BREAKING THE CYCLES
CHANGING THE CONVERSATIONS

Here's to Neural Networks and Neurotransmitters: Keys to Brain (and Therefore Emotional/Physical) Health!

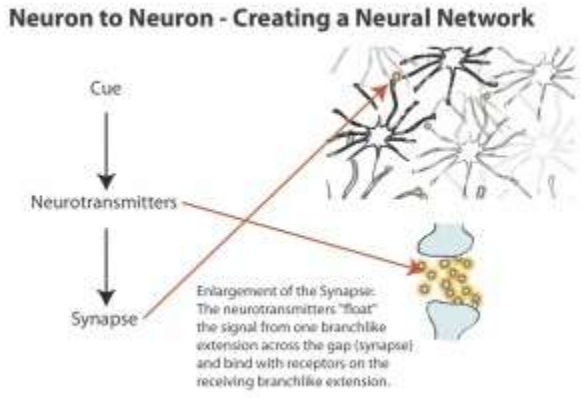
June 27th, 2011

by Lisa Frederiksen

This new brain research is truly amazing and goes a long way to helping clinicians, medical professionals, addicts/alcoholics, family member & friends and the lay person understand how the brain goes together (develops), how it works, and how it unravels. For the purposes of this post, I'm going to focus on two of the "pieces" that underpin all of what our brains can do and do — **neural connections** and **neurotransmitters**.

About Neural Connections
We are born with about 100 billion brain cells — billions of them — also known as neurons but only a relatively small fraction are 'wired.' From birth to around puberty, our brains are 'wiring' neural networks like crazy — a wiring process that allows neurons to "talk" to one another via neural connections. Neural connections in the brain control everything we think, feel, say and do.

A neural connection requires brain cells (neurons), synapses (the gap between the branchlike extensions of a brain cell) and **neurotransmitters** (the chemical messenger that takes a message from one brain



[Image Courtesy: Irene E. Yu]

cell's branchlike extension, across the synapse, to receptors on the receiving brain cell's branchlike extension). There is an expression sometimes used to describe this process — "neurons that fire together, wire together" and this wiring together is sometimes called a "brain map." (Norman Doidge, M.D. *The Brain That Changes Itself*)

Over the course of our lives, we create neural connections (brain maps) for all of the functions our bodies and brains do. In other words, we create neural connections for riding a bike or typing on a computer or talking on the phone or reading a book or running, breathing, reciting multiplication tables, eating, talking with our hands — everything!

About Neurotransmitters
Neurotransmitters are the keys to moving the electrical signal (message) from one neuron to another. In other words, they are the "something" that converts the electrical signal from one neuron into a chemical that can cross the synapse (the gap between two neuron's branchlike extensions) to bind to receptors on the receiving neuron, where it is converted back into an electrical signal to carry on the "message." There are five primary neurotransmitters in the brain [and please understand this is a very BASIC explanation]:

Dopamine is our "feel good" neurotransmitter – in other words, it's the one that connects the neurons responsible for motivation, interest and drive; the neural networks in the brain's "pleasure/reward" system.

Serotonin is key to our moods, sexual desire and function, appetite, sleep, memory and learning, temperature regulation and some social behavior.

Norepinephrine works with the neural networks responsible for our sense of well-being.

Glutamate is the major excitatory neurotransmitter in the brain –the accelerator, if you will.

GABA (Gamma amino butyric acid) GABA is the major inhibitory neurotransmitter — the brakes.

What Throws Neurotransmitters Out of Balance?
Given neurotransmitters are one of the keys to successful, healthy neural networks in the brain, understanding what can change their levels can be key to a person's understanding of what they might do to "heal" their brain — to feel better and thereby change their behaviors. Here are a few:

Genetics – some people are born with higher or lower levels of one or more neurotransmitters and/or receptors for a specific neurotransmitter. For this, a person may take medications that increase or inhibit specific neurotransmitters.

Metabolism – a faulty metabolism can impair how nutrients important to the cells that produce neurotransmitters. For this a person might wrest control of their diabetes or increase their exercise levels in order to increase their metabolism.

Nutrition – the body "makes" neurotransmitters from proteins and certain vitamins and minerals. When a person's nutrition is poor (aka, they don't eat a healthy, nutritionally balanced diet), their body cannot make the healthy levels of neurotransmitters needed for healthy neural networks. For this, a person might eat a healthier diet — the U.S. Department of Agriculture provides an excellent website, Choose My Plate, to help people customize a diet to meet their specific body needs.

Toxic Substances – drugs, alcohol, pesticides and other substances taken at a toxic level SEVERELY harm the production of neurotransmitters and thus neural networks in the brain. For this, a person might reduce the amount of alcohol they consume, restrict their drug use to only those prescribed under the care of a medical doctor, and/or find a treatment program that may help them recover from an addiction.

Hormonal Changes – such as those caused by conditions affecting the thyroid, adrenal, male and female sex hormones, for example, can cause neurotransmitter imbalances. For this, a complete physical with one's doctor can help identify any problem areas and what courses of action may be taken to correct them.

Health Conditions - such as a head injury or mental illness or a sugar imbalance — anything that interrupts the brain's natural ability to produce neurotransmitters, maintain, balance neurotransmitters. For this — especially a head injury or mental illness — a person should seek the help of a trained professional (neurologist, psychiatrist or psychologist, for example).

In Summary
There is a great deal we can do to heal our brains. The place to start is with understanding the importance of neurotransmitters to a neural network and then doing what we can to keep those neurotransmitters producing / working at optimum levels.

Here's to brain health!

Lisa Frederiksen is researcher, writer, speaker, consultant and most recently the author of her seventh and eighth books, *If You Loved Me, You'd Stop!* and *Loved One In Treatment? Now What!* She writes the blog, www.BreakingTheCycles.com, and presents and consults to a wide variety of groups, families and individuals on substance abuse, addiction, and secondhand drinking/drugging (SHDD). Lisa uses her forty-plus years experience with family alcohol abuse and alcoholism to frame her research questions and presentations.
