**[Physical exercise: why aerobic exercise enhances neurogenesis and neuroplasticity](http://www.sharpbrains.com/resources/2-the-4-pillars-of-brain-maintenance/physical-exercise-why-aerobic-exercise-enhances-neurogenesis-and-neuroplasticity/)**

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As lit­tle as three hours a week of brisk walk­ing has been shown to halt, and even reverse, the brain atro­phy (shrink­age) that starts in a person’s for­ties, espe­cially in the regions respon­si­ble for mem­ory and higher cog­ni­tion. Exer­cise increases the brain’s vol­ume of gray mat­ter (actual neu­rons) and white mat­ter (con­nec­tions between neurons).

Through increased blood flow to the brain, phys­i­cal exer­cise trig­gers bio­chem­i­cal changes that spur neu­ro­plas­tic­ity – the pro­duc­tion of new con­nec­tions between neu­rons and even of neu­rons them­selves. Brain exer­cise then pro­tects these fledg­ling neu­rons by bathing them in a nerve growth fac­tor and form­ing func­tional con­nec­tions with neigh­bor­ing neu­rons. Dr. Gage’s work of the Salk Insti­tute for Bio­log­i­cal Stud­ies, have shown that exer­cise helps gen­er­ate new brain cells, even in the aging brain.

Study­ing this topic, Dr. Smeyne of the Saint Jude Children’s Research Hos­pi­tal in Mem­phis, found that results could be seen in two months in Parkin­son patients. Parkin­son patients demon­strate a pro­gres­sive loss of dopamine neu­rons in the sub­stan­tia nigra pars. After two months of exer­cise, the patients had more brain cells. Higher lev­els of exer­cise were shown to be sig­nif­i­cantly more ben­e­fi­cial than lower amounts, although any exer­cise was bet­ter than none. Smeyne also found that start­ing an exer­cise pro­gram early in life was an effec­tive way to lower the risk of devel­op­ing Parkinson’s dis­ease later in life.

Numer­ous ani­mal stud­ies have shown that phys­i­cal exer­cise has a mul­ti­tude of effects on the brain beyond neu­ro­ge­n­e­sis, includ­ing increases in var­i­ous neu­ro­trans­mit­ters and nerve growth fac­tor lev­els, and angio­gen­e­sis (the for­ma­tion of new blood vessels).

In 2003, Dr. Col­combe and Kramer, ana­lyzed the results of 18 sci­en­tific stud­ies pub­lished between 2000 and 2001. The results of this meta-analysis clearly showed that phys­i­cal fit­ness train­ing increases cog­ni­tive per­for­mance in healthy adults between the ages of 55 and 80.

Another meta-analysis pub­lished in 2004 by Dr. Heyn and col­leagues shows sim­i­lar ben­e­fi­cial effects of fit­ness train­ing for peo­ple over 65 years old who had cog­ni­tive impair­ment or dementia.

**What type of exer­cises is needed?**

Accord­ing to Dr. Art Kramer, aer­o­bic exer­cise, at least thirty to sixty min­utes per day, three days a week, has been shown to have a pos­i­tive impact on brain func­tions. Impor­tantly, the exer­cise does not have to be stren­u­ous, walk­ing have been shown to have pos­i­tive effects too.