

## Allostasis, stress and the microbiota-gut-brain axis

This month's column is the first in a two-part series exploring how the bidirectional connection between our brain and 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.

Stress underlies virtually every counseling issue we face, ranging from the results of trauma, poverty, racism and abuse to decisional issues such as college choice, an argument with a loved one or career choice. At the same time, stress is necessary for learning and positive human development, both mentally and physically.

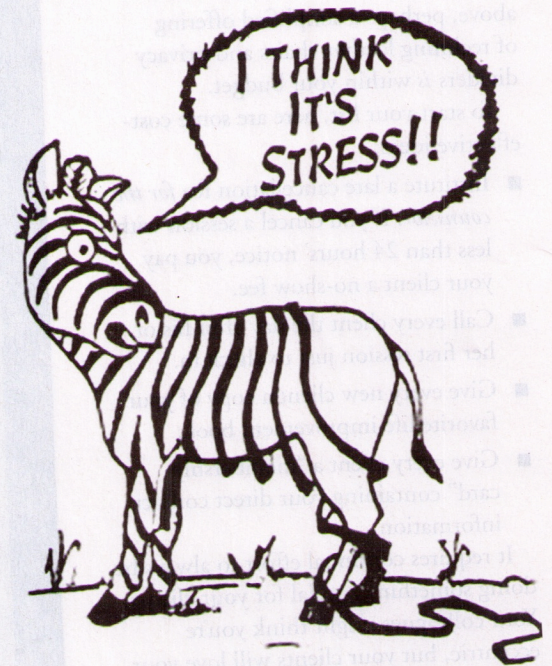
Homeostasis has become a limited concept and leads us to think that we can find a perfect balance. What we all need is a more realistic term, *allostasis*, as best defined by Bruce McEwen and John Wingfield: Allostasis is the process of achieving stability, or homeostasis, through physiological or behavioral change. This can be carried out by means of alteration in hypothalamus-pituitary-adrenal (HPA) axis hormones, the autonomic nervous system, cytokines or a number of other systems, and is generally adaptive in the short term.

Appropriate levels of stress, both physical and mental, strengthen us and lead to resilience. Negative stress, however, can tear us apart. It leads to a reduction in the size of our hippocampus (memory) and increases the size and negative activity in the amygdala, which is the primary site of the emotions related to fear (sadness, anxiety, anger). We have

made the error of focusing only on the results of being overly stressed. Allostasis can also be defined as a healthy balance of calming and activation, or stimulation and quiet.

We believe that counseling needs to focus on allostasis and an active, changing balance as a central goal of therapy. We help clients by building intentional self-regulation through improving cognitive, emotional and behavioral skills. Vital in this process is increasing the strength of the prefrontal cortex for executive functioning and emotional regulation. Psychoeducation in the behavioral life skills is a vital supplement to traditional counseling.

We cannot learn, we cannot develop stronger muscles, we cannot strengthen our hearts and we cannot climb a high mountain (intellectual or physical) without a degree of stress involved. Change in counseling, particularly through the supportive challenge known as confrontation, builds appropriate stress and motivation for change. When stimulated, our perceptual senses of seeing, hearing, touching, tasting and smell are the basis of stress. This is a necessary precursor for the good things, but too much negative stimulation from trauma, poverty, abuse, bullying, harassment or repeated exposure to racism and other forms of oppression can lead to enduring brain change and dangerous bodily reactions. Social justice demands awareness, knowledge, skills and *action* to meet the needs of those who encounter the multiple forms of oppression and trauma.



Recent thinking has led to what is now being referred to as a *sixth sense* or *second brain* — the microbiota-gut-brain axis, which gives special attention to neuroinflammation. Evidence is now clear that emotional distress, as well as physical distress, can cause damaging inflammation. We associate the brain with production of serotonin, but 95 percent of this neurotransmitter is produced in the gut. Bodily stress from illness or other physical dysregulation has a profound impact on our brains, our thoughts and our emotions. Our total body reacts to external stressors. At the same time, internal cognitions and “gut feelings” produce our own internal stress.

In our column in the October 2014 issue of *Counseling Today*, we focused on the prefrontal cortex (PFC) as the seat of executive cognitive functioning and emotional regulation. We noted that the



PFC interacts with the more primitive amygdala, the energizer bunny that is key in our experience of all types of stress. The amygdala, which is activated by events in the external world and from internal bodily stimulation, is particularly sensitive to stress. The hippocampus, one of our memory structures, stores and distributes information throughout the brain. One of the key objectives of counseling is positive memory change, with the possibility of brain "rewiring."

"Depression is as real a disease as diabetes." This statement by Stanford University's Robert Sapolsky is based on considerable research showing that psychological depression has a deep impact on the body. In turn, dysfunction of the body through diet and obesity, infection/inflammation and illness all lead to depression as well. Our cognitions, beliefs, emotions and behaviors can build bodily health, or they can be as toxic as illnesses or environmental pesticides. There is also a bidirectional feedback loop that can increase both depression and body reactions.

Additional research suggests, however, that positive attitudes and beliefs, exercise and healthy lifestyle choices affect the immune system in positive ways. For a very clear and practical background on depression and the body, we suggest watching Sapolsky's lecture at [youtube.com/watch?v=NOAgplgTxfc](http://youtube.com/watch?v=NOAgplgTxfc).

### What might this mean for your practice?

Among neurocounseling's implications for short-term and long-term daily practice:

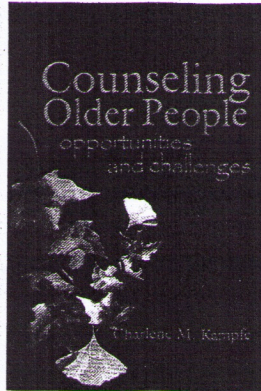
1) Mental health and physical health are closely entwined. We recommend having a poster of the brain and body readily available for your clients. With certain clients, counselors might consider pointing out the relationship between the two and how the clients' willingness to follow up on what they have learned in the interview can change them in positive ways. This should only be done with clients who show interest. Keep in mind that we are not physicians. Our work is counseling, prevention, education and referral.

2) Search for opportunities to help clients build stress resilience. Enable clients to balance inevitable and necessary reactions to stress with the ability to calm

**New!**

## Counseling Older People: Opportunities and Challenges

Charlene M. Kampfe



*"This book is a bright, shining addition to a growing body of literature on counseling older adults. It is filled with strategies for skill development, which is exactly what is needed in counseling programs in order to prepare for, arguably, the largest population on the horizon who may seek our services. If there is one book to suggest as a supplement to any course in diversity, it would be Counseling Older People."*

—Catherine B. Roland, EdD  
Editor, *Adultspan Journal*

This book provides insight into the primary issues faced by older adults; the services and benefits available to them; and the knowledge base, techniques, and skills necessary to work effectively in a therapeutic relationship. Dr. Kampfe offers empirically and anecdotally based interventions for dealing with clients' personal concerns and describes ways in which counselors can advocate for older people on a systemic level. Individual and group exercises are incorporated throughout the book to enhance its practicality.

Topics covered include an overview of population demographics and characteristics; counseling considerations and empowering older clients; successful aging; mental health and wellness; common medical conditions; multiple losses and transitions; financial concerns; elder abuse; veterans' issues; sensory loss; changing family dynamics; managing Social Security and Medicare; working after retirement age; retirement transitions, losses, and gains; residential options; and death and dying.

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themselves. Help them develop and learn new ways to cope with more demanding stressors.

3) Bidirectionality (also known as cross-talk) is replacing linear thought in neuroscience/neurobiology and counseling. Allostasis reveals the bidirectionality of the interaction between the needed stress of stimulation and the need for calming. Too much emphasis in either direction can be problematic.

### ANS: The key to stress resilience and allostasis

The autonomic nervous system (ANS) regulates the body's unconscious actions of the heart, esophagus, lungs, stomach and gastrointestinal system. It consists of two divisions: the *sympathetic* nervous system, which is focused on response to stimuli and activation, and the *parasympathetic* nervous system, which is focused on calming and balance.

The ANS is connected to the brain stem in a bidirectional pattern. What happens in the brain affects both sympathetic stimulation (e.g., stress) and parasympathetic calming. In turn, bidirectional cross-talk means that action in the ANS affects the brain. Note that another way to think about stress is as *activation* that can be either strength building or destructive.

The calming and activating or stop-and-go actions of the ANS are repeated throughout the entire stress system by our neurotransmitters. For example, the neurotransmitter glutamate activates and makes learning possible, while GABA (gamma-aminobutyric acid) is necessary for balanced calming. Hormones in the brain and body interact with cytokines in positive and negative ways. Even in our gastrointestinal system, an interactive imbalance of highly diverse microorganisms (microbiota) can lead to poor mental and physical health, while a healthy gut, achieved through diet, exercise and a positive attitude, can improve our mental well-being. Through our listening as counselors, we tend to calm clients. Through reframing and confronting the discrepancies in their lives, we seek to activate change. Each of our counseling interventions has an impact on the holistic body and mind.

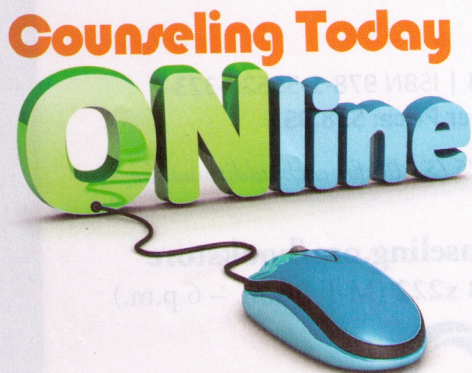
The ANS is also basic to the evolutionary process and thus needs to be considered first as we work with stress. For example, view the embryos of fish, mammals and humans. They all appear quite similar in the early stages of development. All have variations of the vagus nerve. Why? Heart function, eating and lungs are basic to survival and future development. Allostatic resilience — our counseling goal — ultimately affects

the ANS and the entire body, including the brain. The higher body processes of allostasis represent later stages in the evolutionary process.

Stephen Porges' polyvagal theory emphasizes the centrality of the vagus neural circuits for self-regulation. A critical role of the vagus nerve is providing the physiological basis of safety, coping with danger and avoiding life threat (as described by Ted Chapin in the November 2014 Neurocounseling column). Research has found that stimulating the vagal links to the amygdala not only calms but also facilitates memory of emotional or stressful events (see [apa.org/monitor/apr04/vagus.aspx](http://apa.org/monitor/apr04/vagus.aspx)). Drawing from this, Porges provides specific suggestions to help clients deal with fight-and-flight sympathetic overstimulation. Most useful may be helping clients become aware of the power of unconscious body processing and how they can calm themselves through biofeedback, control of their heart rate, breathing exercises and the relaxation response, as well as providing neurofeedback.

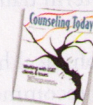
Porges stresses safety needs and also emphasizes social skills and engagement training as it relates to clients becoming comfortable in social relationships. This action can be adapted and made more specific. For example, working solely

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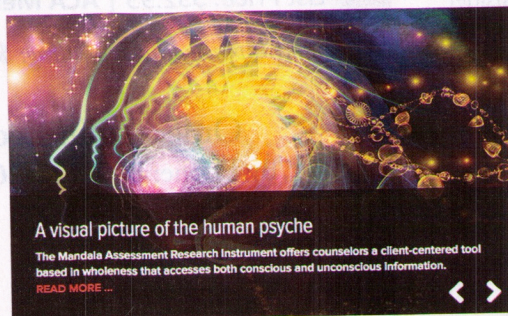
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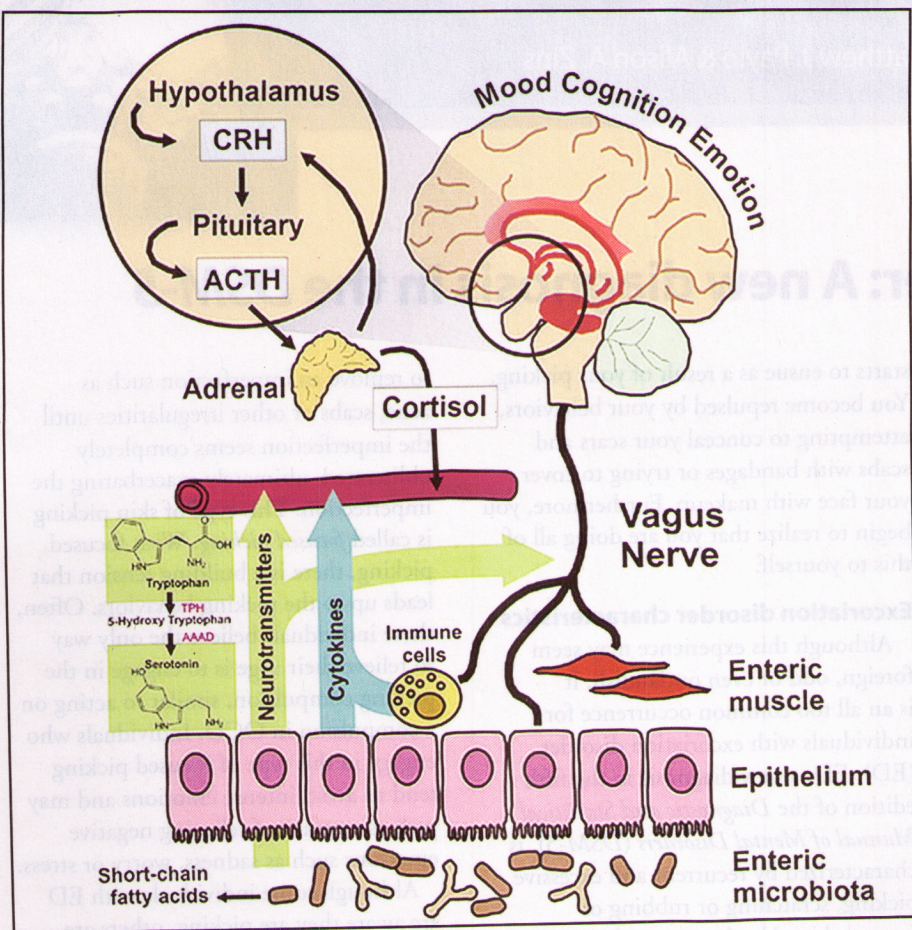
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### COUNSELING TODAY WEEKLY POLL

Do you plan on advocating for the profession for Counseling Awareness Month?

- No, being a good counselor and helping clients is advocacy enough
- Yes, via social media to friends, family and colleagues
- Yes, via word of mouth to friends, family and colleagues
- Yes, by writing an op/ed or doing an





This illustration shows the bidirectional cross-talk interconnections of the brain, gastrointestinal system and immune system. (Used by permission of authors Sue Grenham, Gerard Clarke, John F. Cryan & Timothy G. Dinan, "Brain-gut-microbe communication in health and disease," December 2011 *Frontiers in Physiology*, journal.frontiersin.org/article/10.3389/fphys.2011.00094/full.)

with gaze and eye contact is a beginning with children who have autism, but this is also true with our clients who lack trust in others. Listening skills can also be useful in calming. Furthermore, Porges' work turns out to be fully in tune with our column's general emphasis on Therapeutic Lifestyle Changes, which extend to the importance of diet, exercise, cognitive challenge, cultural health and other factors mentioned in our columns, almost regardless of which structure or area of the brain or body we focus on.

### Illustrating the microbiota-gut-brain axis

We discussed basic brain structures, neurotransmitters and the hormone-focused HPA axis in the October Neurocounseling column. Now we'll turn to the second brain, the gastrointestinal system, which we will refer to simply as the "gut," and which itself affects the

development of the HPA. In turn, the gut is disturbed by imbalances in the ANS, the brain and by any external or internal stressor. Sapolsky makes it clear that our stress system is holistic and that the psychic distress reverberates throughout the body, just as illness does.

In the figure above, we see the reciprocal bidirectional cross-talk interconnections of the brain, the gastrointestinal system and the immune system, all connected by the ANS. The HPA axis generates and passes on hormones throughout the body. Important here is the production of cortisol, which is necessary for learning, but it is typically dysregulated in serious situations such as war, trauma, rape or the repeated traumas of bullying, poverty, racism and harassment.

In the second part of this series, we will explore in greater depth how stress influences this bidirectional connection

and the implications of the ANS, vagus nerve and microbiota-gut-brain axis specifically for counseling practice.

As we look forward to next month's article, consider the following:

1) Counseling not only changes the brain, it also has a meaningful impact on the body and its functioning. Our present skills and theories remain relevant in the new neuroscience/neurobiological world.

2) The National Institute of Mental Health is now giving major funding to a brain-based assessment and treatment framework. Thus, our attention to areas that our field has mostly ignored up to this point will likely be changing. In our opinion, counselor education and counseling and therapy practice will become more scientifically based. Introduce yourself to this coming new world by exploring the links at [nimh.nih.gov/research-priorities/rdoc/index.shtml](http://nimh.nih.gov/research-priorities/rdoc/index.shtml).

3) The material in this article is based on the most current research. We expect the connection between brain and body — and onward to key genetic factors — to become increasingly central in the literature.

Lori Russell-Chapin and Laura K. Jones serve as co-editors of the Neurocounseling: Bridging Brain and Behavior column. Contact them with comments, questions about neurocounseling or ideas for future columns at [lar@fsmail.bradley.edu](mailto:lar@fsmail.bradley.edu) and [Laura.Jones@unco.edu](mailto:Laura.Jones@unco.edu), respectively. ♦

Allen E. and Mary Bradford Ivey are perhaps best known for their original work in microcounseling and microskills, as well as their continuing interest in multicultural counseling and therapy. They are now focusing on neurocounseling as a necessary factor in effective counseling but also showing how neurocounseling relates to social justice. Contact them at [allenivey@gmail.com](mailto:allenivey@gmail.com) and [mary.b.ivey@gmail.com](mailto:mary.b.ivey@gmail.com), respectively.

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