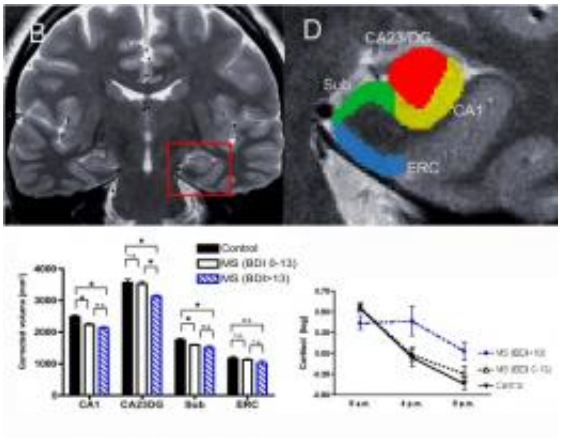
Brain atrophy responsible for depression in people battling multiple sclerosis

July 1 2010, By Mark Wheeler



Brain images showing location of hippocampus and its sub-regions in the brain. Bar graph shows atrophy within these specific hippocampal sub-regions. Black bars represent the control group; white bars represent people with MS who are not depressed; striped bars represent people with MS and depression.

(PhysOrg.com) -- The cause of depression, researchers say, is atrophy of a specific region of the hippocampus, a critical part of the brain involved in mood and memory, among other functions.

Adding to all that ails people managing their multiple sclerosis is depression — for which MS sufferers have a lifetime risk as high as 50 percent.

Yet despite its prevalence, the cause of this depression is not understood.

It's not related to how severe one's MS is, and it can occur at any stage of the disease. That suggests it is not simply a psychological reaction that comes from dealing with the burden of a serious neurologic disorder.

Now, in the first such study in living humans, researchers at UCLA suggest a cause, and it's not psychological, but physical: atrophy of a specific region of the hippocampus, a critical part of the brain involved in mood and memory, among other functions.

Reporting in the early online edition of the journal *Biological Psychiatry*, senior study author Dr. Nancy Sicotte, a UCLA associate professor of neurology, Stefan Gold, lead author and a postdoctoral fellow in the UCLA Multiple Sclerosis Program, and colleagues used high-resolution magnetic resonance imaging to identify three key sub-regions of the hippocampus that were found to be smaller in people with MS when compared with the brains of healthy individuals.

The researchers also found a relationship between this atrophy and hyperactivity of the hypothalamic-pituitary-adrenal (HPA) axis, a complex set of interactions among three glands. The HPA axis is part of the neuroendocrine system that controls reactions to stress and regulates many physiological processes. It's thought that this dysregulation may play a role in the atrophy of the hippocampus and the development of depression.

"Depression is one of the most common symptoms in patients with multiple sclerosis," Gold said. "It impacts cognitive function, quality of life, work performance and treatment compliance. Worst of all, it's also one of the strongest predictors of suicide."

The researchers examined three sub-regions of the hippocampus region — CA1, CA3 and the dentate gyrus area of the hippocampal region called CA23DG (CA stands for cornu ammonis). They imaged 29

patients with relapsing remitting multiple sclerosis and compared them with 20 healthy control subjects who did not have MS. They also measured participants' cortisol level three times a day; cortisol is a major stress hormone produced by the HPA axis that affects many tissues in the body, including the brain.

In addition to the difference between MS patients and healthy controls, the researchers found that the multiple sclerosis patients diagnosed with depression showed a smaller CA23DG sub-region of the hippocampus, along with excessive release of cortisol from the HPA axis.

"Interestingly, this idea of a link between excessive activity of the HPA axis and reduced brain volume in the hippocampus hasn't received a lot of attention, despite the fact that the most consistently reproduced findings in psychiatric patients with depression (but without MS) include hyperactivity of the HPA axis and smaller volumes of the hippocampus," Sicotte said.

"So the next step is to compare MS patients with depression to psychiatric patients with depression to see how the disease progresses in each," she said.

Provided by University of California Los Angeles