

Severe depression associated with greater number of nerve cells in thalamus region of brain

DALLAS – July 1, 2004 – Individuals who suffer from severe depression have more nerve cells in the part of the brain that controls emotion, researchers at UT Southwestern Medical Center at Dallas have found.

Studies of postmortem brains of patients diagnosed with major depressive disorder (MDD) showed a 31 percent greater than average number of nerve cells in the portion of the thalamus involved with emotional regulation. Researchers also discovered that this portion of the thalamus is physically larger than normal in people with MDD. Located in the center of the brain, the thalamus is involved with many different brain functions, including relaying information from other parts of the brain to the cerebral cortex.

The findings, published in today's issue of *The American Journal of Psychiatry*, are the first to directly link a psychiatric disorder with an increase in total regional nerve cells, said Dr. Dwight German, professor of psychiatry at UT Southwestern.

“This supports the hypothesis that structural abnormalities in the brain are responsible for depression,” he said. “Often people don't understand why mentally ill people behave in odd ways. They may think they have a weak will or were brought up in some unusual way.

“But if their brains are different, they're going to behave differently. Depression is an emotional disorder. So it makes sense that the part of the brain that is involved in emotional regulation is physically different.”

Four groups were represented in the study: subjects with major depression, with bipolar disorder and with schizophrenia, as well as a comparison group with no history of mental illness. Major depression is characterized by a depressed mood and lack of interest or pleasure in normal activities for a prolonged period of time, while bipolar disease is distinguished by alternating periods of extreme mania or elevated mood swings, and severe depression. Schizophrenia often results in psychotic episodes of hallucinations and delusions and a lack of perception of reality.

Brain specimens were provided by the Stanley Foundation Brain Bank, which collects donated postmortem brains for research on mental illness, and the subjects were matched according to age, gender, brain weight and other variables.

Researchers from UT Southwestern, working with a team from Texas A&M University System Health Science Center, used special computer-imaging systems to meticulously count the number of nerve cells in the thalamus.

Results showed an increase of 37 percent and 26 percent, respectively, in the number of nerve cells in the mediodorsal and anteroventral/anteromedial areas of the thalamus in subjects with MDD when compared with similar cells in those with no psychiatric problems. The number of nerve cells in subjects with bipolar disorder and schizophrenia was normal.

Researchers also found that the size of the affected areas of the thalamus in subjects with MDD was 16 percent larger than those in the other groups.

“The thalamus is often referred to as the secretary of the cerebral cortex – the part of the brain that controls all kinds of important functions such as seeing, talking, moving, thinking and memory,” Dr. German said. “Most everything that goes into the cortex has to go through the thalamus first.

“The thalamus also contains cells that are not involved with emotion. Our studies found these portions of the thalamus to be perfectly normal. But the ones that are involved in emotion are the ones that were abnormal.”

Researchers also looked at the effect of antidepressant medications on the number of nerve cells and found no significant difference among any of the subject groups – whether they had taken antidepressants or not – reinforcing the belief that abnormalities in brain development are responsible for depression.

Other researchers involved in the study were Dr. Umar Yazdani, a postdoctoral researcher in psychiatry from UT Southwestern, and Drs. Keith A. Young, Leigh A. Holcomb and Paul B. Hicks from Central Texas Veterans Health Care System, Texas A&M University System Health Science Center and Scott & White Hospital in Temple.

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