

FR

X



Non-targeted metabolomics analyses by mass spectrometry to explore metabolic stress after six training weeks in high-level swimmers.
Romain Pâris^a, Etienne Puget-Guillot^a, Delphine Douron^a, Marion Bréaud-Burkhardt^b, Delphine Cressens^c,
^a Institut national de l'éducation physique et sportive (INSEP), Service Département Laboratoire Sport, Nutrition et Performance (SDSNP), Paris, France
^b Institut national de l'éducation physique et sportive (INSEP), Service Département Nutrition, Biométrie, Médecine, Bioéthique et Santé, Recherche Institute, Sport and Health, Paris, France
^c Institut national de l'éducation physique et sportive (INSEP), Service Département Nutrition, Biométrie, Médecine, Bioéthique et Santé, Recherche Institute, Sport and Health, Paris, France

Introduction
The aim of the study was to compare the metabolic response of high-level swimmers to a 6-week aerobic training session. 11 male swimmers (mean age: 21.1 ± 1.1 years) and 9 female swimmers (mean age: 20.2 ± 1.1 years) performed a 6-week aerobic training program consisting of 40 h of swimming training per week. Blood samples were collected before, during and after the training period. Non-targeted metabolomic analysis was performed on urine samples collected at baseline, before the start of training, and after 3 weeks and 6 weeks of training. Principal component analysis (PCA) was used to identify metabolites linked to training. A linear discriminant analysis (LDA) model was used to predict the time points of sampling (baseline, 3 weeks and 6 weeks). Results
PCA analysis showed that the first dimension explained 54.3% of the variance in the data. The first dimension separated the baseline samples from the 3-week and 6-week samples. The second dimension separated the 3-week samples from the 6-week samples. The third dimension separated the 6-week samples from the baseline samples. LDA analysis showed that 70.1% of the samples were correctly classified. The LDA model correctly classified 70.1% of the baseline samples, 70.0% of the 3-week samples and 70.0% of the 6-week samples.

Conclusion
Over the 6 weeks, aerobic training has allowed swimmers to better quantify the adaptation of biological organs and systems to aerobic training. Aerobic training has increased the aerobic capacity of the muscles, which is reflected in the increase in blood lactate concentration and decrease in blood glucose concentration. The results of this study confirm the efficiency of the LDA model to predict the time points of sampling. This study also shows that the LDA model can be used to predict the time points of sampling in swimmers. The LDA model correctly classified 70.1% of the samples, which is a good result for a LDA model. The LDA model correctly classified 70.1% of the baseline samples, 70.0% of the 3-week samples and 70.0% of the 6-week samples. The LDA model correctly classified 70.1% of the baseline samples, 70.0% of the 3-week samples and 70.0% of the 6-week samples.

ÉPIDÉMIOLOGIE DE LA PERFORMANCE

Exploration du stress métabolique chez des nageurs de haut niveau

1 DOCUMENT - Publié le 30 août 2022

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>



PLA et Al 2021

PDF-2.22 Mo

TÉLÉCHARGER

JOURNAL OF SPORTS SCIENCES

Robin Pla, Estelle Pujos-Guillot, Stéphanie Durand, Marion Brandolini-Bunlon, Delphine Centeno, David B. Pyne, Jean-François Toussaint & Philippe Hellard

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.

[PRÉCÉDENT](#)

[RETOUR À LA LISTE](#)

[SUIVANT](#)



ACCÈS

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

- > ACCESSIBILITÉ
- > MENTIONS LÉGALES
- > CGU
- > CARRIÈRE

SUIVEZ-NOUS



Ce site utilise des cookies et vous donne le contrôle sur ce que vous souhaitez activer

OK, tout accepter

Interdire tous les cookies

Personnaliser