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### **How Stress Affects Memory**

Not so long ago, brain experts of science thought of age-related memory loss as a result of brain cell death. Now, with more evolved ways to study the brain, scientists in present time, have discovered that aging does not cause brain cell deaths in the area of the brain (the hippocampus) associated with storing and retrieving memories.

More recent research now indicates that age-related memory decline happens deep within the head in the areas of the brain that makes neurotransmitter communication neurons, which enable communication and coordinated functioning between different areas in our brains. These neurotransmitters enable man and women to make associations between the smell of exotic fruit and a vacation you once took with your loved one.

### **Stress and the Mind**

For quite a number of years, doctors have been collecting from animal studies, proof of the negative stress effects inflicted on their brains. In a five-year study on humans, researchers took 11 individuals in their 70s and, each year, measured their level of cortisol, the main stress related hormone and chief culprit to support this story. At the conclusion of the experiments, the scientists used images to test visual recall and complex mazes to test spatial recall in their evaluating of the volunteers ability to perform memory tasks both immediately, and then 24 hours later.

Sure enough, those individuals with high cortisol levels were found to have worse performances on both visual and spatial recall abilities. The scientists then took Magnetic Resonance Imaging (MRI) of their brains and discovered the higher cortisol stressed people has lost more hippocampal brain cells than subjects with lower cortisol levels.

From other studies, it has also been found that stress starts a negative cycle where high levels of cortisol and other glucocorticoids (stress effect hormones) actually cause damage to the neurons of the hippocampus. And subsequently, the damaged neurons stimulate more glucocorticoids to be produced, causing even more damage to the hippocampus! Also other studies have confirmed that people who feel they can't do anything to reduce their stress are those individuals with the highest levels of cortisol.

### **Chronic Stress Anxiety Interferes with the Human Body's Protective Loop**

#### **Normal Feedback Loop**

Stress anxiety sends signals to Hypothalamus > Hypothalamus releases corticotropin releasing hormone (CRH) which signals Pituitary Gland > Pituitary Gland releases adrenocorticotrophic hormone (ACTH) which signals Adrenal Cortex > Adrenal Cortex releases cortisol into bloodstream > Hippocampal glucocortical receptors detect cortisol (in the form of glucocorticoids) and send inhibitory signals to hypothalamus to stop releasing CRH.

#### **Chronic Stress Loop**

Under stress health effects of chronic stress, the natural feedback loop's protective function becomes altered by excessive secretion of cortisol, which damages the receptors in the hippocampus, causing less release of inhibitory signals.

Prolonged exposure to high cortisol levels in the hippocampus results in diminished short-term memory abilities. Studies of stress symptoms on humans have documented a blunted response to increased levels of cortisol and a correlation between cortisol levels and memory impairment.

**Sources: Stress and Cognitive Function** *Current Opinion in Neurobiology* 1995 Apr 5:205-16  
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29;306(5697):882 **Health Information - National Institutes of Health** (<http://health.nih.gov>)