Redefining 'gut feelings'

This month's column wraps up a two-part series exploring how the bidirectional connection between our brain and our gut helps us to achieve physiological stability and in turn supports our ability to regulate our emotions, thoughts and behaviors. We will further examine the influence of stress in this process and what counselors can do to support clients in this continually oscillating balance to enhance their mental, emotional and physical well-being.

Nearly every chemical that controls the brain is also located in the stomach region, including hormones and neurotransmitters such as serotonin, dopamine, glutamate, GABA (gamma-aminobutyric acid) and norepinephrine. In fact, the gut produces more serotonin than the brain does. No longer should we think of "gut feelings" as just a passing thought.

In turn, a recycled negative feedback loop can lead from the gut to the brain to the immune system, with accompanying inflammation. Stress increases inflammation, and it has been found that bodily inflammation accompanies depression and other psychological diagnoses. Interacting with the hypothalamus-pituitary-adrenal axis (HPA) are the cytokines, which are produced in both the brain and gut.

The cytokines are the proteins and chemicals that are most central in producing inflammation. Inflammation is a critical issue to which counseling gives virtually no attention. Yet depression and other distressing issues that we discuss with clients are often accompanied by inflammation, which can be dangerous to physical health over time.

Although stress (also known as oxidative stress) is often central in producing inflammation in the brain and body, physical illness (cancer, diabetes, severe flu or cold) is another cause. Chemicals, pesticides, gluten (for some individuals) and other pathogens also produce inflammation.

Something that is important to this process does not receive enough attention: maintaining a balance of gut microbiota. Too many negative microbes can result from external stressors and emotional imbalance, a poor diet (particularly as it relates to sugar), allergies, environmental toxins and even genetically modified food (for some people). This imbalance is another route toward inflammation that has been identified as an issue in depression and other diagnoses. The inflammatory actions are both caused by and activated by cytokines.

At this point, we also need to consider the mitochondria, which are found in large numbers in our cells and produce the energy that moves our brain and body. Although the mitochondria enable us to move our muscles and think clearly during the production of the fuel ATP (adenosine triphosphate), they also need strengthening themselves. ATP is the molecular unit that energizes our metabolism and enables our muscles to contract, allowing us to move and breathe. Among other things, it also plays an important role in nervous system and cell signaling, as well as DNA synthesis. We help our mitochondria through proper exercise, diet and positive health habits — the very same treatment methods we have emphasized throughout our columns. It could be said that the mitochondria are in a continuing drama with cytokines because both can either destroy or enhance the other.

The figure on page 15 is too detailed to discuss fully, but please note the nature of bidirectional cross-talk and how it relates to allostasis:

1) Diet and exercise have a profound impact on the energy-producing mitochondria

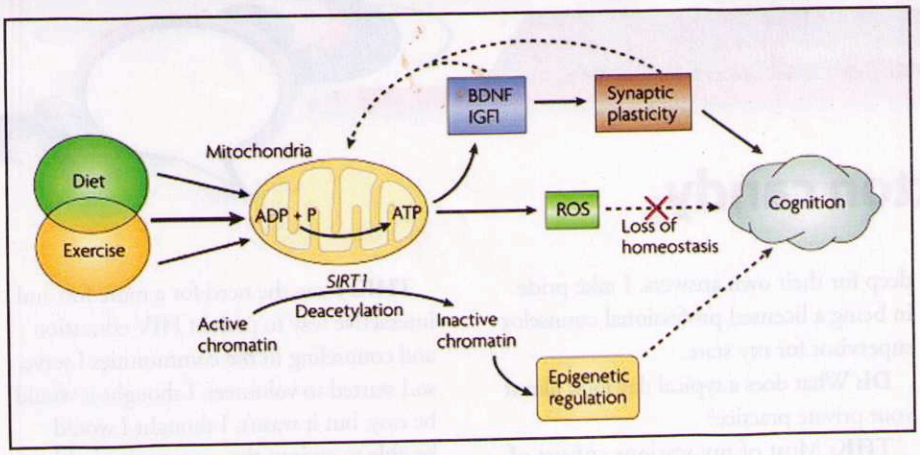
2) The mitochondria ATP energy produces brain-derived neurotrophic factor (BDNF), which is "miracle grow" for the brain

3) These lead to synaptic plasticity, brain growth and sharper cognition

Also key are the reactive oxygen species (ROS) that speak to oxidation in the body and brain. Illness, poor diet, lack of exercise and depression all can lead to oxidation, inflammation and apoptosis (death) of the mitochondria and cognitive issues. In addition, throughout the process, epigenetic change to genes can be either positive or negative (there actually should be a bidirectional arrow in the epigenetic-cognitive relationship because cognitions can possibly influence epigenetics).

Mitochondria contain extensive DNA. It is at this foundational level, through epigenetics, that counseling can be part of enabling genes to turn on or off in ways that lead to more healthy living and even a longer life. On the other side of the epigenetics coin, negative experiences such as social oppression, trauma, depression and illness can all lead to the death of mitochondria and dangerous changes in DNA.

A recent article by Roman Fischer and Olaf Maier in the *Oxidative Medicine and Cellular Longevity* journal carries this full cycle back to the central nervous system: "Neuroinflammation and mitochondrial dysfunction are common features of chronic neurodegenerative diseases of the central nervous system. Both conditions



This illustration shows the nature of bidirectional cross-talk and how it relates to allostasis. (Used by permission, National Institute of Health, Fernando Gómez-Pinilla, "Brain foods: The effects of nutrients on brain function," Nature Reviews Neuroscience, *July 2008.)*

can lead to increased oxidative stress by excessive release of harmful reactive oxygen and nitrogen species (ROS and RNS), which further promote neuronal damage and subsequent inflammation resulting in a feed-forward loop of neurodegeneration" (see *dx.doi.org/10.1155/2015/610813*).

Conclusion

We acknowledge that this two-part series has included considerable data and some terms that may be unfamiliar to most counselors at this point, but we believe these terms will soon be central in counselor education.

To recap important points from the series, external psychological stressors or pathogens from the environment or internal physical stressors from illness or the nature of one's inherited genes can lead to the six senses perceiving a stress threat or challenge. This can have an impact on the autonomic nervous system, the vagus nerve and the flow of neurotransmitters and hormones through the HPA axis. Through this process, pro-inflammatory or anti-inflammatory cytokines interact throughout the body at all levels, from the HPA axis to the gut microbiota. Of particular importance is the impact this has on the immune system and inflammation.

We hold an optimistic view of the ability of counselors to build allostasis and stress resilience among clients. For more on this, please review the three implications of neurocounseling that we highlighted in last month's column.

We are effective in making a difference with our clients. Counseling changes the brain and can have an impact on every one of the bodily systems we have mentioned throughout this series. Of course, exercising caution is imperative. We are not healers of the body; that is the role of physicians. With each client with whom we are honored to work, we need to be as alert as possible to the reality of unseen illness as it manifests itself. We should also have referral sources available. For example, Robert Sapolsky has stated that when we see depression and anxiety, we also need to think of the possibility of thyroid problems. Visit the popular site Everyday Health for a useful discussion of much of what we need to know (see *everydayhealth.com/columns/therese-borchard-sanity-break/depression-bipolar-disorder-and-hypothyroidism/*).

It is now virtually a truism that relationship and the working alliance make up 30 percent of effective counseling and therapy. Carl Rogers lives! But to repeat ourselves and the thoughts of our neurocounseling column colleagues, we highly recommend taking a serious look at Therapeutic Lifestyle Changes as a proven way to improve clients' mental and physical health.

John Ratey of Harvard Medical School states that it is unethical for physicians not to prescribe appropriate exercise to all patients. The same holds true for us as counselors. Are you also considering the importance of your clients' diet, their sleep patterns and their willingness to take on cognitive challenge? We are rather good at helping clients with their social relationships, which are so basic to calming or activating the autonomic nervous system. Cultural health and social justice action have positive mental and physical health benefits as well. Beyond these, other Therapeutic Lifestyle Changes, all based in some research in neuroscience and neurobiology, are well worth adding to your present skills in cognitive behavior therapy, rational emotive behavior therapy, narrative therapy, psychodynamic therapy, dialectical behavior therapy or other therapeutic system.

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