

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

Regular, intense physical exertion has a significant impact on the body's constitution, particularly the processes in professional athletes' intestines. Intensive physical exertion appears to cause intestinal barrier abnormalities, which can increase enterocyte permeability. Epidemiology is a tool for determining the causes of disease and health outcomes in communities. The community is the patient in epidemiology, and people are studied collectively. Multiple mucosal epithelia line the human body, forming direct barriers between the exterior and the internal host milieu. The gastrointestinal (GI) tract has one of the greatest luminal contact areas of these barriers, and it plays a critical role in immune system modulation and thus health. The GI mucosa has a difficult job: it must operate as a semipermeable barrier that allows nutrients to be absorbed and immunological sensing to occur while preventing the spread of potentially dangerous antigens and bacteria. The interplay between structural components and molecular interactions at the intestinal mucosa, which operate in a dynamic manner to preserve intestinal integrity and immunological homeostasis, is responsible for the control of this seemingly "conflicting" duty. The intestinal barrier's function can be jeopardised by significant structural damage to the mucosa or more subtle alterations in the barrier's regulatory components. Intestinal barrier deficiencies have been linked to a variety of diseases, including gastrointestinal (GI) celiac disease, inflammatory bowel disease (IBD), colon cancer, as well as extra-intestinal ailments (e.g. chronic liver disease, type 1 diabetes, obesity). It is widely assumed that intestinal barrier dysfunction and an uncontrolled flux of antigens across the intestinal epithelium may challenge the immune system of susceptible individuals and disrupt the host-microbial balance, triggering inflammatory mechanisms in the gut or other distant organ systems.

The mucosa of the intestine is made up of numerous components that help it operate as a physical and immunological defence barrier. The outer mucus layer, which contains commensal gut microbiota, antimicrobial proteins (AMPs), and secretory immunoglobulin A (sIgA) molecules, the central single cell layer, which contains specialised epithelial cells, and the inner lamina propria, which contains innate and adaptive immune cells such as T cells, B cells, macrophages, and dendritic cells, are just a few examples.

The majority of available assays actively assess intestinal permeability, which should be defined as the movement of molecules across the intestinal epithelium in the strict sense of the term. Although the terms "permeability" and "barrier function" are sometimes used interchangeably, these assays represent just one element of intestinal barrier function. Intestinal fluxes can be measured using a variety of marker molecules, either alone or in combination. Different permeability mechanisms are explored depending on the charge and size of the molecules. Large antigenic molecules, lipophilic substances, and nutrients will favour the transcellular route, which involves molecules being carried across the IECs by endocytosis, passive diffusion, or binding to specialised membrane transporters. Ions (particularly cations) and tiny hydrophilic molecules (600 Dalton) prefer the paracellular transport pathway and diffuse across the intercellular gaps between neighbouring IECs, with the TJs serving as the rate-limiting step for epithelial permeability.

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