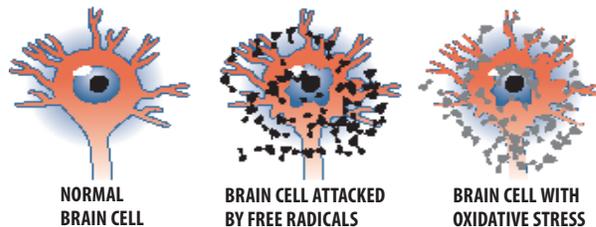


How to Protect Your Brain from Chronic Oxidative Stress

Avoiding factors that increase the formation of toxic free radicals can help prevent brain aging and disease.

The human body contains exquisitely intricate natural defense mechanisms to protect its cells from damage. However, long-term exposure to psychological stressors (such as depression or anxiety) and physical and environmental stressors (such as pollutants, or vitamin deficiency) can sometimes result in a phenomenon called chronic oxidative stress. This refers to a condition in which the body produces an overabundance of unstable molecules or ions called free radicals that exceed the body's capacity to neutralize them, causing pathological changes that result in cell damage, aging, and disease.



“Cellular oxidative stress exacerbates a person’s particular vulnerability to disease, lowering the threshold so that certain disorders may develop more readily,” explains Greg Fricchione, MD, Director of the Benson Henry Institute for Mind Body Medicine (BHI) at MGH. “In the brain, chronic oxidative stress is a major contributor to cognitive decline and pathologies such as Parkinson’s disease (PD) and Alzheimer’s disease (AD). Oxidative stress also plays a role in systemic diseases that affect the brain, such as atherosclerotic disease and diabetes.”

But there’s good news, Dr. Fricchione says: “It may be possible to protect the brain from the destructive impact of chronic oxidative stress through strategies such as practicing relaxation techniques to reduce stress, strengthening resiliency, consuming a diet rich in antioxidants, and other measures.”

SHIELDING BRAIN CELLS

Getting regular aerobic exercise (ideally, 30 minutes a day, at least five days a week) may be one way to shield your body and brain from oxidative stress (although some research suggests that

too much exercise may actually cause oxidative stress). Researchers reported at the October 2009 annual meeting of the Society for Neuroscience in Chicago on an experiment that compared the effects of increased oxidative-stress levels on rats that exercised and rats that were sedentary. All rats were injected with a chemical that caused oxidative stress, but compared with the sedentary rats, animals that had exercised were much less prone to anxiety when exposed to stressful situations in the laboratory. The findings suggest that exercise may help prepare brain cells and their pathways to handle stress.

Oxidative stress is associated with a variety of pathological processes—including inflammation, trauma, infection, hemorrhage, and overproduction of the beta-amyloid plaque associated with AD. Research suggests that, in addition to exercising, taking the following steps may offer protection:

- **Eat a healthy diet.** Consuming a low-fat diet with plenty of antioxidant-rich fruits and vegetables, whole grain, and foods such as fish and nuts that contain brain-healthy omega-3 fatty acids can help boost your brain’s resistance to damage caused by free radicals.

- **Reduce your stress levels.** “Both stress from external events and internal stress associated with feelings such as anxiety and depression are transmitted to the cellular level as oxidative stress,” says Dr. Fricchione. He recommends lowering stress by learning the Relaxation Response (see What You Can Do). If anxiety or depression is severe or

WHAT YOU CAN DO

Below is a description of the Relaxation Response technique taught at BHI. Practice the technique once or twice daily, ideally before breakfast and before dinner.

- Sit or lie quietly in a comfortable position with your eyes closed.
- Relax your muscles, progressing from your feet to your calves, thighs, abdomen, shoulders, head, and neck.
- Breathe slowly, and as you exhale, silently repeat a focus word, sound, or phrase (e.g., “peace,” or “praise God”).
- Continue for 10 to 20 minutes. When other thoughts come to mind, simply push them aside in your mind and gently return to your repetition.
- When you are finished, sit quietly for a minute or so, allowing other thoughts to return before rising.

long-lasting, seek an assessment from a mental health professional.

- **Build resiliency.** Maintain a social support network to help you withstand life’s difficulties with less potentially damaging stress. Make an effort to replace negative thinking with a positive approach to challenges. Cultivate optimism. Seek meaning in your life. Practice pro-social behavior—such as giving gifts or pitching in on group projects—to strengthen feelings of connection to loved ones, your community or your religious group.

- **Maintain a healthy weight.** Obesity increases oxidative stress.

- **Avoid physiological stressors** such as cigarettes, fatty foods, too much alcohol (more than one or two drinks a day), pesticides, and pollutants.

- **Seek treatment for medical conditions** such as diabetes, respiratory disease, heart disease, sleep disorders, and chronic inflammation. These conditions are thought to increase oxidative stress on the brain.

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