

# The Gut/Brain Relationship: Exploring Brain Diseases

Abril Reck, FNP-C, LAc | DIGITAL EXCLUSIVE

Several thousand years ago ancient Chinese doctors stressed the importance of a healthy diet, and leading a healthy lifestyle as the primary ingredient to maintaining health. The gut, known at the time as the spleen and stomach, was the precursor to all mental activity and the health of these organs meant that the body was in balance.

Today is a time of chronic illness, a time where hand sanitizer is on every counter and where foods can be bought in neatly displayed packages which are designed to keep the food from spoiling. The "war" on microbes which began with Pasteur's discovery of pasteurizing to reduce microbial counts has come full circle as we begin to discover the most intimate links between our gut microbes and our mental and physical health.<sup>1</sup>

## AN Old Idea Becomes New

Ideas and trends have a cyclical nature, but at times these notions come more clearly into focus and understanding. The resurgence of interest in gut health is an example of how an old idea now becomes fresh. Newer discoveries about the gut/brain axis will help improve both gut and brain health, treat chronic previously incurable diseases and will reinvent the future of medicine.

We are moving from a time of fear where microbes were considered to be dangerous and something related to ill health, to a time of tolerance knowing that we are reliant on everything in our environment to maintain perfect health. Homeostasis extends beyond our bodies and is intimately connected to our ecosystem and to a space-time continuum not previously recognized by modern medicine.

The scientific resurrection of the awareness of the relationship between the gut and the brain in terms of the microbiome has become a very hot topic. For example, in Japan scientists found direct correlations between gut bacteria and brain functions such as stress responses, hormonal fluctuations, neural processing and the function of the hypothalamic pituitary adrenal axis (HPA) of germ-free mice raised in a sterile environment.<sup>2</sup>

In human stress response, the HPA also activates and begins releasing stress hormones, but much like the lives of laboratory rats, we live in conditioned environments where we have little control to turn off the stress cascade.<sup>3</sup> There is evidence that stress hormones directly affect gut microbial activity.<sup>4</sup>

In contrast, the ancient Chinese knew and understood the relationship between eating the right foods within season and correct food preparation in order to maintain health. It is a fascinating concept to think someone like Li Dong-Yuan, the father of the Earth school (1180-1250 BC) could have potentially kept his people healthy by understanding the function of gut health.<sup>5</sup>

Shortly after Sudo, et al.<sup>2</sup> concluded their mice research, the National Institutes of Health (NIH) dumped millions of dollars to start the Human Microbiome Project to begin looking into the vast microbial universe of our bodies in 2007. Since then data has been carefully compiled into a massive tome of evidence implicating the gut microbial layer and its relationship to many aspects of normal bodily function. "Accumulating evidence has shown the impact of stress and early life adversity (ELA) on host gastrointestinal pathophysiology. While most of the focus has been on alterations in brain structure and function, limited experimental work in rodents suggest that the enteric nervous system can also be directly affected, as shown by changes in the number, phenotype, and reactivity of enteric nerves."<sup>6</sup>

### Ancient Chinese Medicine Roots

Gut brain health as previously stated is not a new concept. Perhaps new language and new biological markers have been identified to better understand the relationship, but the central idea of gut brain health is ages old. Pioneers to the subject of gut-brain health were Chinese doctors such as the Yellow Emperor and Li-Dong Yuan who lived thousands of years ago.

Ancient Chinese theory describes each of the five yin organs as correlating with a spirit/mental function; the Spleen being the Yi or thought. The spleen function is important for nutrient digestion, blood health and is connected with our thoughts, memories and ability to get things done.<sup>7</sup> The spleen and stomach together have important digestion functions which can be affected by wrong living or by over thinking.

In modern times, we are bombarded with thinking constantly, worrying all of the time; we function with reptile like reflexes to answer our iPhones, troll the internet and binge watch reality television shows. When do our minds rest? This activity depletes our spleen and stomach function. Our guts are plagued by unhealthy food that has been irradiated, genetically modified, dipped in harmful chemicals and then stored for long periods.

The soils our foods are grown in are depleted of nutrients and even if they are grown organically, their water supply is often contaminated by runoff from neighboring farms; all of which has direct impacts on our gut biome.<sup>8</sup> Modern conveniences and pollutions are directly related to epigenetic changes in our brains and bodies; meaning that they have a direct impact on how we function at the most microscopic level. Perhaps this can explain the skyrocketing rates of new cases of obesity, diabetes, heart disease, autism and depression? Gut microbes are likely going extinct due to our negligent behaviors, and no one even cared until recently.

Nascent to Chinese medical diagnosis is the idea of tongue coating as reflecting the state of the internal organs. The tongue coating much like the soil of our gut garden would reflect the health of the biome as well as it's mental and spiritual health.<sup>9</sup> Interestingly, the Vagus nerve travels from our tongue to connect the brain with the digestive system.<sup>10</sup> How did the ancient Chinese know about this "window" into the soul of the gut? The tongue is the first digestive organ as it secretes enzymes in preparation to break food down into nutrients, and the root of the tongue connects directly with the spleen channel.<sup>7</sup>

### The Second Brain & Mental Health

The Enteric Nervous System (ENS) is the "second" brain which lines the GI tract from esophagus to rectum and contains 100 million nerve cells.<sup>6</sup> We have understood for some time that important

receptors for serotonin uptake line our gut. For half a millennia doctors have been prescribing pharmaceuticals to stimulate these receptors to deal with patients who are depressed. Despite the multibillion dollar industry of antidepressants, research has shown that between 30-40 percent of patients fail to improve with conventional therapies for anxiety and depression.<sup>11</sup>

The use of dietary and herbal supplements has been frowned upon in the modern age of pharmaceuticals. Depression and mental illness has become a huge problem. According to the Centers for Disease Control (CDC)<sup>12</sup>, around 16 million in the United States are depressed in a year, and depression can lead to addiction and other health problems.<sup>12</sup> Scientific understanding between the link of gut bacterial load and mental illness is quickly coming into focus and we may soon see new options for patients with schizophrenia, depression and autism.<sup>13</sup>

Most people think of microbes as being related to infection and poor health, but recent re-education of the populous is helping to fuel the interest on healthy beneficial microbes. In fact, ninety-nine percent of all microbes are beneficial or at least not harmful.<sup>14</sup> The microbes living within the gut contain 150 times more genes than a human.<sup>10</sup> The gut microbe is thought to weight between 1 and 2 kilograms, which is equivalent to the mass of a human brain.<sup>4</sup> Interestingly, the gut microbiome has 1,000 or more types of bacteria with thousands more subspecies.<sup>10</sup>

This huge gene pool of resident bacteria within the human body certainly must be there to keep us healthy and viable in an ever-changing environment. When you think of the gut as housing so many species of bacteria and that it has a direct connection with our brain and our health, then you may come to the brilliant idea that our health begins and ends in the gut. In fact, according to top researchers, "the effects of the gut microbiota on human health will be an area of interest in neuroscience over the next 10 years."<sup>10</sup> Our understanding that microbial colonization begins with conception and is further enhanced in the birth canal through contact with the mother and is later affected by our nutritional intake is likely to revolutionize medical management of diseases in the future.<sup>4</sup>

New studies have recently shown how microbe transplant not only can cure infectious colonic diseases, but can have a direct impact on psychiatric diseases such as autism and depression.<sup>3</sup> There has also been recent evidence about how the microbiome changes and is affected by aging and disease.<sup>3</sup> Apparently, those affected by neurodegenerative diseases such as Parkinson's disease and Alzheimer's have a decreased and weakened microbial residence compared to healthier persons.<sup>3</sup>

The health of our microbiome not only directly relates to the health of our aging brain, but its development. Brain cells begin to mature as early as the third week after conception<sup>15</sup> and a new understanding between nutrition, microbiome and brain health will help to refocus on spleen and stomach wellness. A recent rat study revealed that "windows" of rapid neuronal expansion occur in relation to microbiome development, whilst replacement of microbes lost via probiotic intake can regenerate neurons.<sup>4</sup> So, the question is, can a probiotic cocktail taken at the right time heal brain or gut damage? We may soon know this answer.

## Changing the Outlook

The resurgence of the importance of spleen and stomach balance in regards to mental and physical

health will allow TCM practitioners everywhere to be on the cutting edge of the future of medicine. I believe there will be movement away from pharmaceuticals and more of a drive towards epigenetics, dietary, natural, herbal and energetic medicine.

My research into this topic feels both exciting and scary to think about how we have really been in a dark age of medicine for the last several hundred years. Despite the inventions of miracle drugs like penicillin and surgical interventions such as heart lung transplants, people are not living in a healthy manner. Sadly, it is common to be chronically ill or mentally ill with little hope of improvement.

The current allopathic medical model focuses on making big money because it backs big Pharma instead of big farms. It touts "quick" cures, rather than focusing on maintaining and building health with nutrition. Health care will need to move towards sustainable care in order to be in alignment with the new paradigm. Recognition of gut brain health will force a new definition of health.

The microbiome will reconnect us to the land where we grow our food. It will increase the importance of supporting sustainable local resources, increase awareness of limiting pollution and hopefully will lead to better overall health. In the meantime, since we now know that the gut is the second brain, TCM practitioners should endeavor to learn as much as possible about probiotic foods and nourishment of the spleen and stomach.

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### *Resources*

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