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Keeping Your Brain Healthy

The Healthy Brain is Growing

Medical research has shown that a healthy brain continues to create new neurons (electrically active brain cells that process information), throughout one's adult life in a process called neurogenesis. This new growth, which produces new neural networks, occurs where the brain and spinal column meet, yet migrate to other areas in the brain. Research on mice has shown the new neurons migrate to new areas by traveling with the flow of spinal fluid, which circulates in the brain. Neurologists at Keio University, using a special dye, discovered that the migrating neural cells followed the waving cilia (hair-like projections) that line the spinal fluid pathways in the brain.

Use it or Lose It

Scientists, at the *Society for Neuroscience* conference in Atlanta, revealed a study that showed thousands of new neurons are produced each day in the brains of rats (which also occurs in humans). However, only animals actively involved in learning new information retain this new growth. This explains why many recent medical studies show that older adults engaged in activities involving memory (e.g. reading, chess, crossword puzzles, playing bridge and other card games relying on remembering cards), mental/physical coordination activities (e.g. dancing, ping-pong, tai chi, yoga, switching from the hand you usually control the computer mouse to using the opposite hand, etc.) and mental ingenuity (e.g. working at a job, problem solving, etc.) show preventative benefits against the onset of Alzheimer's and dementia.

Throughout your adult life, the brain's neural networks reorganize themselves through responding to new learning experiences. Many neuroscientists are convinced that learning and memory involve changes at neuron-to-neuron synapses. An active, functioning neuron can be linked to many thousands of other neurons, creating more than a hundred trillion connections.

Exercise Preserves Mental Function

Muscle movement occurs when acetylcholine (ATCh) is released (at a neuromuscular junction), and crosses the synapse (tiny gap) between the nerve and muscle. ATCh then attaches to the ATCh receptor molecules (on the muscle fiber's surface), resulting in muscle contraction. Research has discovered that muscle fiber contains a series of special proteins holding the ATCh receptors in place. Medical Research, at Washington University School of Medicine, shows that a loss of nerve signals (from inactivity) breaks up this connection, resulting in a loss of ATCh receptors. However, as the muscle resumes activity, the molecular structure restores itself.

A study of senior citizens who regularly walked, revealed significant improvement in memory skills compared to sedentary elderly people. Walking also improved their learning ability, concentration, and abstract reasoning.

Stress Compromises the Brain-Blood Barrier

The human brain contains 400 miles of blood vessels and the capillaries in this vascular system are called the blood-brain barrier (BBB), a protective network that shields neurons from poisons, viruses, toxins and extreme fluctuations in blood chemistry. However, stress can dramatically increase the ability of chemicals to *pass through* the BBB. During the Gulf War, Israeli soldiers took a drug to protect themselves from chemical and biological weapons. Normally, it should not have crossed the BBB, yet scientists learned that the stress of war had somehow increased the permeability of the BBB. Nearly one-quarter of the soldiers complained of headaches, nausea, and dizziness – symptoms that occur only if the drug reaches the brain.