

Is There a Neuroanatomical Basis for the Vulnerability to Suicide?

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1. Objectives.

Suicidal behaviour is the consequence of the interaction between stressors and a diathesis or vulnerability. Evidence is accumulating that changes in the central nervous system contribute to this vulnerability. A substantial number of imaging studies in suicide attempters have been published, but most studies are characterized by small sample sizes and increased risk of false positive findings. Therefore, the current study aimed at a systematic review and meta-analysis of published study in order to describe consistently identified disturbances in brain structure and, or, functions.

2. Methods.

Systematic review and meta-analysis of imaging studies of attempted suicide patients, affective controls and healthy volunteers, including structural and functional MRI studies and molecular imaging studies.

3. Results.

A reduced prefrontal perfusion or metabolism, a blunted increase in activation when challenged, and impairment of the prefrontal serotonergic system in association with a history of suicide attempts is shown in molecular imaging studies. Recent structural and functional imaging studies show changes in cortical and subcortical areas and their connections. Meta-analyses revealed structural deficits and functional changes in association with a history of suicidal behaviour. Structural findings included reduced volumes of the rectal gyrus, superior temporal gyrus and caudate nucleus. Functional differences between study groups included an increased reactivity of the anterior and posterior cingulate cortices to negatively valenced emotional stimuli. A number of methodological issues hamper the interpretation of findings. Nevertheless, there is increasing evidence of the involvement of a serotonin-mediated network in suicidal behaviour. The involvement of this network in decision-making, and particularly the prediction of reward and punishment, has been shown previously in healthy individuals.

4. Conclusions.

A diathesis to suicidal behaviour appears to be associated with changes in biochemical, functional and structural brain characteristics, which point at the involvement of a serotonin-mediated decision-making network in the development of suicidal behaviour.