Transcript Details
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Mapping Brain Atrophy in Schizophrenia

Announcer:
Welcome to *On the Frontlines of Schizophrenia* on ReachMD. On this episode, we'll hear from Dr. Ahmed Makhlouf, who's the Medical Director of the Brigham and Women's Hospital Psychosis Program and an Instructor in Psychiatry at Harvard Medical School. He'll be discussing his recent findings on heterogeneous patterns of brain atrophy in schizophrenia. Here's Dr. Makhlouf now.

Dr. Makhlouf:
The objective of the study was to see if patterns of atrophy or brain shrinkage in schizophrenia would localize to a common network. And the method that we used is called coordinate network mapping. It's a meta-analysis approach that utilizes the human connectome as a wiring diagram for the human brain.

We found a common brain network, one single brain network, that links the varied or heterogeneous locations of atrophy in schizophrenia. One of the things that we started with in this study was to see whether locations of atrophy would localize to any particular brain region or brain lobe, and what we found was that they're truly heterogeneous. They're all over the brain. So the main finding was a common network that links all these atrophy locations. This network was specific to schizophrenia.

What we also found, which was contrary to our hypothesis, was that in patients with predominant positive symptoms and patients with predominant negative symptoms, their atrophy patterns in these patients localized to very similar networks. We thought they would map to different brain networks since they're very different symptom clusters, but they actually map to very similar brain networks.

And one of the most interesting findings of this study was that in high-risk individuals—and that includes genetic high-risk individuals—there are very specific parts in the brain, including the anterior cingulate cortex, the hippocampus, and the amygdala, that differentiate patients with schizophrenia who develop full-blown schizophrenia from those individuals at high risk.

And the final finding of our study was that the atrophy patterns in schizophrenia map to a network that is the opposite of what we see in patients who have lesions that lead or are associated with psychosis. And this finding was very counterintuitive. We expected the lesions that cause psychosis or are associated with psychosis to map to similar networks to atrophy, so that was counterintuitive and a surprising finding for sure.

Now, there are a lot of questions that resulted from this study. So, for example, would this network help us understand schizophrenia better? Would it lead to better predictions? Can we develop biomarkers based on the brain network? Can we develop better and more specific and more effective interventions for patients with schizophrenia? Another question that came up was whether schizophrenia is a unified disorder or is it a combination and we're looking at multiple different disorders.

The third question that comes up is because we found differences in atrophy patterns between patients with schizophrenia compared to high-risk individuals, can we use these differences in predicting the probability of switching to schizophrenia or developing full-blown schizophrenia based on atrophy patterns?

The fourth question that came up was, could atrophy in schizophrenia be compensatory rather than causal? Meaning we have atrophy in schizophrenia that is a result of the disease, and the brain is trying to compensate for the disease process rather than the atrophy being an integral part or a causal component of the disease.

In terms of clinical applications, one would be whether the network that we identified can lead to predictions: Can we predict who would develop psychosis? Two, can we use this network as a biomarker for schizophrenia? And three, which is the clinical application we're currently working on, is can we use the brain network that we identified to develop transcranial magnetic stimulation or brain stimulation

targets in general for patients with schizophrenia?

Announcer:
That was Dr. Ahmed Makhlouf discussing his research on heterogeneous patterns of brain atrophy in schizophrenia. To access this and other episodes in our series, visit *On the Frontlines of Schizophrenia* on ReachMD.com, where you can Be Part of the Knowledge. Thanks for listening!