

Lacking energy? Your brain may need more oxygen.

The brain requires a great deal of energy in order to function properly, and the source of that energy is oxygen that is delivered by the blood. Although the brain only makes up two percent of the body, it consumes 20 percent of the body's oxygen supply to power networks of cells (neurons) so they can communicate when behavior is initiated. When you try to do something- move a part of your body, speak, or simply smile- neurons in the area of the brain that manages that particular behavior are activated and the brain's finely-tuned circulation system reacts and increases the flow of blood to that area, ensuring that the neurons have enough energy to respond efficiently to your command.

Imaging technology (MRI) reveals that the blood flow in the brains of people with Alzheimer's disease (AD) is typically impaired, as compared to the circulation in a healthy brain. This can be a result of normal aging as blood vessels stiffen (this is why older people tend to have high blood pressure), and it can also be caused by beta-amyloid plaques associated with AD (*cerebral amyloid angiopathy*) that can accumulate on the walls of blood vessels in the brain and partially block the blood flow.

When the brain doesn't get enough oxygen (*brain hypoxia*) the symptoms that result are strikingly similar to the cognitive difficulties that are commonly found in people with AD:

1. Memory loss
2. Difficulty paying attention
3. Difficulty making decisions
4. Difficulty with movement and coordination

Physical activity increases the heart's ability to pump blood so that the body and brain can get more oxygen, and this is especially important for people with dementia whose cardiovascular circulation may already be impaired. There is a great deal of evidence from controlled clinical trials that studied people with and without dementia, and the results consistently demonstrated that various types of regular physical activity improved cerebral blood flow, stimulated the growth of new neurons in the brain, increased gray matter volume in brain structures that are central to cognitive functioning, and lowered the risk of cognitive decline.

In one study, people who only started being active in their 50s and 60s still had higher cognitive scores at age 70 compared to people of the same age who had never been active. In another study, people who exercised to *any* extent in adulthood fared better cognitively later in life compared with physically inactive people. And, although it didn't measure cognitive decline, a newly published study found that even 500 more steps a day in a population that ranged from ages 71 to 92 resulted in a 14 percent reduction in the risk of coronary heart disease, stroke, and heart failure over a four year follow-up period. The value of being physically active couldn't be clearer.

When you exert the effort to exercise, chemical messengers in the brain (*neurotransmitters*) are released that transfer impulses from neurons to other neurons or to a muscle or a gland. The neurotransmitter dopamine is known as the "great motivator" because it rewards your accomplishments with a feeling of pleasure, and that feeling motivates you to repeat the pleasurable activity. Exercise also stimulates the production of endorphins, neurotransmitters that

helps to reduce pain, stress, anxiety, and depression. High endorphin levels can increase dopamine production- a win-win situation for you.

There are a wide range of other benefits that can result from incorporating some physical activity into your life:

1. Regular physical activity helps preserve functional fitness so that activities of daily life remain more manageable as a person ages; strength and endurance are maximized.
2. Blood glucose level rises after a meal, and if it remains high it can become unhealthy. Physical activity lowers the blood glucose level because muscles and other tissues convert the glucose to energy.
3. Movement burns calories and improves the capacity to use carbohydrates for fuel instead of storing them as fat.
4. Bone growth is stimulated by any weight-bearing activity.
5. Regular physical activity tends to lower blood pressure and cholesterol levels.
6. People sleep longer and more soundly and feel more rested the next day after having been physically active.

The goal is to recognize the value of getting your blood moving by incorporating some physical activity into your day- activity that appeals to you and feels safe. Check with your doctor if you aren't sure what would be safe for you. Start slowly - just walking a short distance or doing some simple movements while seated might be a good start. Pay attention to how the activity feels physically and mentally. You may feel tired afterward, but you will probably also

feel the hum of your increased circulation and a sense of well-being. Those good feelings should encourage you to make exercise a regular part of your day.