The Gut Microbiome: Implications for Training and Recovery

The gut microbiome has become a prominent topic in sports nutrition because of its potential involvement in energy metabolism, immune regulation, gastrointestinal function and exercise adaptation. Cross-sectional studies report that athletes tend to exhibit greater microbial diversity and a higher abundance of short-chain fatty acid (SCFA)-producing taxa than sedentary individuals. However, athletes also differ from non-athletes in diet, energy intake and lifestyle, the direction of causality remains unclear, and microbial composition alone does not necessarily indicate microbial function or translate into improved physiological outcomes.

The relationship between exercise and the gut microbiome is thought to be bidirectional. In humans, sustained aerobic training can alter microbial composition and increase faecal SCFA concentrations, although responses vary between individuals and largely revert when training stops. SCFAs and other microbial metabolites have been implicated in pathways related to energy metabolism, skeletal muscle function and immune regulation. However, evidence that the microbiome in turn influences exercise capacity, training adaptation or recovery derives predominantly from animal and preclinical studies, and its relevance for athletes remains uncertain. Prolonged or strenuous exercise, particularly in the heat, reduces splanchnic blood flow, which can increase intestinal permeability and is associated with gastrointestinal symptoms, although these responses cannot necessarily be attributed to the gut microbiome.

Diet is one of the most important modifiable factors influencing the gut microbiome, making nutrition the most practical link between this research and the athlete. Dietary fibre and other fermentable carbohydrates, protein intake and overall dietary patterns all shape microbial activity. At the same time, the high-carbohydrate, low-fibre strategies commonly used around competition to support fuelling and limit gastrointestinal symptoms may reduce microbial diversity and SCFA production. This requires balancing short-term performance requirements with longer-term dietary strategies that support microbial health. Probiotics and prebiotics have received increasing attention. Some interventions have shown benefits for gastrointestinal symptoms and upper respiratory illness, but effects appear to be strain-specific, findings remain inconsistent, and evidence for direct improvements in performance or recovery is limited and mostly restricted to endurance performance.

This presentation will briefly review the current evidence on exercise—gut microbiome interactions and the proposed mechanisms linking the microbiome to training adaptation and recovery, before focusing on what this means for performance nutrition. This includes how fibre and overall dietary quality can be

combined with adequate fuelling and gastrointestinal tolerance, and when probiotics or commercial microbiome testing may, or may not, be useful. Throughout, the emphasis will be on distinguishing established findings from emerging hypotheses, and on what practitioners can apply today.