WHOLE-BODY AND MUSCLE-LOCALIZED BIOELECTRICAL IMPEDANCE VECTOR MIGRATION OVER A GIRO D'ITALIA PRO RACE

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INTRODUCTION: Giro d'Italia is one of the most demanding multistage races included in the professional cycling Tour, in which it is difficult to intervene systematically in these group of cyclists to assess the adaptations to such intense competitions. Bioelectrical impedance vector analysis (BIVA) is a non-invasive and safe technique for assessing hydration and body composition changes [1]. The purpose of this study was to apply BIVA to assess possible hydration changes evoked over the 3 weeks of Giro d'Italia in a group of elite rink hockey players.
METHODS: 9 elite cyclists completed whole-body and muscle-localized BIVA (quadriceps, hamstrings and calves) assessments at three different checkpoints: one day before the start of Giro d'Italia 2013 (PRE), on the first resting day (MID), and on the final day of the race (POST). A tetra-polar phase-sensitive BIA at 50 kHz was used to measure height-adjusted resistance, height-adjusted reactance and phase angle. Hotelling's T2 test determined differences in the complex vector through the 95% confidence intervals. Haemoglobin, haematocrit, plasma volume and osmolality were also assessed in all three checkpoints as a hydration biomarkers. All the procedures were in accordance to the Declaration of Helsinki.
RESULTS: Whole-body BIVA reported a non-significant shortening vector migration in PRE-MID and a significant lengthening vector migration in MID-POST. In PRE-POST, there was a significant lengthening of the vector. Regarding muscle-localized BIVA, no significant vector migrations were reported neither in quadriceps nor in hamstrings. As far as calves' vector migration, there was a significant shortening of the vector in PRE-MID and a significant lengthening of the vector in MID-POST. Across PRE-POST the mean calves' vector experienced a significant shortening.
Haemoglobin and haematocrit significantly decreased in PRE-MID and significantly increased in MID-POST, but below baseline values. The dynamic of plasma volume was opposite: it significantly increases in PRE-MID and decreases in MID-POST. Considering the entire 3-week race, plasma volume values increased significantly. Osmolality increased significantly from the start to the end of the competition.
CONCLUSION: Haematological markers showed that major hydration changes were experienced in the second half of the race, a fact that was confirmed by the kinetic of whole-body and calves' vector migration. Whole-body BIVA lengthening vector indicated a global dehydration, but a possible fluid accumulation in the calves could have occurred, not like in quadriceps or hamstrings since there were none changes. Results indicate that BIVA is sensitive to assess hydration adaptations in relation to hydration biomarkers changes induced by a strenuous race.
1. Lukaski HC, Piccoli A. Bioelectrical impedance vector analysis for assessment of hydration in physiological states and clinical conditions. In: Handbook of Anthropometry: Physical Measures of Human Form in Health and Disease. 2012. p. 287–305.

TIMING OF CARBOHYDRATE AND PROTEIN INTAKE AND HYDRATION STATUS OF GERMAN JUNIOR FOOTBALL PLAYERS

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INTRODUCTION: Recently, the UEFA expert group highlighted that nutritional support plays a key factor for junior football players and will help to optimise growth, health, performance, recovery, training adaptations and body composition (Colllins et al. 2020). Although, young players may have different nutritional needs from those of adults the expert group stated that carbohydrate (CHO) and protein (PRO) needs are similar to those of senior players and Urine specific gravity (USG) can be a useful indicator of hydration status suggesting euhydration of USG <1.020. Data on nutritional status in junior football players are still rare, therefore this observational study focus, whether academy players follow the UEFA nutrition guidelines on training and match days.
METHODS: In total, 55 male junior football players (15 ± 0,8 yrs; 176 ± 8 cm; 63,9 ± 8,6 kg) from 3 academy teams (Under 17, 16 & 15 yrs) of a German professional football club were asked to weigh and record their food and beverages consumed on five consecutive days as well as their activities. These included training days (TD1 - TD3), pre-match day (MD-1) and a match day (MD). MD Kick-Off time was between 11am-1pm. Dietary protocols were analysed based on the German food database (BLS 3.1) using Ebispro Software. On each morning, urine samples were collected and analysed for urine specific gravity (USG).
RESULTS: On TDs mean PRO 1.7 ± 0.7 g/kg/d and CHO 4.7 ± 2.1 g/kg/d intake was within the recommended guidelines. In 21% of all TDs PRO intake was <1g/kg and for CHO <3 g/kg (22%) respectively. Mean MD-1/MD PRO intake (1.6 ± 0.7 g/kg/d) and CHO intake (4.4 ± 2.0 g/kg/d) was similar to TDs. However, 78% of the players are below the recommended CHO intake (6-8g/kg/d) on MD-1. On MD pre-Match CHO Intake (<4 hrs before Kick Off) was 1.5 ± 0.8 g/kg. Depending on the team and Kick-Off time 20% - 38% of the players consumed CHO <1 g/kg. Mean total water intake (TWI) on TDs was 4.0 ± 1.8. L (63 ± 29 mL/kg) and 3.8 ± 1.9 L (60 ± 30 mL/kg) on MD-1/MD. Mean morning USG on TDs was 1.022 ± 0.008 (30% <1.020 and 32% >1.025), on MD-1 1.023 ± 0.008 (26% <1.020 and 38% >1.025) and on MD 1.023 ± 0.006 (32% <1.020 and 41% >1.025).
CONCLUSION: In the present study, PRO and CHO intake of German Junior Football Players were within the recommended guidelines on training days, but not for CHO on MD-1 and MD. A relatively high number of players have had a low CHO intake and a morning USG >1.025 before Kick-Off on MD, assuming that they were not well prepared for competition. These data suggest that young academic football players need more information regarding a sport specific diet and timing of nutrient intake during trainings days, but specifically on match day.
Collins J, Maughan RJ, Gleeson M, et al., UEFA expert group statement on nutrition in elite football. Br J Sports Med 2021; 55:416–442