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The Grown-Up Brain, the secret life of

by Barbara Strauch; book quotes/review mixed in with notes by Dr. Joan Margaret

p. 47 What is Wisdom? Some call it mental magic. In middle and old age something happens that didn't use to: When faced with what would appear from the outside to be a challenging problem, grinding mental computation is circumvented. Solution comes effortlessly, seemingly by itself. We gain easy insight.

Mental magic is the trade off in brain development for our short-term memory problems of forgetting names of things or why we just came into the room. If an old brain is presented new information, it might take longer to assimilate it and use it well. But when faced with information that relates to what is already known, the middle-aged brain works quicker and smarter, discerning patterns and jumping to a logical endpoint.

p. 134 Contrary to old beliefs we DO make new brain cells, called neurons, – which are stem cells, the very earliest and most versatile of cells. The brain makes them primarily in a tiny area of the hippocampus called the dentate gyrus. (*These new neurons are part of our strategies to brain health, additional to plasticity of whole areas of the brain that enable us to retrain mature neurons to new tasks. See the Eight Strategies, JM.*)

"In a research lab on the computer screen, one squiggle of magenta was the enlarged picture of a mouse hippocampus. On top of that was a sliver of dark blue, the dentate gyrus. Extending out of that were dozens of branches, which are mature neurons. And scattered among those branches were tiny bright-green dots, the baby neurons."

The process of making brand new neurons, called neurogenesis, is stimulated by focusing on a specific goal, which produces theta waves and the neurotransmitter serotonin (*joy, JM*). New neurons are also generated by meditation, exercise and anything that increases heart rate and blood flow. This is how playing games promotes neurogenesis: the intense focus and the emotions during a challenge directly stimulate the dentate gyrus to make new cells, so we can better coordinate thoughts. (*For example, this is how the BEMER by increasing blood flow, generates new brain cells, JM.*)

The dentate gyrus is the gatekeeper for the hippocampus in that it filters sensory input; it breaks sensations into smaller pieces – a leaf a bit greener, tea slightly hotter. It is a pattern separator. Brain cells in the dentate gyrus take note of similarities and differences, and then pass them on to the hippocampus.

New neurons have the job of tying disparate information together and place that information in a specific time frame, helping us make associations. For example, a Beach Boys song and salt smell will forever be tied together in time and place and stored in the cortex. The more neurogenesis you have, the more you link together things that are different into a pattern that will hang together in your brain. Neurogenesis helps us generalize experiences and rationalize them.

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p. 149 While at rest the brain uses 10% of the body's oxygen; in mental activity, it uses up to 50%, leaving it sensitive to and in greater need of nutrients.

Anti-oxidants and Inflammation

When our cells, including brain cells, burn oxygen to make energy, they produce free radicals. A free radical is a molecule that is missing an electron. Because it lacks that electron, it is unstable and wants to steal electrons from other cells. It grabs those electrons where it can, causing damage to other cells in the vicinity. That damage is called oxidative stress and many believe it is a main culprit in normal aging. So eliminating as many free radicals as possible is a good idea. A young body efficiently neutralizes free radicals with another molecule, called an antioxidant, in a continual repair program.

As we age, that repair process becomes less efficient and the antioxidants can't keep up with the hordes of free radicals. Free radicals are also produced by exposure to environmental insults such as air and water pollution, pesticides on fruit and vegetables, nitrates in drinking water from the agricultural fertilizers, ultraviolet light and x-rays.

Within the last few years, another aging mechanism was identified: inflammation. There is inflammation when the body is injured and white blood cells rush to the site to do repairs. With the incoming surge there can be collateral damage, like a fire truck running over the flower bed in its rush to park near the burning house, harming the surrounding healthy cells. In a state of chronic low-level inflammation, as for instance from daily consumption of refined carbohydrates, there will be a buildup of damage. That damage is common in the arteries, requiring the body to use plaque to repair that damage.

With these evil twins of brain aging, oxidative stress and inflammation, the question becomes what can we do to slow the process, halt or even reverse it? (*YES! JM*)