

THE ASSOCIATION BETWEEN GFR AND BRAIN VOLUME IN ELDERLY

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Background: Chronic kidney disease is associated with structural brain changes, including white matter changes that may be related to cognitive decline common to this disorder. The effect of kidney dysfunction on brain volume is not known.

Objective: To examine the relationship between kidney function and whole brain volume.

Methods: Non-demented [Clinical Dementia Rating (CDR) 0, n=61] and early-stage Alzheimer's disease subjects (CDR 0.5 and 1, n=57) aged 60 and over were enrolled for this study. Dual energy x-ray absorptiometry was used to assess LM. Glomerular filtration rate (GFR) was estimated using 3 formulae: Cockcroft-Gault (CG), 4-variable MDRD (MDRD), and lean mass (LM) [$LM-GFR = (2.4 * LM) - (0.75 * LM * \text{serum creatinine})$]. Linear regression (controlling for age) was used to examine the relationship between brain volume, white matter volume and GFR.

Results: Mean age in controls versus demented subjects was $(72 \pm 7.3$ vs. 74 ± 6.7 , $p = 0.18$). Brain volume was associated with GFR using CG formula ($\beta = 0.036$, $p = 0.008$) and LM-GFR equation ($\beta = 0.045$, $p = 0.007$). Similarly, white matter volume was associated with GFR using CG formula ($\beta = 0.023$, $p = 0.02$) and LM-GFR equation ($\beta = 0.049$, $p = 0.0001$). However, MDRD was not associated with brain volume ($\beta = 0.018$, $p = 0.19$) or white matter volume ($\beta = 0.000$, $p = 0.99$).

Conclusion: GFR is associated with both whole brain volume and white matter volume. These associations were observed more consistently when using weight-based GFR formulae suggesting that AD-related changes in body composition may be important to consider when estimating GFR in geriatric population. Further longitudinal studies are needed to explore whether GFR may modify the brain aging process.