EFFECT OF ALCOHOL ON RECOVERY FROM ECCENTRIC EXERCISE-INDUCED MUSCLE DAMAGE

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Introduction
Strenuous eccentric contractions produce micro-structural damage to skeletal muscle resulting in impaired muscular performance, inflammation, and soreness. Most running-based team sports (e.g. rugby, hockey, soccer) require significant eccentric work and, particularly during competition, this results in muscle damage and soreness. At the same time, large volumes of alcohol are regularly consumed by sports-people in the post-match environment. Rapid post-match recovery of muscle performance is necessary to enable adequate training and optimal performance during the following game. Little is known, however, of the acute effects alcohol consumption has on the process of repair and recovery of performance after eccentric exercise-induced muscle damage.

Aim
The aim of this study was to compare the effects of acute alcohol intake with that of an isocaloric non-alcoholic beverage on recovery of muscle performance following strenuous eccentric muscular work.

Methods
Eleven men, 23.9 ± 4.7 years (mean± SD) performed two bouts of 300 maximal eccentric contractions of the quadriceps muscles on a Biodex dynamometer. The dominant leg was used on the first bout in half the subjects, and the second bout was performed by the contralateral leg.

After one bout, subjects consumed an amount of beverage containing 1g/kg bodyweight of alcohol (as vodka) diluted with orange juice, and after the other bout they consumed an isocaloric quantity of orange juice. Allocation of the two post-exercise beverages was randomly assigned in a balanced fashion, separated by at least one week.

The volume of alcohol consumed was enough to classify the session as an episode of binge drinking (> 6 standard drinks), but was well below the reported volumes regularly consumed by sports people after competition. The two treatments were balanced for energy value and fluid volume. Equal volumes of beverage were consumed every 15 minutes over a total time of one and a half hours. Treatment and leg used were balanced and allocated randomly.

Measures of maximal isokinetic (concentric and eccentric) torque and isometric tension produced across the knee were measured before and at 36 and 60 hours following the damaging exercise. Venous blood samples were collected before and at 12 and 36 hours after exercise and later analysed for creatine kinase activity.

Subjects were instructed to abstain from any form of exercise and alcohol use from 48 hours before and 60 hours after the trial. Each subject completed two trials separated by at least 10 days. On the day of the trial subjects were given an isocaloric meal four hours before the start of the trial.
A general linear-model repeated-measure analysis of variance (ANOVA) was used to compare conditions (alcohol and control) over time for each criterion measure. This analysis provided main effects of Time and Trial and the Trial by Time interaction effect. Paired-samples T-tests (two tailed) were carried out to find the level of significance between each time point within a trial.

The study protocol as described was approved by Massey University Human Ethics Committee

Results

Alcohol ingestion following strenuous eccentric exercise resulted in significantly reduced eccentric and concentric maximal and average torque at 36 and 60 hours post-exercise (all p < 0.05), when compared with a non-alcohol post-exercise beverage. Decreases in maximal, but not average, isometric strength were also found to be significance (p < 0.05). Although elevated above pre-exercise values, no difference in creatine kinase activity was evident between trials.
Conclusions
The results of our study show that moderate consumption of alcohol increases the level of injury related strength loss and therefore delays the recovery of dynamic and static strength following eccentric exercise-induced muscle damage. This indicates that recovery from any strenuous sporting pursuit which has an eccentric component, such as field or court based team sports, will be delayed if moderate amounts of alcohol are consumed during the subsequent three hours.

Reporting
This study was presented to the Medical Sciences Congress NZ at their annual conference in Queenstown, 27th to 30th November, 2007. A full manuscript is in the process of submission to an international peer-reviewed journal and will be available from the authors on publication.

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