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LABORATOIRE SEP

Exploration du stress métabolique chez des nageurs de haut niveau

Non-targeted metabolomics analyses by mass spectrometry to explore metabolic stress after six training weeks in high level swimmers.

URL of the page: <https://labos-recherche.insep.fr/fr/publications/exploration-du-stress-metabolique-chez-des-nageurs-de-haut-niveau>

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ABSTRACT : The objective was to compare the metabolic responses of high-level national swimmers to threshold or polarised training. 22 swimmers (n = 12 males and 10 females) participated in a 28-week cross-over intervention study consisting of 2 × 6 period weeks of training. Swimmers were assigned randomly to either training group for the first period: polarised (POL) (81% in energetic zone 1: blood lactate $[La] b \leq 2 \text{ mmol.L}^{-1}$; 4% in zone 2: $2 \text{ mmol.L}^{-1} < [La] b \leq 4 \text{ mmol.L}^{-1}$; 15% in zone 3: $[La] b > 4 \text{ mmol.L}^{-1}$) or threshold (THR) (65%/25%/10%). Before and after each training period, urine samples were collected for non-targeted metabolomics analysis. Mixed model analysis was performed on metabolomics data including fatigue class factors and/or training and/or interaction. Ion intensities of 6-ketodecanoylcarnitine (+31%), pregnanediol-3-glucuronide (+81%), P-cresol sulphate (+18%) were higher in the threshold group ($P < 0.05$) indicating higher glycogenic depletion and inflammation without alteration of the neuroendocrine stress axis. 4-phenylbutanic acid sulphate was 200% higher in less fatigued swimmers ($P < 0.01$) linking the anti-inflammatory activity at the cell membrane level to the subjective perception of fatigue. This research suggests the importance of replenishing glycogen stores and reducing inflammation during high thresholds training loads.

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