

SAUERKRAUT SUPPLEMENTATION AND THE ATHLETE GUT MICROBIOTA: PRELIMINARY RESULTS OF A PROSPECTIVE COHORT STUDY

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Objectives: The optimization of athlete's gut microbiota is an emerging field of research. However, there is a scarcity of supplementation studies using whole probiotic foods and, to the best of our knowledge, this is the first study conducted on sauerkraut as a probiotic-rich fermented food, in healthy elite athletes with the aim to improve their gut microbiota composition.

Methods: Healthy elite athletes (n=3, males=2, age range 25-35 years) were provided with sauerkraut (250 g/day) for 10 days. The pasteurized sauerkraut had a cultured lactic-acid-forming bacteria count of $4.82 \cdot 10^3 (\pm 2,31)$ CFU/mL and fiber content of 1.5 g/100 g. Subjects were instructed not to modify their usual diet and training regime. Compliance was monitored using dietary and lifestyle records. On Days 0, 5 and 11, stool samples were obtained using the Intest.pro test kit (BIOMES NGS GmbH, Germany) and 16s rDNA Seq was performed.

Results: Pre-intervention average daily fiber intake was equal to $20,1 \pm 7,0$ g and increased by 3,2 g (a total of $23,3 \pm 12,3$ g) during intervention, which can be attributed to the sauerkraut intake. The overall balance of the gut microbiota improved in all three subjects, measured a mathematical model utilizing bacterial α -diversity, relative abundance of *Proteobacteria* and other key bacterial taxa. Significant changes in taxa were seen as early as Day 5: an increase in the relative abundances of butyrate-producing genus *Lachnospiraceae UCG-008* and decrease of unspecific *Bacteroidales* and *Clostridia UCG-014*. Additionally, significant alterations in certain metabolic pathways were seen, most notably an increase in the reductive TCA cycle I pathway.

Conclusion: Our preliminary results indicate that already 5 days of sauerkraut supplementation in athletes's diet can impact their gut microbiota composition and functionality in various positive ways. Due to study limitations, it cannot be concluded whether these effects can be attributed to the increased intake of probiotics or prebiotics or the phenomenon of cross-feeding or quorum sensing within the microbial community. However, these results can be considered as an indication that a synergy between the "food first" concept in sports nutrition and the significance of probiotics and prebiotics administration in athletes' microbiota deserves further investigation.