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Intestinal microbiota and its host: harmony or discord?

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More bacterial than human (90% vs. 10%), we must all live with a 1 to 2 kilogram organ located in our gut. This is our microbiota, for which we merely serve as a receptacle.

Passed down from our mother at birth, composed of more than 100,000 billion cells (100 times more than the number of cells in the human body and comprised of bacteria and microorganisms), the composition and phenotypic profile of our microbiota are unique to each of us, as shown by its DNA sequencing. Thus, our microbiota, or intestinal flora, is a determinant organ that plays a fundamental role in our lives, our personality and behaviour, and our health.

Between the microbiota and the human, between it and us, its host, there exists a subtle and fragile harmony (symbiosis). Yet this symbiosis can break at any time, leading to dysbiosis, because the cohabitation between us and our microbiota is not always easy.

The foods that we eat and the drugs that we take are the primary culprits that can perturb this delicate ecosystem. By favouring or eliminating certain bacteria over others, these factors can upset the natural equilibrium created by a harmonious distribution of gut bacteria forming microbiota.

WHEN ARE ACTIVITIES OF GUT MICROBIOTA BENEFICIAL?

The activities of the gut microbiota are beneficial when it exerts its gut barrier function, stimulates our defences, develops our immune system, synthesises vitamins and short-chain fatty acids that protect from metabolic syndrome and type 2 diabetes, not to mention a plethora of other activities. When gut microbiota exercises these functions, the relationship between it and its host can be characterised as symbiosis.

WHEN CAN THE ACTIVITIES OF GUT MICROBIOTA BECOME DETRIMENTAL?

The activities of the gut microbiota can become detrimental when our diet is not balanced and/or is inappropriate, when as children we are given antibiotics, when we suffer from colon, inflammatory bowel or liver diseases, cardiometabolic disorders, insulin resistance, when our microbiota thwarts the effects of the medicines we take or negatively affects our mood. Then the relationship between us and our microbiota is one of discord, or "dysbiosis".

WHICH MECHANISMS LEAD TO DYSBIOSIS?

An imbalance in microbiota composition, an overpopulation of certain bacteria favouring certain metabolic pathways, or synthesis of factors such as neurotransmitters or those causing insulin resistance, as well as bacterial translocation (i.e., the passage of bacteria through the intestinal wall) and their diffusion in the body, are some of the suggested mechanisms.

STRATEGIES TO RETURN TO SYMBIOSIS

There are strategies by which we and our microbiota can regain harmony. For example, a suitable diet, or faecal transplantation in some serious colopathies, can repopulate the gut and restore the ecosystem. Probiotics can replace the missing bacteria and recolonise the gut, while prebiotics prime the gut for synthesis of short-chain fatty acids and restoration of insulin sensitivity. These are some of the possible strategies.

It's this complex cross-talk between the host (us) and our microbiota that oscillates between harmony and discord, which which the specialists gathered for this meeting aim to dissect, analyse and understand.