Association of verbal fluency and reading abilities with dopamine D₂/D₃ receptor availability in schizophrenia: an ¹⁸F-fallypride positron emission tomography study

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Abstract

Impairments in verbal fluency and reading have prominently featured in reports of core cognitive deficits in schizophrenia. Since these impairments are predictive of patients overall cognitive functioning and response to treatment, they may be linked to the dopaminergic dysfunction in untreated schizophrenia. In order to evaluate this hypothesis, we used ¹⁸F-fallypride positron emission tomography in 18 healthy and 21 unmedicated schizophrenia subjects, and correlated dopamine receptor binding potentials in relevant AFNI-derived gray matter regions with each group's performance on Wide Range Achievement (WRAT) composite reading and Controlled Oral Word Association (COWAT) tests. In healthy subjects, WRAT reading scores were positively but weakly associated with dopamine D₂/D₃ receptor availability in the hippocampus, caudate and temporal cortex, consistent with greater availability being better, while in patients with schizophrenia the association was of the inverted U shape indicating a clear optimal dopamine level. with levels below or above being associated with poor performance.

Subjects

We recruited 21 patients with schizophrenia, all unmedicated more than 30 days and 16 never medicated. Exclusion criteria included use of psychoactive substance abuse, head trauma, and intellectual disability. Eighteen healthy volunteers served as comparison subjects.

Imaging Methods

For F18-fallypride PET a dose of 0.7mCi/10kg was injected into a forearm vein and subjects were scanned for 2-4 hours of dynamic imaging. T1 weighted MRI images were used for alignment and standardization to the MNI standard brain. AFNI regions of interest were applied

Results

T for inverted U quadratic effect for relationship between WRAT scores and fallypride binding potential

Patients with schizophrenia

Healthy volunteers

Dopamine binding potential vs reading (WRAT) performance

Reading score

Dopamine binding potential

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