CRF and indicators of body composition in adolescents. The study included 140 adolescents, 63 boys (11.6 ± 0.02 years, 43.1 ± 3.7 kg, 150.1 ± 0.3 cm) and 77 girls (11.6 ± 0.03 years; 42.7 ± 2.4 kg, 150.0 ± 1.2 cm). As indicators of body composition the body mass index (BMI), waist circumference (WC), sum of subscapular and triceps skinfolds (ΣDC), the percentage of body fat (% BF), lean body mass (MM), fat body mass (MG) were used. CRF was evaluated by testing 20-meter shuttle run (SR-20m) and VO_2 was estimated by the equation proposed by Barnett et al. (1993). To investigate the relation between CRF and indicators of body composition, partial correlation coefficient, controlling sex and age variables, was used. We found significant and the moderate to strong relation to BMI ($r = -0.52$), WC ($r = -0.53$), ΣDC ($r = -0.80$), %BF ($r = -0.80$) and MG ($r = -0.81$), and a weak correlation MG ($r = 0.14$) for MM. Moreover, the indicator of body composition that best relationship with the CRF was the MG, with explanation coefficient of 65%. It is concluded that all indicators of body adiposity were inversely related to CRF, while the MM showed a positive relation, of low magnitude though.

Keywords: Cardiorespiratory fitness, body composition, adolescents.

Validation of the running-based anaerobic sprint test (*RAST*) as a tool predictor of anaerobic capacity in soccer players: a pilot study

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The aim this study was to investigate possible associations between running-based anaerobic sprint test (*RAST*) and the maximal accumulated oxygen deficit (MAOD) in soccer players. Six soccer players (aged 15±00 years, height 169.5±7.2 cm, weight 61.5±9.1 kg) were submitted a maximal incremental test to determine the maximal oxygen uptake ($VO_2\text{max}$) and velocity at $VO_2\text{max}$ ($vVO_2\text{max}$). In addition, efforts were performed 10 submaximal intensities (50 and 95% of $vVO_2\text{max}$) and a supra-maximum (110% of $vVO_2\text{max}$) for the determination of energy demand theory (EDT) in supra-maximal efforts and the actual demand at this intensity (AED). The MAOD was considered as the difference between the EDT and AED. Additionally, there were 6 runs maximum of 35 meters with 10 second intervals (*RAST*) for the determination of absolute (abs) and relative (REL) of peak power (PP) and mean (PM), and the fatigue index (IF) and the maximum velocities (V_{max}) and mean (VM). After the sixth effort, blood samples were collected to determine the peak lactate concentration ($[Lac]_{\text{peak}}$). Prior to implementation of the *RAST*, participants were adapted to the maximum effort. The possible associations between the variables from the *RAST* and MAOD were tested using Pearson correlation ($P < 0.05$). There were no significant associations between the variables like coming do *RAST* PP_{abs} (553.2 ± 123.3 W), PM_{abs} (402.9 ± 88.9 W), RPD (8.9 ± 0.9 W.Kg⁻¹), PM_{rel} (6.6 ± 1.3 W.Kg⁻¹), IF ($37.0 \pm 5.1\%$), V_{max} (6.8 ± 0.2 m.s⁻¹), VM (6.3 ± 0.2 m.s⁻¹) and $Lac]_{\text{peak}}$ (12.0 ± 0.7 mM) with the values from the absolute MAOD (2.20 ± 0.71 L) and relative (36.96 ± 11.78 ml.kg⁻¹). It can be concluded that the *RAST* was not a valid test to predict anaerobic capacity in soccer players.

Keywords: *RAST*, MAOD, soccer players.

Analysis of mechanical properties of rats bone tissue subjected to high intake of sucrose and swimming training

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The high intake of sucrose is linked to metabolism modifications. The aim of this study was to analyze the effects of swimming and high sucrose supplementation on bone mass. Male rats (n=10 per group) were divided in Control (C), Sucrose (S), Exercise (E) and Sucrose+Exercise (SE), and, the E and SE groups were submitted to swimming training (3 sessions at 60 min/week during 12 weeks nearly the anaerobic threshold intensity). The bone mass was analyzed by DXA for determinate bone mineral density (BMD) and, Biomechanical Three-Point Bending Testing, these data were used for the calculation of the structural properties: maximum load (N), toughness (N.mm), and stiffness (N/mm). The results show that Sucrose caused an increase in BMD ($0,2261 \pm 0,004 \text{g/cm}^2$) with compared to others groups; C ($0,2078 \pm 0,004 \text{g/cm}^2$); E ($0,2003 \pm 0,004 \text{g/cm}^2$) and SE ($0,2191 \pm 0,004 \text{g/cm}^2$); nevertheless there is an impairment of bone quality with increased stiffness, decreased toughness and maximum load supported. There is no deleterious effect of sucrose intake in swimming training rats, and confirm that swimming training improve lifestyle skeletal health. **Financial support:** CAPES.

Keywords: Swimming, sucrose, bone mass.

Glicidic and lipidic serum parameters after time-to-exhaustion swim in rats

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The aim was to investigate the glicidic and lipidic serum parameters after time-to-exhaustion (TTE) swim at lactate minimum intensity (LMI) in rats. Eighteen rats underwent the lactate minimum test (De Araujo et al., 2007) and 48hs later nine were euthanized in rest (control group-CG) and nine immediately after TTE swim at LMI (experimental group-EG). All routines started at 20hs under red light. Thoracotomy followed by cardiac puncture was used to collect blood samples, which after prepared were used to determination of blood glucose (GLUC) and free fatty acids (FFA) by commercial kits. As statistic method were used *t-test* for independent samples and *Pearson* correlation test, with a significant level set in 5%. The results are expressed in mean \pm standard deviation. GLUC was equal to 137.53 ± 16.14 and 78.40 ± 32.91 mg/dL for CG and EG, respectively, and FFA was correspondent to 256.72 ± 108.95 μ E/L for CG and 685.75 ± 159.39 μ E/L for EG. Were found significant decrease in GLUC ($p < 0.01$; 42.99%) and significant increase in FFA ($p < 0.01$; 167.12%) on the EG in relation to CG, showing $r = -0.82$ ($p = 0.013$). Once rats swam for approximately 2 hours, the data corroborates the literature, whereas during aerobic exercise the body has a tendency to “save” glucose as a mechanism to slow glycogen oxidation, providing FFA. However, glycogen is the principal substrate for exercise at this intensity and even with the provision of FFA muscle is unable to oxidize acetyl-CoA generated in the β -oxidation. So, both glicidic and lipidic serum substrate are modulated by aerobic exercise until exhaustion in swimming rats.

Keywords: Rat, swimming, time-ti-exhaustion, lactate minimum.

Time-to-exhaustion at lactate minimum intensity in swimming rats

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The Lactate Minimum Test (LMT) enables the possibility to determine an aerobic parameter and had been widely used to prescribe training with ensuring intensity control in swimming rats. However, the ideal training volume at lactate minimum intensity (LMI) is unknown due to lack of data about time-to-exhaustion at this intensity. Therefore, the purpose was to verify the tolerance of rats in swim exercise at lactate minimum intensity (LMI), identifying a parameter that could be used for prescription of volume training. Nine male Wistar rats (90 age days) were submitted to water and loads adaptation before enforcement of LMT, according De Araujo et al. (2007). After an interval of 48 hours of LMT attainment rats were euthanized in carbonic gas chamber, immediately after underwent a time-to-exhaustion (TTE) swim at LMI. The exhaustion was considered when the rat remains submerged at least 10 seconds and even with vigorous attempts to emerge, no success. Once rat has nocturnal habit and bright light can stress the animal, all routines began at 20hs under red light. The determination coefficient of second order polynomial fit was correspondent to 0.94 ± 0.05 . The lactate peak after induction phase was 8.00 ± 1.28 mM. LMI corresponded to $5.21 \pm 0.45\%$ body weight. The TTE in LMI was correspondent to 114.37 ± 36.23 min (minimum=88.67min and maximum= 204min) featuring 1.55 ± 0.33 mM and 5.80 ± 1.96 mM for initial and final lactate concentration, respectively. From the results presented it is possible to conduct the training prescription from an objective viewpoint, since it knows the time-to-to-exhaustion at ILM.

Keywords: Rat, time-to-exhaustion, swimming, lactate minimum test.

Critical load on resistance exercise for young and elderly

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The aims of this study were to determine the value of critical load (CL) at 45 °leg press exercise (LP) and to compare this intensity to two populations. The study included 12 young (age: 23 ± 2 years) and 12 elderly (age: 68 ± 4 years), all healthy males. The visits took place in five days; on the first determined the maximum load (1RM%) for the LP; the second to fourth days they performed a test protocol to concentric failure in the intensities 60, 75 and 90 1RM% randomly, on the fifth day and was tested in the CL (as determined by linear regression from the plot of the three intensities previously performed on a graph: the inverse of time versus the load). Statistical analysis was realized using the program *Statistica* 8.0, and the results were expressed as mean and standard deviation (SD). To compare the results of CL between groups were used the *unpaired Student t test*, with a significance of $p < 0.05$. The mean and SD of the execution time in the intensities: 60, 75 and 90 1RM% were respectively young: 83.6 ± 12.4 s, 56.7 ± 12.2 s and 26.5 ± 10.31 s; elderly: 83.4 ± 14.8 s, 58.0 ± 16.38 s and 26.50 ± 11.81 s. The graph analysis resulted in a CL for the young and elderly respectively the intensities of 54.2 ± 4.2 1RM% and 53.7 ± 5.3 1RM% and there was no significant difference ($p=0.80$). Thus, we can conclude that both the value obtained in the CL intensity close to 54% 1RM, no age dependence.

Keywords: Critical load, resistance exercise, elderly.