Guard Against Falls in Blood Sugar Levels

Tennis players should maintain carbohydrate intake and do appropriate off-court warm-up exercises to guard against falls in blood sugar levels during play, according to a report by German and Dutch researchers in a special tennis issue of the *Journal of Science and Medicine in Sport.*

The special issue will be published shortly by Sports Medicine Australia (SMA), with the support of Tennis Australia.

The purpose of the researchers' study was to specify the changes in blood glucose concentrations in the course of repeated tournament and practice matches, and to quantify the incidence of hypoglycaemia or low glucose levels in elite tennis players.

In many team tennis events worldwide, every player has to play two consecutive matches -- usually, a singles and a doubles -- with the order of play depending on the type and level of competition. The duration of play and the duration of the rest period in between the matches are generally unpredictable. This is the same for most tournaments, when a player has to play two singles matches per day. Every outdoor event also carries the risk of rain delay, introducing another factor that can disturb metabolic homeostasis or equilibrium.

The study shows various changes in blood glucose concentration during tennis match play under realistic tournament conditions. Under tournament conditions, clearly higher concentrations were recorded than during training, as well as significant fluctuations in concentrations in the course of a tournament day. The data show that, after the warm-up for the singles match, a significant higher blood glucose concentration was observed than during practice. Furthermore, the extremely high glucose concentrations at the end of a two-set singles match was particularly striking.

Glucose homeostasis is strongly disrupted several times during the course of team tennis tournaments. Particularly during the warm-up for a second work load on a competition day (eg, a second tournament match or resumption of play after a rain delay or a training unit after match play), glucose concentrations drop considerably and the risk of hypoglycaemia rises. This is particularly true after a long match and a short break (30-60 minutes).

The study reports that continuous carbohydrate intake is therefore important from the third set of a match and during the break after the match. In addition, performing an off-court warm-up (jogging and exercises) can shift the drop in glucose levels to the less critical period before the start of a match.

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In another paper in the Physiology section of the special issue, Queensland researchers report on their study of 24 elite female players – 5 internationally-ranked, 13 national representatives and 6 State-level players – which aimed to develop a practical method of quantifying energy expenditure during tennis.

Results showed that it was possible to quantify the energetic cost of playing tennis at a given intensity from a rate of perceived exertion **(**RPE) score given for the entire competitive session. The researchers reported:

"… perceived exertion is a simple, non-expensive and non-invasive method, which can be used at any time by athletes. It gives the coach frequent and accurate information about the player's physical effort during training and/or competition."

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Abstracts

Blood glucose responses and incidence of hypoglycaemia in elite tennis under practice and tournament conditions

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The purpose of the study was to specify the changes in blood glucose concentrations in the course of repeated tournament and practice matches, and to quantify the incidence of hypoglycaemia in elite tennis players. The study consisted of two parts. In the first, 147 tournament players completed a questionnaire about the incidence of hypoglycaemic symptoms during repeated tennis matches. In the second part of the study, the players participated in two subsequent matches (one singles match followed by a doubles) under (T) tournament (n=57) and (P) practice (n=20) conditions. Of the 147 players consulted, 94 (63.9%) reported experiences with hypoglycaemic symptoms during a tennis tournament (n=80) and/or tennis practice (n=62). The warm-up period for the second match each day was identified as the most sensitive point for the occurrence of hypoglycaemic symptoms (n=29), compared to the final stages of the first (n=11) or second match (n=7). Under both practice and tournament conditions, a significant ($p<0.01$) drop in blood glucose concentration was found during the warm-up period for the second match per day (T: from 5.8±1.4 $mmol \cdot L^{-1}$ to 4.3±0.8 $mmol \cdot L^{-1}$ and P: from 5.4±1.1 $mmol \cdot L^{-1}$ to 4.1±1.5 $mmol \cdot L^{-1}$). In conclusion, precautions should be taken to prevent a sudden drop in blood glucose concentration and hypoglycaemic symptoms during the early stages of a player's second tennis match in one day.

A practical method of estimating energy expenditure during tennis play

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This study aimed to develop a practical method of estimating energy expenditure (EE) during tennis. Twenty-four elite female tennis players first completed a tennis-specific graded test in which five different intensity levels were applied randomly. Each intensity level was intended to simulate a "game" of singles tennis and comprised six 14 s periods of activity alternated with 20 s of active rest. Oxygen consumption (VO_2) and heart rate (HR) were measured continuously and each player's rate of perceived exertion (RPE) was recorded at the end of each intensity level. Rate of energy expenditure (EE_{VO2}) during the test was calculated using the sum of VO_2 during play and the 'O_2 debt' during recovery, divided by the duration of the activity. There were significant individual linear relationships between EE_{VO2} and RPE, EE_{VO2} and HR, ($r \geq 0.89$ & $r \geq 0.93$; $p<0.001$). On a second occasion, six players completed a 60-min singles tennis match during which VO_2, HR and RPE were recorded; EE_{VO2} was compared with EE predicted from the previously derived RPE and HR regression equations. Analysis found that EE_{VO2} was overestimated by EE_{RPE} (92±76 $kJ.h^{-1}$) and EE_{HR} (435 ± 678 $kJ.h^{-1}$), but the error of estimation for EE_{RPE} ($t=-3.01$; $p=0.03$) was less than 5% whereas for EE_{HR} the error was 20.7%. The results of the study show that RPE can be used to estimate the energetic cost of playing tennis.