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SCHIZOPHRENIA Factsheet

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What is magnetic resonance spectroscopy (MRS)?

MRS is a specialised imaging technique that utilises magnetic resonance imaging to investigate biochemical alterations within tissues. Two notable methods of MRS are 1H-MRS (proton-MRS) and 31P-MRS (phosphorus-MRS). Each technique is sensitive to different metabolic compounds. 1H-MRS can be used to measure N-acetylaspartate, an amino acid that is used as a marker of neuronal viability. Decreased levels are associated with neuron death or dysfunction. 1H-MRS is also used to measure creatine, a compound involved in energy metabolism, glutamate, a neurotransmitter, and glutamine, a metabolite of glutamate. 31P-MRS is used to measure phospholipid levels, such as phosphomonoesters and phosphodiesters, that provide information about cellular energy metabolism and membrane synthesis.

What is the evidence for MRS?

All patients versus controls

High quality evidence finds decreases in glutathione in the anterior cingulate and myo-inositol in the medial prefrontal region of people with schizophrenia. Moderate or moderate to high quality evidence finds N-acetylaspartate is decreased in the frontal lobe, temporal lobe, thalamus, hippocampus, cerebellum, and cingulate cortex. N-acetylaspartate may also be reduced in the parietal cortex, basal ganglia and occipital lobe (white matter only) and increased in the striatum and lenticular nucleus. There were reductions in frontal glutamate, phosphomonoesters, and hippocampal choline/creatine, and increases in frontal glutamine and temporal phosphodiesters. There were no differences in GABA levels in the medial frontal cortex.

Unmedicated patients (drug free or drug naive) versus controls

Moderate to high quality evidence finds decreases in N-acetylaspartate in the thalamus and decreases in frontal white matter (using <3T MRI scanners only),. There are also increases in glutamate+glutamine in the medial prefrontal cortex, and increases in choline in the basal ganglia. There were no differences in glutamate, creatine or myo-inositol.

First-episode psychosis patients versus controls

Moderate quality evidence finds decreased phosphomonoesters levels and increased phosphodiesters levels in both the prefrontal cortex and temporal cortex.

People at clinical or genetic high risk versus controls

Moderate to high quality evidence finds a medium-sized decrease in glutamate in the thalamus of people at clinical high risk of psychosis, and a medium-sized increase in glutamate+glutamine in the frontal lobe of first-degree relatives. Moderate to low quality evidence finds N-acetylaspartate/creatine reductions in the anterior cingulate and hippocampus of first-degree relatives. People at clinical or genetic high-risk of schizophrenia showed N-acetylaspartate reductions in the thalamus and N-acetylaspartate/creatine reductions in the prefrontal cortex. There were also reduced prefrontal phosphomonoester levels and increased prefrontal phosphodiester levels in first-degree relatives.

For more information see the technical table

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NeuRA (Neuroscience Research Australia) is one of the largest independent medical and clinical research institutes in Australia and an international leader in neurological research.

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.

HOW YOUR SUPPORT HELPS

We are able to make significant advances due to the generosity of countless people. Your donation allows us to continue to work towards transforming lives. For information on how you can support our research, phone **1300 888 019** or make a secure donation at **neura.edu.au/donate/schizophrenia**.

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