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Dynamics of gut microbiota during a cycling Grand Tour is related to exercise performance and modulated by dietary intake

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INTRODUCTION:

Regular exercise has been described as a factor modifying both the diversity and the relative abundance of certain bacterial phyla or families, although the few studies that have been carried out on this show important methodological differences and divergent results. To our knowledge, the effect of a cycling stage race on the gut microbiota composition and metabolic activity of professional cyclists has not been analysed. Studying the composition of the intestinal microbiota in this context can help both to understand its potential modulatory role in the response to exercise and to optimize and personalize the use of supplements. The aim of this cohort study was to analyse the dynamics of faecal microbiota composition of professional cyclists over a Grand Tour, and their relationship with performance and dietary intake.

METHODS:

16 professional cyclists competing in La Vuelta 2019 were recruited. Faecal samples were collected at four time points: The day before the first stage (A); After 9 stages (B); After 15 stages (C); On the last stage (D). Faecal microbiota populations were analysed using 16S rRNA sequencing. Dietary intake before and during La Vuelta 2019 was recorded by means of semiquantitative food frequency questionnaires.

RESULTS:

A principal component analysis (PCA) followed by Generalized Estimating Equation (GEE) models were carried out to explore the dynamics of microbiota and its relationship with performance. Bifidobacteriaceae, Coriobacteriaceae, Erysipelotrichaceae, and Sutterellaceae dynamics showed a strong final performance predictive value ($R^2=0.83$, ranking and $R^2=0.81$, accumulated time). The abundance of Erysipelotrichaceae at the beginning of La Vuelta was directly related to the previous intake of a complex-carbohydrate-rich foods, while during the competition the abundance of Bifidobacteriaceae was negatively affected by the intake of simple carbohydrates from supplements.

CONCLUSION:

An ecological perspective represents more realistically the relationship between gut microbiota composition and performance, compared to single-taxon approaches. The composition and periodisation of diet and supplementation during a Grand Tour, particularly carbohydrates, could be designed to modulate gut microbiota composition that allow better performance.

Topic: Nutrition

Presentation: Poster

