Exercise not only makes you healthier, it also may make you more intelligent. Experts caution that no one knows what these new cells actually do in the human brain, or whether they really become part of functional circuits that affect behavior and thought. But what is no longer in doubt is that new cell growth has been found in the places in the brain where we think, learn and remember. Not long ago, neuroscientists believed the brain stopped producing any new nerve cells, called neurons, at birth. Researchers knew that synapses, the connections between neurons needed for transmitting memories and thoughts, change and grow as a person ages, declining later in life. But their consensus was that the number of neurons had only one way to go: down. During the past few years, researchers at institutions in the United States and abroad have turned that thinking on its head as they pioneered the study of neurogenesis, or new brain cell development. (Image: [[https://bodyflex.s16.cdn-upgates.com/_cache/0/7/07fc5967d3751677cbf4b1c6fb534f3a-balicek-spalovace24-7.jpg|https://bodyflex.s16.cdn-upgates.com/_cache/0/7/07fc5967d3751677cbf4b1c6fb534f3a-balicek-spalovace24-7.jpg)]]

(Image: https://kaboompics.com/download/940a1f61c3836b3e4904a2d5764aad95/original)They have found in a number of test subjects, including humans, that neurons are continuously being formed, even by the elderly. And behavior has a significant impact on how many new cells are grown. The results are astonishing (see Mind-Body Exercise Connection Research). Fred H. Gage says. And exercise seems to be a key to that interaction. Those blood vessels are associated with the birth of new cells. When you exercise, muscles begin to use oxygen at a higher rate, and the heart pumps more oxygenated blood through the carotid artery to the brain. In fact, the brain uses about 25 percent of the oxygen that you take in. Because exercise creates endorphins, people who exercise regularly have more energy, feel alert and have an increased sense of well-being and better memory retention. Prior to the recent studies, scientists assumed that increased cerebral blood flow was the factor linking exercise and better brain function. Now, we are beginning to understand more about the workout-brain connection (see A Brain Primer).

Each patient while living had received an injection of bromodeoxyuridine, See details or BrdU, for diagnostic purposes. BrdU is absorbed only by cells that are dividing, meaning they are creating new cells. In cancer patients it is used to see if cancer cells are multiplying. When BrdU-labeled neurons were found in the hippocampus, it was a the equivalent of a smoking gun for Gage and Eriksson. They could only conclude that neurogenesis was taking place. More important, these new cells weren't just floating around aimlessly. Meanwhile, Gage and other Salk scientists were engaged in different research, this time on the effects of learning on the brains of mice. What they found could have big meaning for us humans. The mice were exposed to a rich environment of toys, treats and other incentives to think. Almost as an afterthought, running wheels - mouse treadmills - were introduced as another variable. The mice ran at their own pace, as often and for as long as they liked.

And the mice that did the running grew twice the new brain cells as mice in a control group. The Salk researchers do not know why running should have such an enhancing effect on neural development. There are some informed guesses: Running might increase the flow of oxygen and nutrients to brain tissues or release special growth factors that promote new neurons, Gage said. Or it could be that running prompts the nervous system to prepare for an onslaught of new information as an animal navigates unfamiliar terrain in the pursuit of prey or in flight from an enemy. Meanwhile, Prime Boosts at Princeton, neuroscientists Elizabeth Gould and Charles Gross of the university's psychology department brought neurogenesis a step further, finding new neurons not just in the hippocampus of adult rhesus monkeys but also in the more advanced cerebral cortex. In order to test for the presence of new neurons in the adult brain, Gould and Gross injected the monkeys with BrdU. At different times after the injection, ranging from two hours to seven days, the researchers examined the cerebral cortex and found evidence of BrdU in cells in three different regions, all of which play a role in higher thought.

The researchers were able to detect several different proteins in the cells that are found specifically in neurons. Also, they showed that the cells containing BrdU had the long axon extensions characteristic of neurons. To get those results, Gould and Gross used a technique called fluorescent retrograde tracing. In this technique a chemical dye is applied to a small region of the brain, and the dye travels from the end of an axon back to the cell body, making the axon visible under a microscope. And when the monkeys engaged in various stimulating exercises, Visit Prime Boosts the number of new cells jumped. Taken together these recent findings suggest that neurogenesis is found across the range of mammalian species, including human beings. Gould and Gross reiterate that it's not yet known what purpose the new cells serve in the cortex, but if the newly formed neurons are found to have a functional role, scientists may have to reexamine current theories about how the brain works.