

Delusions associated with consistent pattern of brain injury

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A new study provides a novel theory for how delusions arise and why they persist. NYU Langone Medical Center researcher Orrin Devinsky, MD, performed an in-depth analysis of patients with certain delusions and brain disorders revealing a consistent pattern of injury to the frontal lobe and right hemisphere of the human brain. The cognitive deficits caused by these injuries to the right hemisphere, leads to the over compensation by the left hemisphere of the brain for the injury, resulting in delusions. The article entitled "Delusional misidentifications and duplications: Right brain lesions, left brain delusions" appears in the latest issue of the journal of *Neurology*.

"Problems caused by these brain injuries include impairment in monitoring of self, awareness of errors, and incorrectly identifying what is familiar and what is a work of fiction," said Dr. Devinsky, professor of Neurology, Psychiatry and Neurosurgery and Director of the NYU Epilepsy Center at NYU Langone Medical Center. "However, delusions result from the loss of these functions as well as the over activation of the left hemisphere and its language structures, that 'create a story', a story which cannot be edited and modified to account for reality. Delusions result from right hemisphere lesions, but it is the left hemisphere that is deluded."

Often bizarre in content and held with absolute certainty, delusions are pathologic beliefs that remain fixed despite clear evidence that they are incorrect. "Delusions are common problems in a variety of psychiatric and neurological disorders," said Dr. Devinsky. "Psychiatric disorders

with delusions, for example- schizophrenia, have been proven to have functional and structural brain pathology. But now improved diagnostic techniques are allowing us to have increased identification of neurologic disorders among other patient populations with delusions."

In the study, the author finds that most neurologic patients with delusions usually have lesions in the right hemisphere and/or bifrontal areas. For example, the neurological disorders of Confabulation (incorrect or distorted statements made without conscious effort to deceive), Capgras (the ability to consciously recognize familiar faces but not emotionally connect with them) and Prosopagnosia (patients who may fail to recognize spouses or their own face but generate an unconscious response to familiar faces) result from right sided lesions.

The right hemisphere of the brain dominates self recognition, emotional familiarity and ego boundaries. After injury, the left hemisphere tends to have a creative narrator leading to excessive, false explanations. The resistance of delusions to change despite clear evidence that they are wrong likely reflects frontal dysfunction of the brain, which impairs the ability to monitor self and to recognize and correct inaccurate memories and familiarity assessments. Thus, right hemisphere lesions may cause delusions by disrupting the relation between and the monitoring of psychic, emotional and physical self to people, places, and even body parts. This explains why content specific delusions involve people places or things of personal significance and distort ones relation to oneself, the author explains.

"Our knowledge of delusions is limited by our ability to comprehend the patients irrational thought process," said Dr. Devinsky. "The pathogenesis of delusions likely includes many mechanisms that span overlapping psychological, cognitive and neurological disorders. Future research should explore the psychological, cognitive, and psychologic-anatomic systems that change during the emergence and resolution of

delusions as well as strategies to treat delusions."

Examples of Various Research Reviewed

In one study, nine patients with right hemisphere infarctions at a stroke rehabilitation unit had frequent delusion. While size of the stroke did not correlate when compared to the control group, the presence of brain atrophy was a significant predictor of delusions. When delusions occurred, it was usually caused by a right hemisphere lesion. Also, one study pointed out that delusional patients with Alzheimer's disease usually have significantly more right frontal lobe damage.

Other research showed that Reduplicative Paramnesia and Capgras syndrome cases with unilateral brain lesions strongly implicate the right hemisphere, usually the frontal lobe of the brain. Among 69 patients with Reduplicative Paramnesia, lesions were primarily in the right hemisphere in 36 cases (52%), bilateral in 28 (41%) and left hemisphere in 5 (7%) -- a sevenfold increase of right over left-sided lesions. Similarly in 26 Capgras patients, lesions were primarily in the right hemisphere in 8 (32%), bilateral in 16 (62%) and left sided in 2 (7%) - a four-fold increase of right - over left-sided lesions. For both delusional syndromes, many bilateral cases had maximal damage in the right hemisphere.

Among another study of 29 cases of delusional misidentification syndromes, all patients had right hemisphere pathology, while 15 (52%) had left hemisphere damage. Fourteen had exclusively right hemisphere damage but none had isolated left hemisphere damage. When lateralized lesions are found, right hemisphere lesions are more common in other delusional misidentification and content specific delusions. Frontal lesions are strongly implicated in misidentification syndromes. Exclusively frontal lesions were associated with delusions in 10 of 29

(34.5) cases- four with right frontal and six with bifrontal lesions. None had lesions sparing the frontal lobes.

Source: New York University School of Medicine

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