Interaction between COMT ValMet polymorphism and childhood adversity affects reward processing in adulthood.


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Abstract

BACKGROUND: Accumulating evidence suggests that altered dopamine transmission may increase the risk of mental disorders such as ADHD, schizophrenia or depression, possibly mediated by reward system dysfunction. This study aimed to clarify the impact of the COMT Val158Met polymorphism in interaction with environmental variation (G×E) on neuronal activity during reward processing.

METHODS: 168 healthy young adults from a prospective study conducted over 25 years participated in a monetary incentive delay task measured with simultaneous EEG-fMRI. DNA was genotyped for COMT, and childhood family adversity (CFA) up to age 11 was assessed by a standardized parent interview.

RESULTS: At reward delivery, a G×E revealed that fMRI activation for win vs. no-win trials in reward-related regions increased with the level of CFA in Met homozygotes as compared to Val/Met heterozygotes and Val homozygotes, who showed no significant effect. During the anticipation of monetary vs. verbal rewards, activation decreased with the level of CFA, which was also observed for EEG, in which the CNV declined with the level of CFA.

CONCLUSIONS: These results identify convergent genetic and environmental effects on reward processing in a prospective study. Moreover, G×E effects during reward delivery suggest that stress during childhood is associated with higher reward sensitivity and reduced efficiency in processing rewarding stimuli in genetically at-risk individuals. Together with previous evidence, these results begin to define a specific system mediating interacting effects of early environmental and genetic risk factors, which may be targeted by early intervention and prevention.