



# SCHIZOPHRENIA Factsheet

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## What is positron emission tomography (PET)?

PET is a nuclear based imaging technique that utilises a radioactive tracer to visualise functional brain activity. The radioisotopes tracers are coupled with a biological molecule such as glucose, which is used during cellular metabolism and can be used to highlight areas with changes in metabolic activity.

## What is the evidence from PET studies?

During executive functioning and working memory tasks, moderate quality evidence suggests significant decreases in functional activation in the frontal lobe, including the dorsolateral prefrontal cortex, and in neocortical regions, including the parietal and occipital cortices and bilateral claustrum, fusiform gyrus, and cerebellum, and in subcortical regions, including the right putamen, hippocampus and left mediodorsal thalamus. Moderate to low quality evidence suggests significant increases in functional activation in the anterior cingulate cortex, temporal lobe, parietal cortex, lingual gyri, insula and the amygdala. During memory encoding tasks, moderate quality evidence suggests significant decreases in functional activation in the medial frontal gyri and the hippocampus. During memory retrieval tasks, decreased activation is seen in the medial and inferior frontal gyri, the cerebellum, hippocampus, and the fusiform gyrus, with increases in the anterior cingulate cortex and the medial temporal gyrus. During emotion processing tasks, moderate and moderate to low quality evidence suggests decreased activation in the amygdala, parahippocampus, superior frontal gyrus and middle occipital gyrus. There is also lower magnitude of activation in the fusiform gyrus, lentiform nucleus, and parahippocampal gyrus. During explicit (effortful) emotion tasks, there is decreased activation in the fusiform gyrus, while during implicit (automatic) emotion tasks, there are decreases in the superior frontal and middle occipital gyri. During auditory hallucinations, moderate and moderate to low quality evidence suggests increased activation in Broca's area of the temporal lobe, insula, hippocampus, left parietal operculum, left and right postcentral gyrus, and left inferior frontal gyrus, and decreased activation of Broca's area, the left middle temporal gyrus, left premotor cortex, anterior cingulate cortex, and left superior temporal gyrus during external auditory stimulation. During cognitive tasks and rest periods, moderate to high quality evidence shows a medium to large effect of reduced functional activity in bilateral frontal lobes in people with schizophrenia. Moderate quality evidence suggests increased functional activity in the left temporal lobe during cognitive tasks, but no differences between patients and controls during rest periods.

Moderate quality evidence suggests elevated striatal dopamine synthesis and release capacities and increased synaptic dopamine levels in people with schizophrenia. The finding for dopamine synthesis was apparent in treatment-responsive and treatment-naive patients, but not significant in treatment-resistant patients. There were no differences in dopamine D2/3 receptor or transporter availability. Within-group variability was similar for dopamine synthesis and release capacities, but there was greater variability in synaptic dopamine levels, and dopamine D2/3 receptor and transporter availability in the patient groups than in the control groups. There was also a small to medium-sized increase in translocator protein in people with schizophrenia when measured using binding potential, but not when measured using volume of distribution.

Moderate quality evidence suggests greatest dopamine D2 receptor occupancy with haloperidol (92%), then risperidone, olanzapine, clozapine, quetiapine, aripiprazole, ziprasidone, and then amisulpride (85%). There may be an association between dopamine receptor occupancy and clinical improvement following treatment with antipsychotic medications.

**For more information see the technical table**



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*Diseases of the brain and nervous system pose the greatest health, economic and social burden of any disease group because they are chronic, debilitating and have no known cures.*

*Medical research is the cornerstone of efforts to advance the health and wellbeing of families and the community. Our dedicated scientists are focussed on transforming their research into significant and practical benefits for all patients.*

*While we hope you find this information useful, it is always important to discuss any questions about schizophrenia or its treatment with your doctor or other health care provider.*

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