



## Gut Bacteria–Brain Axis in Autism

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### Editorial

It is well known that host-bacteria interactions play a critical role in maintaining tissue and body homeostasis [1]. Indeed, changes in gut bacteria composition are reflected in changes in behaviors, highlighting a strong and interconnected way of communication between the gut micro biota and the brain [2]. Confirming this hypothesis arises from the fact that dysfunctions of the gut bacteria-brain axis are correlated with several disorders: anxiety, depression, irritable bowel syndrome and, above all, autism.

Starting from an early idea of Nobel laureate Luc Montagnier that metabolites from gut bacteria end up in the plasma and could trigger damage to the brain [3], we can now coin the term “BBB” in autism as bacteria-brain-behavior influence that we see in autistic children. It is noteworthy to consider that nowadays almost all the autistic patients suffer from gastrointestinal symptoms and show an altered intestinal barrier, such as an impaired gut barrier function [4,5]. This impaired gut barrier permits the passage of dietary-derived non-self antigens and has a dramatic consequence on the immune system responses of the autistic child [6].

Alteration of the gut microbiome has been demonstrated in a mouse model of autism [7] and further evidence of changes in the gut microbiota of autistic children arised from increased abundance of *Sutterella* spp. found in stool samples [8].

Bacteria changes are also responsible for altering gene expression and protein levels of key molecular events associated with immune regulation [9].

Of course, the detailed mechanisms by which bacteria metabolites can influence brain development and functioning are still to be further elucidated. However, the recent findings on the gut-brain axis involvement on autism development open the way for a possible future novel management of autistic pathology targeting the altered microbiome. Besides short-term antibiotics that could offer the possibility to modulate the gut bacteria leading to improvement in autistic behaviors [10], potential future probiotics (beneficial bacteria:

lactic acid-producing bacteria and bifidobacteria) and prebiotics (non-digestible oligosaccharides) based “drugs” could enhance gut good bacteria against abnormal colonizing bacteria, in this way alleviating autistic symptoms.

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