The influence of physical activity and nutrition on the problem of gaping intestinal barrier in the group of active athletes

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Abstract

Introduction:

Regular, intensive physical effort has huge effect on constitution including processes in intestines of professional athletes. It appears that intensive physical effort can lead to disorders of enteric barrier, which can increase the permeability of enterocytes.

Epidemiology is the method used to find the causes of health outcomes and diseases in populations. In epidemiology, the patient is the community and individuals are viewed collectively

The human body has multiple mucosal epithelia that form direct barriers between the environment and the internal host milieu. The gastrointestinal (GI) tract harbours one of the largest luminal interaction areas of these barriers, and plays a pivotal role in the regulation of the immune system, and hence in health . The GI mucosa has the complex task to act as a semipermeable barrier that allows the absorption of nutrients and immune sensing, while limiting the transport of potentially harmful antigens and microorganisms. The regulation of this seemingly 'conflicting' task is achieved by an interplay between structural components and molecular interactions at the intestinal mucosa, which operate in a dynamic manner to maintain intestinal integrity and immune homeostasis. The function of the intestinal barrier can be compromised through severe structural damage of the mucosa, or more subtle changes in the regulating components of the barrier.

Intestinal barrier defects have been associated with a broad range of diseases, including GI celiac disease inflammatory bowel disease (IBD), colon carcinoma, but also extra-intestinal disorders (e.g. chronic liver disease, type 1 diabetes, obesity). For all these diseases, it is commonly hypothesized that dysfunction of the intestinal barrier and an uncontrolled flux of antigens across the intestinal epithelium may challenge the immune system of susceptible individuals and affect the host-microbial balance, as such initiating inflammatory mechanisms in the gut or more distant organ systems

The intestinal mucosa is composed of several elements that aid in its function as a physical and immunological defence barrier. These mainly include the outer mucus layer with the commensal gut microbiota, antimicrobial proteins (AMPs) and secretory immunoglobulin A (sIgA) molecules, the central single cell layer with specialised epithelial cells, and the inner lamina propria where innate and adaptive immune cells reside such as T cells, B cells, macrophages and dendritic cells

Most available assays actively measure intestinal permeability, which should be interpreted in the strict sense of the term as the passage of molecules across the intestinal epithelium. These assays therefore represent only one aspect of intestinal barrier function although the terms "permeability" and "barrier function" are often used interchangeably. Various marker molecules, alone or in combination, can be used to assess intestinal fluxes. Dependent on the charge and size of the molecules, distinct permeability mechanisms are evaluated. In general, the movement of molecules from the intestinal lumen to the subepithelial space can be classified in two routes: transcellular and paracellular Large antigenic molecules, lipophilic compounds and nutrients will prefer the transcellular route where molecules are transported through the IECs by endocytosis, passive diffusion or binding to specific membrane transporters. Ions (especially cations) and small hydrophilic molecules (<600 Dalton) will favour the paracellular transport pathway, and will diffuse through the intercellular spaces between adjacent IECs, with the TJs as the rate-limiting step for epithelial permeability.

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