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NEW RESEARCH MAY EXPLAIN THE LINK BETWEEN HEMODIALYSIS AND BRAIN FUNCTION DECLINE

Hemodialysis causes decreased blood flow to the brain.

Highlights

- In a group of older patients undergoing hemodialysis, cerebral blood flow declined by 10%, from before the start to the end of hemodialysis.
- Cerebral blood flow declined in all brain regions that were examined, including the frontal, parietal, temporal, and occipital lobes; cerebellum; and thalamus.

Washington, DC (March 1, 2018) — A new study reveals that hemodialysis may reduce blood flow to the brain in older patients being treated for kidney failure. The findings, which appear in an upcoming issue of the *Journal of the American Society of Nephrology* (JASN), may help explain why previous studies have found a link between hemodialysis and worsening cognitive function in elderly patients.

More than 2 million people with kidney failure worldwide currently receive treatment with dialysis or a kidney transplant to stay alive, with the majority of patients undergoing hemodialysis. Recent studies have provided increasing evidence that although conventional in-center hemodialysis can prolong lives, it may also have negative effects on the brain that lead to cognitive deficits. Investigators have hypothesized that the repetitive circulatory stress of hemodialysis—which filters a patient’s blood outside the body before returning it—may reduce the blood supply to the brain; however, the mechanisms involved are unclear.

To investigate, Harmke Polinder-Bos, MD (University Medical Center Groningen, in The Netherlands) and her colleagues studied the effects of conventional hemodialysis on cerebral blood flow (CBF), measured by special positron emission tomography–computed tomography imaging tests. During single hemodialysis sessions in 12 patients ≥65 years of age, 3 scans were performed: before, early after the start of, and at the end of hemodialysis.

From before the start to the end of hemodialysis, CBF declined significantly by 10%, from an average of 34.5–30.5 ml/100 g per minute. CBF decline caused clinical symptoms in 1 patient. Regional CBF declined in all brain regions that were examined, including the

frontal, parietal, temporal, and occipital lobes; cerebellum; and thalamus. Hemodialysis treatment–related factors that might relate to CBF decline were a higher body temperature in patients, a greater ultrafiltration volume and ultrafiltration rate during dialysis, and a higher blood pH.

“The findings of this study are an important step in understanding the negative effect of hemodialysis on the brain,” said Dr. Polinder-Bos. “These findings might form a point of departure for further research to develop hemodialysis protocols that minimize or prevent cerebrovascular stress.”

In an accompanying perspective article, Dawn F. Wolfgram, MD (Medical College of Wisconsin and Clement Zablocki VA Medical Center) noted that for many patients there may be other options available for treating kidney failure. “Peritoneal dialysis, short frequent home dialysis, and nocturnal dialysis do not cause the significant hemodynamic stress that commonly accompanies conventional hemodialysis,” she wrote. “The underutilization of these alternative dialytic techniques in the United States may have allowed the complications of hemodialysis to become more apparent, especially as older and sicker patients begin renal replacement therapy with in-center hemodialysis.”

Study co-authors include David Vallez Garca PhD, Johanna Kuipers, Jan Willem J. Elting MD PhD, Marcel J.H. Aries MD PhD, Wim P. Krijnen PhD, Henk Groen MD PhD, Antoon T.M. Willemsen PhD, Peter J. van Laar MD PhD, Fijanne Strijkert MSc, Gert Luurtsema PhD, Riemer H.J.A. Slart MD PhD, Ralf Westerhuis MD PhD, Ron T. Gansevoort MD PhD, Carlo A.J.M. Gaillard MD PhD, and Casper F.M. Franssen MD PhD.

Disclosures: The authors have no conflicts of interest to declare.

The article, entitled “Hemodialysis Induces an Acute Decline in Cerebral Blood Flow in Elderly Patients,” will appear online at <http://jasn.asnjournals.org/> on March 1, 2018, doi: 10.1681/ASN.2017101088.

The accompanying perspective, entitled “Filtering the evidence: Is there a cognitive cost of hemodialysis?” will appear online at <http://jasn.asnjournals.org/> on March 1, 2018.

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