Neurobiology of hedonic tone: the relationship between treatment-resistant depression, attention-deficit hyperactivity disorder, and substance abuse.

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Abstract

Anhedonia, defined as the state of reduced ability to experience feelings of pleasure, is one of the hallmarks of depression. Hedonic tone is the trait underlying one's characteristic ability to feel pleasure. Low hedonic tone represents a reduced capacity to experience pleasure, thus increasing the likelihood of experiencing anhedonia. Low hedonic tone has been associated with several psychopathologies, including major depressive disorder (MDD), substance use, and attention-deficit hyperactivity disorder (ADHD). The main neural pathway that modulates emotional affect comprises the limbic-cortical-striatal-pallidal-thalamic circuits. The activity of various components of the limbic-cortical-striatal-pallidal-thalamic pathway is correlated with hedonic tone in healthy individuals and is altered in MDD. Dysfunction of these circuits has also been implicated in the relative ineffectiveness of selective serotonin reuptake inhibitors used to treat anxiety and depression in patients with low hedonic tone. Mood disorders such as MDD, ADHD, and substance abuse share low hedonic tone as well as altered activation of brain regions involved in reward processing and monoamine signaling as their features. Given the common features of these disorders, it is not surprising that they have high levels of comorbidities. The purpose of this article is to review the neurobiology of hedonic tone as it pertains to depression, ADHD, and the potential for substance abuse. We propose that, since low hedonic tone is a shared feature of MDD, ADHD, and substance abuse, evaluation of hedonic tone may become a diagnostic feature used to predict subtypes of MDD, such as treatment-resistant depression, as well as comorbidities of these disorders.