

# Asymmetry in caudate nucleus D<sub>2</sub>-like dopamine receptors is lost with Age: An [<sup>18</sup>F]Desmethoxyfallypride study in healthy volunteers

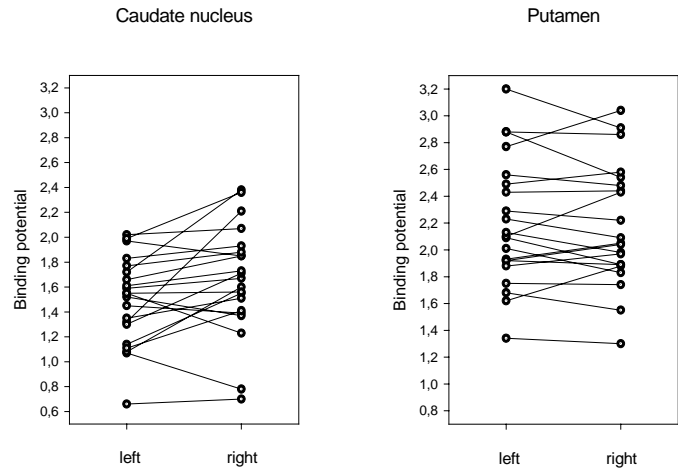
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**Introduction:** Asymmetry of morphological, functional, and physiological parameters in healthy brains is a well-documented phenomenon. Although asymmetry of presynaptic dopamine nerve terminal markers (DOPA decarboxylase activity, dopamine transporters) has also been demonstrated, asymmetry of postsynaptic D<sub>2</sub>-like dopamine receptor binding has been documented meta-analytically only. Therefore, the purpose of this study in normal volunteers was to investigate potential lateralization of D<sub>2</sub> receptors in healthy striatum and its change with age.

**Methods:** D<sub>2</sub>-like dopamine receptors were quantified with positron emission tomography and [<sup>18</sup>F]desmethoxyfallypride ([<sup>18</sup>F]DMFP) in 21 healthy male volunteers. Time activity curves were generated after normalization using a template for cerebellum, caudate nucleus, and putamen. Binding potentials were calculated by means of the simplified reference tissue model and the pseudo-equilibrium method. To evaluate the asymmetry of striatal binding potentials we calculated a laterality index according to the following equation:  $(BP_{\text{left}} - BP_{\text{right}})/(BP_{\text{left}} + BP_{\text{right}})$ . Individual binding indices were correlated with age.

**Results:** The BP in the right caudate was statistically significantly larger than in the left caudate (right:  $1.65 \pm 0.44$ , mean  $\pm$  SD; left:  $1.49 \pm 0.35$ ;  $p = 0.020$ ; figure 1, top). BPs did not differ in magnitude in the putamen (right:  $2.24 \pm 0.46$ ; left:  $2.25 \pm 0.45$ ; n.s.). There was a significant correlation of asymmetry of D<sub>2</sub> binding in caudate nucleus with age ( $R = 0.5717$ ;  $p = 0.0068$ ; figure 2, bottom). There was no asymmetry in binding in the putamen.



**Conclusions:** We could demonstrate a significant asymmetry in caudate nucleus D<sub>2</sub>-like dopamine receptor binding, which is lost with age. No such relationships could be shown for the putamen. Our findings are in line with other observations of functional asymmetry of the caudate nucleus, but not the putamen, which seems to be lost not only with age but also in various disease states such as schizophrenia. This study underlines the functional importance of functional asymmetry of the caudate nucleus, which is closely connected to limbic and cortical regions and involved in emotional and cognitive processing.

