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Perspective

Effects of GABA Receptor Neurotransmission on Suicidal Behavior

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DESCRIPTION

Suicide is defined as a behavior motivated by a desire to end extreme psychological suffering. Other psychological elements like as personality features, affective characteristics, and dysregulation appear to have a role, with a growing importance to suicidal decision-making deficit. Researchers in Canada discovered that depressed people who commit suicide have an aberrant distribution of Gamma Aminobutyric Acid (GABA) receptors, one of the brain's most abundant neurotransmitters. The function of GABA is to inhibit neuron activity. Suicidal conduct is a significant public health issue. Both industrialized and developing countries have seen an upsurge in suicides. Every 40 seconds, someone commits suicide somewhere in the world, resulting in nearly one million deaths each year. Furthermore, it is commonly known that some populations have a higher prevalence of suicide, such as some Asian and African population, which has a rate of 38.5 per 100,000 people.

Over the last decade, a number of researches have looked into genome-wide transcriptome changes linked to depression and suicide. GABA signal transmissions are thought to have a role in depression, although little is known about the chemical factors and neurological mechanisms that underpin this theory, mRNA microarrays were commonly utilized in these research to compare post-mortem brain tissue from those who were diagnosed with Major Depressive Disorder (MDD) and died by suicide to others who were in good mental health and did not die by suicide. They discovered disruption of glutamatergic and GABAergic signaling genes in a variety of cortical and subcortical areas. Genes producing GABA type receptor subunits and their associated binding proteins were consistently found to be increased in the prefrontal cortex, hippocampus, and anterior cingulate for GABAergic signaling.

GABA is the primary excitatory and inhibitory neurotransmitter in the central nervous system, and evidence suggests that changes in the neurotransmitter systems may have a role in depression pathogenesis. The cerebral cortex of MDD patients, for example, has been found to have higher amounts of both neurotransmitters. NMDA receptors are implicated in the neuropathology of MDD and the effect of antidepressants, according to pharmacological data. GABA system failure in depression is suggested by knockout animals and positive modulators of GABAA and GABAB receptors. Changes in GABA signaling are not only detected in depression, but also in schizophrenia and a variety of neurological illnesses. In the central nervous system, GABA is the major excitatory and inhibitory neurotransmitter. Alterations in the neurotransmitter systems have been associated with serious depression and suicide, according to growing evidence. The occipital cortex of participants diagnosed with significant depression had higher glutamate levels and lower GABA levels, according to a magnetic resonance spectroscopy technique.

Additionally, aberrant glutamate/glutamine and GABA concentration reductions were found in the prefrontal cortex of unmediated depressive patients. Researchers who used one of the microarray set's chips (HG-U133A) to investigate gene expression in the anterior and cerebral cortex brain areas of suicides and depressed suicides came up with similar results. Interestingly, some of their findings suggest that depressed suicides and controls have similar changes in glutamate recycling (glutamine synthase, GLUL), glutamate receptors (GRIA1, GRIA3, GRIK1, GRM3), and GABA receptors (GABARB3, GABRD, GABARG2). Decreased levels of GABA (A) receptor subunits (α1, α3, α4 and δ) in the BA10 of depressed suicide victims compared to non-depressed controls were also discovered lately.

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