The Unexpected Relationship of Gut Health to Fitness, Health, and Athletic Performance

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1. Introduction to Gut Health
    1. Microbiota is the diverse ecosystem (bacteria, archaea, viruses, and fungal communities) living in a particular area.
    2. Collection of genomes from all microorganisms within an environment.

    Microbiota describes the actual bacteria; ***microbiome*** is the bacteria AND their genes.
    3. Provide an essential functions for health & digestion.

2. Introduction to Probiotics
    1. Probiotics are "live microorganisms that confer a health benefit on the host."
    2. Found in foods such as yogurt and kefir; Can be added to supplements such as capsules, tablets, or powders
    3. Help to absorb nutrients and assist the digestive tract. Impact the body through the amount and diversity of the good bacteria in the digestive tract.
    4. probiotics are bacteria consumed through food or supplements; prebiotics are carbohydrates (such as fiber) that feed the good bacteria residing in our guts

3. Review of the Research on Probiotics
    1. positive effects on overall digestion
    2. reduction of disease risk (obesity, CHD, diabetes, IBD)
    3. positive effects on mental health
    4. current gaps in the research (humans vs. mice; strain-specific)

4. Review of the Associations on Gut Health and Fitness, and Athletic Performance
    1. exercise increases richness and diversity of gut microbiota
    2. diet is established modulator of gut microbiota
    3. body composition and microbiota gut health are related

5. Review of the Impact of Probiotic Supplementation in Athletes
    1. Improves immune response to training
    2. Expedite recovery and decrease soreness.
    3. Reduces the risk for URTI and related illnesses.
    4. Potential to increase performance variables.
    5. Assists with energy production.
    6. May influence muscle mass and strength.
    7. Can decrease stress levels and increase resilience.

6. How does it interact with protein supplementation?
    1. May increase amino acid absorption from plant protein
    2. Can speed recovery and reduce soreness
    3. Has shown negative impact when mixed with certain proteins in endurance athletes

7. Summary of Information & Research Findings

1. Probiotics are live microorganisms that offer a health benefit when consumed in adequate amounts.
2. Regular consumption of specific probiotics may assist with immune function and reduce sickness.
3. Probiotic benefits include better gut-barrier function, nutrient absorption, recovery, and overall performance.
4. Probiotics may improve body composition, lean body mass, neurotransmitter synthesis, cognition, and mood.
5. Positive effect of probiotics on normalizing age-related reductions in testosterone and reduced cortisol levels.
6. Interpretation depends on the specific strain of probiotic, and by the differing clinical outcome measures within the literature.

8. Recommendations for Probiotics
    1. Address the current diet.
    2. Increase prebiotic foods.
    3. Focus on probiotic foods that have been validated within the research.
    4. Consider supplements as a preventative approach to wellness.
    5. Aim for 10 – 20 billion units per day (based on tolerance)

9. Summary of Research: Strain-Specific

The following probiotic strains/species have shown improvements in athletic performance/recovery:

1. B. coagulans GBI-30, 6086 (BC30) at 1 × 109 CFU has beneficial effects in combination with protein on exercise recovery;
2. Encapsulated B. breve BR03 in combination with S. thermophilus FP4 at 5 × 109 CFU each has beneficial effects on exercise recovery and performance following muscle-damaging exercise;
3. L. delbrueckii ssp. bulgaricus at 1 × 105 CFU can increase VO2max and aerobic power;
4. L. acidophilus SPP, L. delbrueckii bulgaricus, B.bifidum, and S. salivarus thermophilus at 4 × 1010 CFU administered in form of a yogurt drink can increase VO2max;
5. L. plantarum TWK10 at 1 × 1010 CFU has been shown to increase endurance performance;
6. L. acidophilus, L. rhamnosus, L. casei, L. plantarum, L. fermentum, B. lactis, B. breve, B. bifidum and S. thermophilus at 4.5 × 1010 CFU can increase run time to fatigue in the heat.

The following probiotic strains/species have been linked to improved gut health in athletes:

1. L. rhamnosus GG at 4 × 1010 CFU in form of a milk-based drink,
2. B. bifidum W23, B. lactis W51, E. faecium W54, L. acidophilus W22, L. brevis W63, and L. lactis W58, at 1 × 1010 CFU;
3. L. salivarius (UCC118) (unknown dose).

The following strains/species have been shown to improve immune health in athletes, reducing the episodes, severity or duration of exercise-induced infections:

1. 1.2 × 1010 CFU L. fermentum VRI-003 (PCC) at 1.2 × 1010 CFU and at 1 × 109 CFU in males;
2. L. casei Shirota (LcS) at 6.5 × 109 CFU twice daily;
3. L. delbrueckii bulgaricus, B. bifidum, and S. salivarus thermophilus at 4 × 1010 CFU administered in the form of a yogurt drink;
4. B. animalis subsp. lactis BI-04 2 × 1010 CFU;
5. L. gasseri 2.6 × 109 CFU, B. bifidum 0.2 × 109, and B. longum 0.2 × 109 CFU;

6. B. bifidum W23, B. lactis W51, E. faecium W54, L. acidophilus W22, L. brevis W63, L. lactis W58 at 1 × 1010 CFU;
7. L. helveticus Lafti L10 at 2 × 1010 CFU.