

# Neurovascular uncoupling in schizophrenia: A bimodal meta-analysis of brain perfusion and glucose metabolism

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# Central Principles

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1. Psychotic disorders are most likely associated with disturbances in central blood supply.
2. In healthy brains, regional Cerebral Blood Flow (rCBF) is tightly coupled to resting cerebral glucose metabolism (rCMR<sub>glu</sub>).
3. Both rCBF (as measured by Arterial Spin Labeling) and rCMR<sub>glu</sub> (as measured by FDG-PET) can be used as markers of regional neurological activity.
4. Brain regions with concordant changes in rCBF and rCMR<sub>glu</sub> between patients and controls can be shown to be involved in the pathophysiology of schizophrenia with a greater degree of certainty than studies that have only investigated rCBF changes or have only investigated rCMR<sub>glu</sub> changes.
5. Brain regions that can be shown to have discordant changes in rCBF and rCMR<sub>glu</sub> between patients and controls may have changes in patients with schizophrenia that are related to neurovascular uncoupling (inflammation, mitochondrial dysfunction, oxidative stress, etc.).

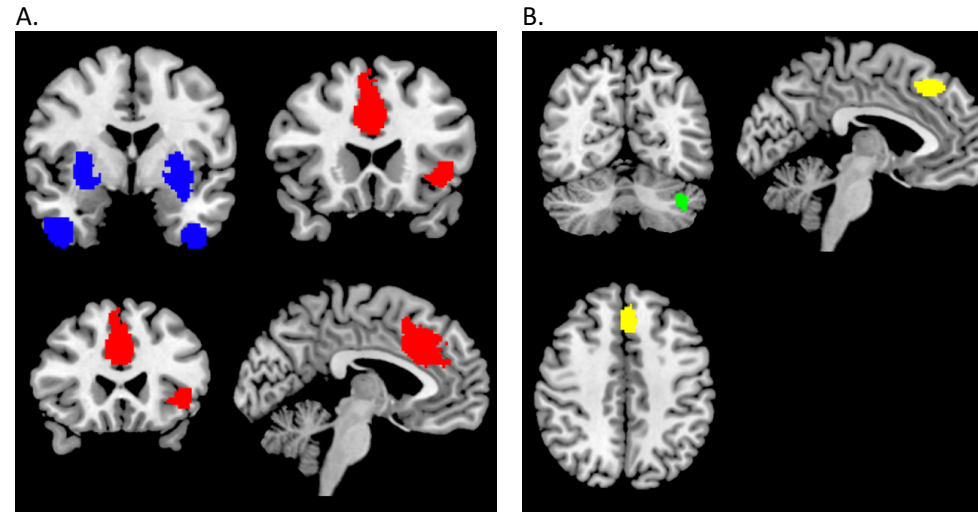
# Goals

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1. Conduct a meta-analysis to combine studies that have used ASL or FDG-PET to identify brain regions of significant difference in neurological activity between patients with schizophrenia and healthy patients. (Concordant changes)
2. Identify brain regions of uncoupling between rCBF and rCMRglu in patients with schizophrenia and healthy controls. (Discordant changes)

# Results

Region	SDM Z	MNI Coordinate	Cluster Size	P value	Jack-knife Score (/23)
Right Lenticular Nucleus, Putamen, BA 48	3.574	28,8,10	1466	0	23
Left Striatum	3.173	-22,2,4	1140	0	f22
Right Inferior Temporal Gyrus, BA 20	3.231	42,4,-42	612	0	24
Left Temporal Pole, Middle Temporal Gyrus, BA 20	2.506	-34,2,-44	316	< 0.0001	23
Right Thalamus	2.147	16,-22,12	123	0.001	23
Corpus Callosum	1.964	-18,-28,2	62	0.002	22
Right Median Cingulate / Paracingulate Gyri, BA 32	-2.838	6,22,32	1306	< 0.00001	21
Right Middle Occipital Gyrus, BA 18	-2.998	30,-96,12	241	0	24
Left Superior Occipital Gyrus, BA 17	-2.641	-14,-100,14	249	0.0001	23
Left Inferior Frontal Gyrus, Triangular Part, BA 47	-2.653	-42,22,-2	296	0.0001	22
Left Middle Frontal Gyrus, Orbital Part, BA 46	-2.550	-40,50,4	288	0.0002	8
Right Superior Frontal Gyrus, Dorsolateral BA 8	-2.213	20,20,56	82	0.002	20



A: Conjoint Changes, B: Disjoint Changes

Blue: CBF ↑, CMR ↑

Red: CBF ↓, CMR ↓

Yellow CBF normal, CMR ↑

Green: CBF normal, CMR ↓