

POLIOENCEPHALITIS:

EXPLAINING POST-POLIO FATIGUE, TYPE A BEHAVIOR OR PAIN

Richard L. Bruno, of the College of Physicians and Surgeons, Columbia University, presented a new hypothesis about the cause of Post-polio Sequelae at the third annual Gaylord Hospital Post-Polio Symposium in Meriden, CT. Post-Polio Sequelae are the debilitating new symptoms - muscle weakness, overwhelming fatigue, and pain - reported by more than 500,000 Americans living today who had poliomyelitis 30 or more years ago.

In a national survey of 676 people who had polio, Bruno and Nancy Frick, M.Div., of Harvest Center in Hackensack, NJ, found that while physical overexertion was the most frequent cause of PPS, psychological stress was the second most frequent cause. "We had hypotheses to explain how physical or psychological stress could cause muscle weakness by tiring out motor neurons damaged by the polio virus," said Bruno, "but we had no idea how psychological stress could cause fatigue and pain."

Bruno reviewed the autopsy material prepared in the 1940's by David Bodian, Johns Hopkins neuropathologist. Bodian studied the brains of persons infected by the polio virus to discover how it entered the central nervous system. Bruno said, "Bodian discovered that 'In all cases of poliomyelitis an encephalitis exists, whether paralytic symptoms are present or not.' He discovered that polio-induced lesions in the anterior hypothalamus, in the median raphe nuclei and in the reticular formation of the brainstem were very common and severe."

"This polio-induced damage to the hypothalamus can explain how psychological stress causes," said Bruno. He explained that the anterior hypothalamus serves as the 'brake' on the brain's response to psychological stress. Polioencephalitis damages hypothalamic neurons and may 'release the brake' allowing an exaggerated stress response and oversecretion of corticosteroids during psychological stress. "Corticosteroid secretion has been linked to failure of neurons by inhibiting their ability to use glucose. Corticosteroid secretion during stress could cause the metabolic failure of polio-damaged neurons in the median raphe, whose activity is thought to be responsible for maintaining wakefulness, and in the reticular formation, which activates the cortex and controls the ability to focus attention. Metabolic failure of these neurons would explain why people who had polio are overwhelmingly sleepy and fatigued and report that they are unable to focus their attention during and after psychological stress," said Bruno.

Behavioral evidence for an exaggerated stress response in people who had polio is suggested by the national survey finding that their Type A behavior score was 17 points higher than in non-disabled controls. "Polioencephalitis-induced damage to the hypothalamus may physiologically predispose people who had polio to develop the hard-driving, highly stressed Type A personality," Bruno said. He continued: "Polioencephalitis also damages other brain areas, such as the periaquiductal gray. This damage may decrease the production of endorphins and explain our 1985 finding that people who had polio are twice as sensitive to pain as are controls."



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