

# Can gut bacteria affect the brain ?

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Asperger Syndrome is an autism, characterized by, among adult patients, symptoms including; communication difficulties, conversation anxiety, and dysmimia. Among children, repetitive behavior and obsessive persistency are known. Researches have found that by taking beneficial bacteria, human irritation and obsession will decrease and the more natural behavior will be recovered.

This is no banbury tale. Scientists have discovered that gastrointestinal bacteria to influence brain operation. There have already been many researches which probed into the relationship, and found that gut bacteria and brain interact with each other, with an emerging conclusion that gut bacteria interact with the brain to reduce irritation and abnormal behavior and preference among not only Asperger syndrome patients but in all human being.

Dr. Emeran Mayor, Professor of Medical Psychiatry at the University of California have scanned using MRI the brains of volunteers to see how gut bacteria affect human brains. Based on the scanned data from 60 brains, he concluded that the disparity in different parts of brain was attributable to the abundance of gut bacteria.

In another study, healthy females age 18-55 who took compound gut bacteria twice daily showed a clearly lower level of irritation by comparison to the corresponding females who were given placebo. This finding was confirmed by the reduction of brain electronic signals associated with irritation found by brain scanning, the result of which was reported in the gastroenterology journal.

Dr. Kirsten Tillisch, who assisted Dr. Mayor mentioned above was used to hear from patients comments that “before they developed a gastroenteropathy, they did not have depression or irritation.” She says that the researches have discovered the existence of a route connecting the intestines and the brain.

Professor Stephen Collins of McMaster University in Ontario, Canada implanted enteric bacteria of fearfulness-free mice in intestines of the mice in irritated state, the latter mice lost irritation and got well with each other. Furthermore, when enteric bacteria of irritated mice were implanted in intestines of fearfulness-free mice, the latter mice lost boldness, starting to show jumpiness.

The maximum benefits of the above findings will be the application of the use of gut bacteria for the treatment of autism and abnormal behavior, and autism in particular.

The prestigious journal PLOS ONE carried recently an article that the Western-type lifestyle involving high-fat, high-sugar and high-salt diet possibly caused autism. This is only illative, but typical Western eating habits with high hydrocarbons is probably problem-riddled. As Dr. mayor pointed out, standard Western food and drinks tend to increase bad intestinal bacteria whereas diet based on vegetable, fruits and fibers increased beneficial bacteril.

Professor Mayer believes gut bacteria influence the human growth substantially in the brain development and formation stage. Applying antibiotics repeatedly to infants kill beneficial gut bacteria. He is preparing a research into the effects of such antibiotic application on brain development of children. This will be an investigation into the long-term effects in child development stages.

Around the same time, the Arizona Biodesign Institute of the Arizona State University has discovered that a group of children with autism lacked in certain types of intestinal bacteria, which a comparative group of normal children possessed.

Humans first get in contact with beneficial bacteria when pass through the parturient

canal of their mothers at birth. The children pick up the beneficial bacteria from the genital duct, and maintain those in their intestines. Recent studies found that when the mothers suffered from depression, the opportunity to transfer varieties of beneficial gut bacteria becomes limited.

Animal studies found that mothers with depression have altered bacteria flora in their genital tract, and such abnormality was inherited by the new generation. Pregnant mice with depression have in birth duct bacteria flora different from that of healthy mice. Within several days of birth, bacteria flora of infant mice became the same as that of the mother mice with depression.

Why would this happen? The descendants of the female mice with depression carry over the adverse effects in their genes due to the lack of 20 types of lactobacillus.

Such defection in genes relates to the development of new brain cells and the development of the brain.

The bacteria exert influence through the vagus nerve which connects intestines with the brain. This nerve has been found by researchers to communicate hunger and the feeling of fullness, as well as agreeable and disagreeable emotions. Studies are proving that gut bacteria produce nerve transmitter substances, thereby chemically tuning the brain.

In other words, would not this mean that human behavior could possibly be controlled by adjusting bacterial community?

Dr. Faith Dickerson of the Sheppard Pratt Health System is verifying whether the application of beneficial bacteria will be useful for the treatment of monomania and bipolar disorder (circulatory psychosis).

Scientists of the world have already started the treatment of autism patients by microbial application with successful results, bringing high hopes for the families with autism patients. The Chairman of the British National Autistic Society declared baldly in 2013 that "autism is a treatable disease."

Researches into another human genome, genome microbiology, are starting to

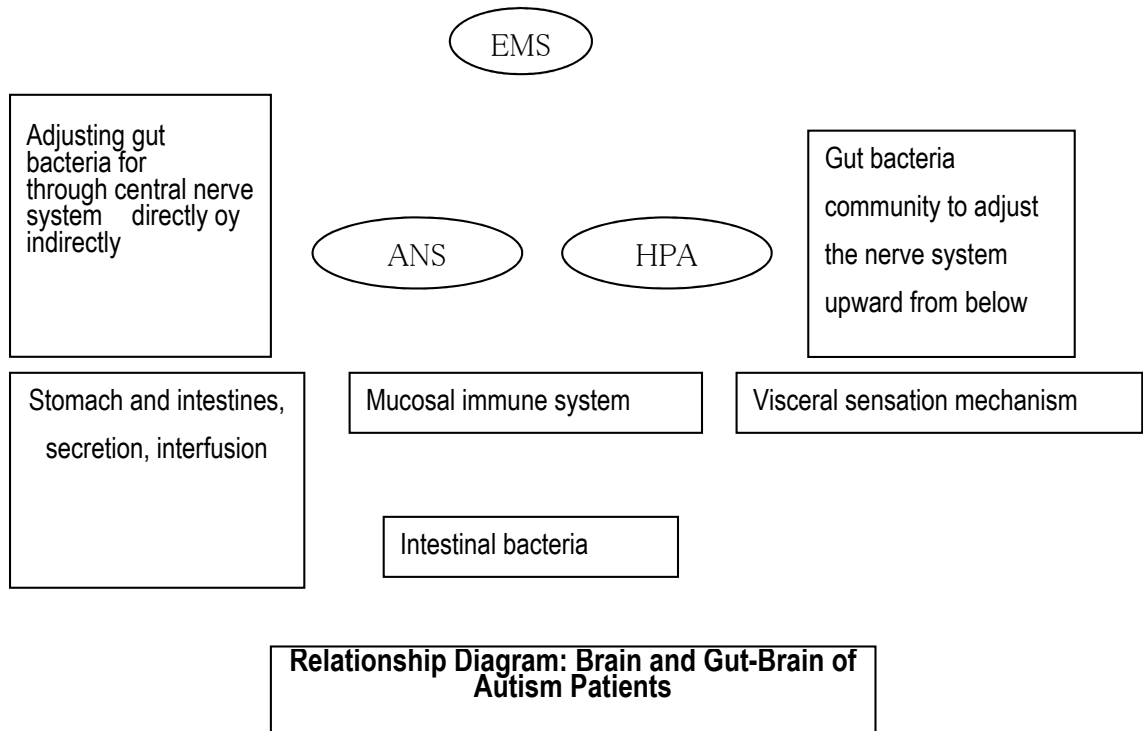
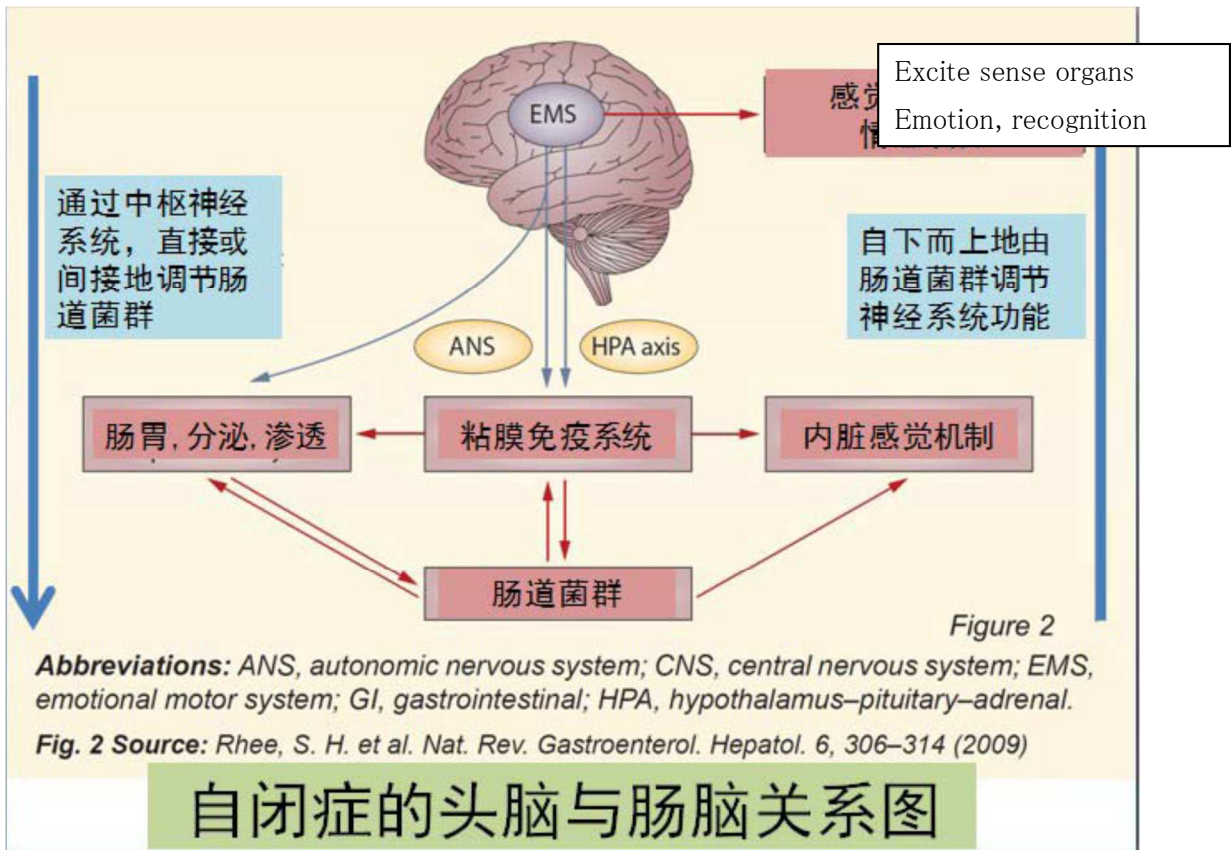
uncover the relationship between the disease symptoms and the disease development mechanism, so far unknown. Now everything appears possible to explore.

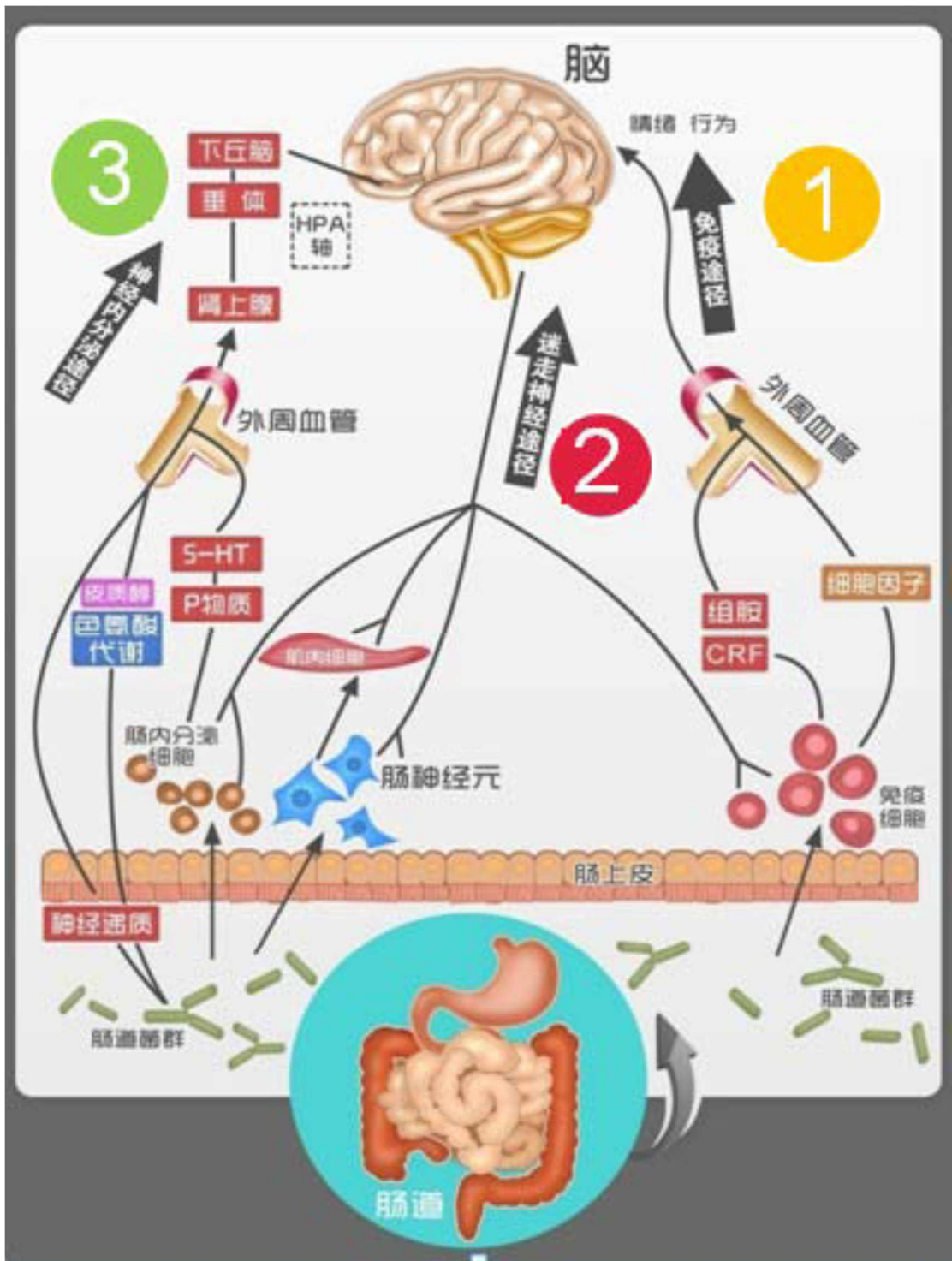
In fact, ever rising number of research institutions and universities world-wide are tackling with the microbial applications in medical fields, or already actually treating the patients. The scientists have already uncovered in detail the direct and indirect relationship between bacteria and autism.

The Behavioral Biology Laboratory of The Chinese Academy of Science Institute of Psychology is one of the earliest starters among Chinese institutions of researches into microbial gut-brain interaction and the treatment of mental disorders. The research objective of behavioral biology is to challenge the task of treating “incurable diseases.” In equanimity, or symbiotic philosophy, the search for such cure is a matter of fact, not a miracle seeking.

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该图展示了肠道与大脑之间的双向通信。大脑通过HPA轴（下丘脑、垂体、肾上腺）和迷走神经途径影响肠道。肠道通过免疫途径和迷走神经途径影响大脑。图中还显示了肠道上皮、肠内分泌细胞、肠神经元、肌肉细胞、免疫细胞、细胞因子、组胺、CRF、皮质醇、色氨酸代谢、5-HT、P物质、肠道菌群等成分。

