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Abstract

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Hippocampal volume and cell number in depression, schizophrenia, and suicide subjects

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Substantial evidence suggests that structural plasticity in the hippocampus may play an important role in the pathophysiology of psychiatric disorders, especially major depressive disorder (MDD) and schizophrenia. Also, *in vivo* imaging studies indicate that the volume of hippocampus may be reduced in both disorders. The aim of the present study is to investigate if depression, schizophrenia or suicide is associated with reduced volume of the hippocampal formation and/or changes in the numbers of neurons and/or glial cells in the different subregions of the hippocampus.

The study is based upon postmortem brain samples from 10 subjects with schizophrenia, 8 subjects with major depression, 11 suicide subjects with a history of depressive disorder, and 10 control subjects with no history of psychiatric or neurological diseases. The microscopic analysis is based on state of the art design-unbiased stereological techniques: the Cavalieri estimator is used to estimate the volume of hippocampus and its subregions, and the optical fractionator method is used to estimate the total number of neurons and glial cells in the individual cell layers in four main regions of hippocampus: the granular cell layer, hilus, CA2/3, and CA1.

We found the volume and the number of neurons and glial cells were similarly reduced by approximately 20% to 35% in depressed and schizophrenia subjects relative to control subjects across all hippocampal regions. In suicide subjects, we only found increased neuron number in CA2/3 subregion.

The volume and number of cells are reduced in depressed and schizophrenia subjects relative to control subjects across all hippocampal regions. Our findings imply that the hippocampus may be a common site of pathophysiology in depression and schizophrenia. Suicide subjects may have a different neurobiology in hippocampus compared to subjects dying with MDD without suicide.