Hysterectomy is associated with increased levels of iron in the brain

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The human body has a love-hate relationship with iron. Just the right amount is needed for proper cell function, yet too much is associated with brain diseases like Alzheimer's and Parkinson's.

Science knows that men have more iron in their bodies and brains than women. These higher levels may be part of the explanation for why men develop these age-related neurodegenerative diseases at a younger age.

But why do women have less iron in their systems than men? One possible explanation for the gender difference is that during menstruation, iron is eliminated through the loss of blood.

Now, a new study by UCLA researchers confirms this suspicion and suggests strategies to reduce excess iron levels in both men and women. Dr. George Bartzokis, a professor of psychiatry at the Semel Institute for Neuroscience and Human Behavior at UCLA, and colleagues compared iron levels in women who had undergone a hysterectomy before menopause -- and thus, did not menstruate and lose iron -- with levels in postmenopausal women who had not had a premenopausal hysterectomy. They found the women who had undergone a hysterectomy had higher levels of iron in their brains than the women who hadn't, and further, they had levels that were comparable to men.

The research is reported in the current online edition of the journal *Neurobiology of Aging*.

The researchers used an MRI technique that can measure the amount of ferritin iron in the brain (ferritin is a protein that stores iron). They examined 39 postmenopausal women, 15 of whom had undergone a premenopausal hysterectomy. They looked at several areas in the brain three white-matter regions and and five gray-matter regions. Fifty-four male subjects were also imaged for comparison.

The researchers found that among the women, the 15 who had undergone a hysterectomy had concentrations of iron in the white-matter regions of the brain's frontal lobe that did not differ from the men's levels. Further, both the women who had a hysterectomy and the men had significantly higher amounts of iron than the women who had not undergone a hysterectomy. (Gray matter areas showed slight increases that were not statistically significant.)

Hysterectomy is the most common non-obstetrical surgery among women in the United States, with one in three having had a hysterectomy by age 60, said Bartzokis, who is also a member of the UCLA Laboratory of Neuro Imaging and the UCLA Brain Research Institute.

The results of this study, he said, suggest that menstruation-associated blood loss may explain gender differences in brain iron. And of interest to both men and women, he said, is that it's possible that brain iron can be influenced by peripheral iron levels -- that is, iron levels throughout the body -- and may thus be a modifiable risk factor for age-related degenerative diseases.

"Iron accumulates in our bodies as we age," Bartzokis said, "and in the brain contributes to the development of abnormal deposits of proteins associated with several prevalent neurodegenerative diseases, such as Alzheimer's disease, Parkinson's disease and dementia with Lewy bodies. Higher brain iron levels in men may be part of the explanation for why men develop these age-related neurodegenerative diseases at a

younger age, compared to women."

Bartzokis suggests it may be possible to reduce age-related brain iron accumulations by reducing the levels of iron throughout the body. This may have health benefits, especially in men, and may help counteract the negative effects of aging on the brain by reducing the iron available to catalyze, or speed up, damaging free-radical reactions.

There are a few ways body stores of iron can be reduced naturally, especially for premenopausal women. Menstruation leads to the elimination of iron through loss of blood. During pregnancy, iron is transferred from the woman to the fetus, and when women breast-feed, iron is transferred to the baby through the mother's milk.

"But there are things postmenopausal women and especially men can do to reduce their iron levels through relatively simple actions," Bartzokis said. "These include not overloading themselves with over-the-counter supplements that contain iron, unless recommended by their doctor; eating less red meat, which contains high levels of iron; donating blood; and possibly taking natural iron-chelating substances, molecules that bind to and remove iron, such as curcumin or green tea, that may have positive health consequences."

Provided by University of California - Los Angeles