

Nutrition

EVALUATING THE EFFECT OF LYCOPENE ON THE LEVEL OF PLASMA MALONDIALDEHYDE IN ATHELETES BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

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Introduction Malondialdehyde (MDA), as the final product of lipid peroxidation, was usually detected as the marker of oxidative stress in human body. However, traditional detection methods of MDA, such as UV spectrophotometry and enzyme-linked immunoassay, were lack of specificity and sensitivity. Thus, the purpose of this study was to establish an accurate, rapid and effective method based on high performance liquid chromatography (HPLC) to determine MDA in human plasma. With this method, we quantitatively evaluated the extent of lipid peroxidation in human body and further studied the antioxidant effect of lycopene supplement on athletes. **Methods** (1) The method of HPLC was established with thiobarbituric acid (TBA) as the derivative reagent and the separation was performed on a Phenomenex LUNA C18 column (150 mm×4.6 mm, 5µm). The detection wavelength was set at 532 nm. (2) Fourteen professional female players from Shanghai Women's Field Hockey Team were randomly divided into two groups: the lycopene group (n = 7) and the control group (n = 7). The experiment was carried out in winter training with high training intensity. During the experiment, the lycopene group was supplied with lycopene capsule (which was equivalent to an intake of lycopene as 28 mg/d) for 30 days and the control group was not treated. All the subjects' MDA level in plasma before and after the experiment was detected with the established HPLC method. **Results** (1) Under the optimized HPLC conditions, good linearity of MDA was obtained in the range of 1.0-40.0 µmol/L and the correlation coefficient was 0.9998. The recoveries of MDA at the addition of three levels (2.5, 5.0 and 10.0 µmol/L) was in the range of 100.6%-118.6%. (2) The application research of lycopene supplement showed that after heavy-load training for one month, the MDA level of the control group was significantly increased (4.52 ± 0.31 vs. 5.78 ± 0.65 µmol/L, $P < 0.01$), while the lycopene group showed no significant difference (4.81 ± 0.26 vs. 4.91 ± 0.31 µmol/L). Furthermore, after the experiment, the MDA level of the lycopene group was significantly lower contrasted with the control group. **Conclusion** From this study, we successfully established an accurate and reliable HPLC method with good specificity, which was suitable for the determination of MDA in human plasma. Based on the method, we further found that lycopene supplement could inhibit the increase of MDA level during the period of intensive training, which indicated lycopene does have some antioxidant effect in human body. It might also provide some evidence for the role of lycopene in heavy-load training, such as preventing sports fatigue and injury. **References** Richard MJ, Guiraud P, Meo J, Favier A. (1992). *J Chromatogr*, 577(1), 9-18. Rao AV, Ray MR, Rao LG. (2006). *Advances in Food and Nutrition Research*, 51, 99-164. Moselhy HF, Reid RG, Yousef S, Boyle SP. (2013). *J Lipid Res*, 54(3), 852-858. Spirlandeli AL, Deminice R, Jordao AA. (2014). *Int J Sports Med*, 35(1), 14-18.

GASTROINTESTINAL DISORDERS CAUSED BY USING DRY FOOD

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Introduction Military activities are characterized with high physical load and psychological load. Military personnel are trained in military field exercises several times. The meal in the field exercises support physical endurance and provide physical fitness of military personnel (Wang et al, 2015; Booth, 2003). According to the military legislation all military personnel should be supplied by the hot meal, but the cases when that is impossible, participants of the field training are provided by the dry meal with energy capacity 1200 kcal three times in the day. Energy expenses during the daily activities in the field exercises is high, therefore food energy capacity is high, about 3500-7200 kcal. In some cases combat feeding can cause health disorders that diminish physical fitness and operational readiness of individual (Cochet et al, 2015). **Material and Methods** We provide questionnaire for participants of the military field exercises that allow estimates quality and quantity of the dry food from the users' point of view. There are 120 respondents both genders: respondents from NAF Infantry instructor school and National Defence Academy. **Results** Dry meal covers requirements in food energy for 53% of respondents, the rest 47% feel hunger. Only 23% of respondents give positive assessment to the quality of the dry meal, the rest 73% of respondents dissatisfied with assortment of the component of the dry meal. Military personnel pass through annual health capacity evaluation procedures. 3% of respondents have gastrointestinal disorder. The dry meal that is used (during three days of military training) causes negative consequences: 30% of respondents pointed heartburn, and 10% stress attention to the pain in abdomen, but 3% note the vomiting and diarrhoea. **Conclusion** 1. Dry meal provides basic level of nutrients during the field exercises for individuals – military personnel, but amount of dry food is less than military regulation requires; 2. Gastrointestinal problems are not taking the leading position in the list of diseases, but for 30% of participants of the experimental group had gastrointestinal disorders such as heartburn after using dry meal, 10% of respondents had abdominal pain, but 3% - vomiting and diarrhoea. Do not insert authors here

THE EFFECT OF POMEGRANATE EXTRACT ON OXYGEN TRANSPORT AND EXERCISE PERFORMANCE IN HIGHLY-TRAINED CYCLISTS AT LOW AND HIGH ALTITUDES

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Introduction Maximal aerobic exercise performance is often limited by the rate of oxygen (O₂) delivery via the erythrocytes to the muscles for energy production (Wagner, 1996). Nitric oxide (NO), produced endogenously by NO synthases in epithelia and also from dietary nitrate (NO₃⁻), induces dilation of the arterioles, improving blood flow and reducing erythrocyte damage. Pre-exercise intake of NO₃⁻-rich beetroot juice (BJ), reduces O₂ uptake (VO₂) for the same submaximal cycling workload, leading to an improvement in power output at VO₂max and time to exhaustion during a cycling time trial (TT) (Bailey et al. 2009; Lansley et al. 2011; Larsen et al. 2007). However, BJ has little such effect in highly-trained athletes who have greater vascular control. Pomegranate extract (POM) is high in NO₃⁻ and polyphenols; the latter increasing NO production in the stomach and protecting NO from oxidative damage (Ignarro et al. 2006). This study investigated whether POM reduces the O₂ cost of exercise in highly-trained cyclists and if the effect is greater at high altitude where lower atmospheric O₂ pressures impair O₂ delivery to the muscles. **Methods** Eight cyclists completed three stages of exercise at 50, 65 and 80% of their VO₂max, followed by a TT to exhaustion (TTEX) at a workload calculated to elicit VO₂max. The protocol was completed four times: at sea-level (SEA) and 1650m of altitude (ALT), with pre-exercise consumption of 1000mg of POM or a placebo (PL) at both altitudes. VO₂ was measured in the last minute of each stage. A repeated measures ANOVA was performed for all dependent variables. **Results**