

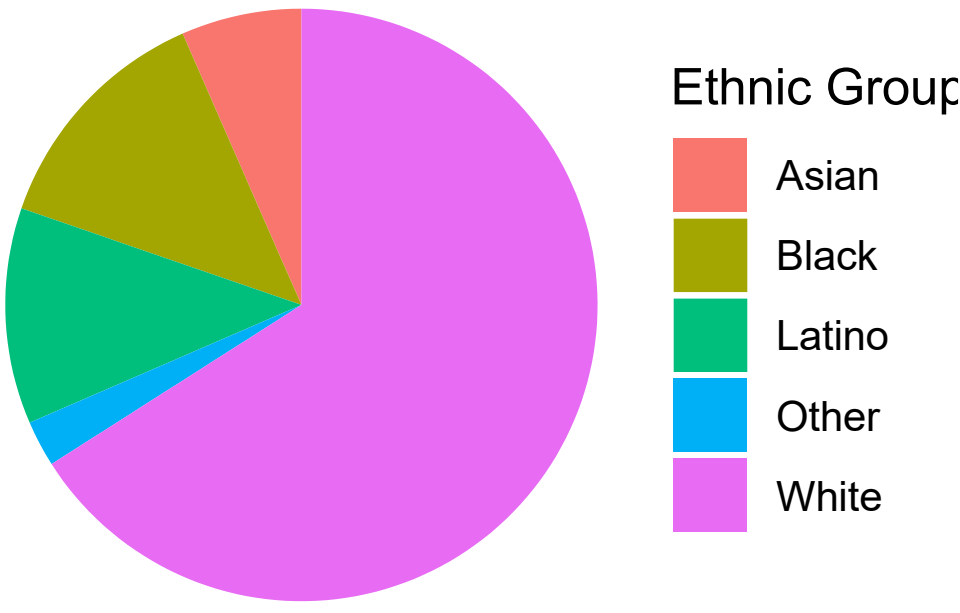
BACKGROUND

- Clinical blood tests that indicate disease risk may serve as markers for brain health and aging-related cognitive decline. ^{1,2,3,4}
- We aimed to determine the relationship of such blood markers with cognition and brain structure in a large adult sample (N=1007; age: M=62 (SD=15), 36-98 years) from the Adult Aging Brain Connectome (AABC) & HCP-Aging studies. ⁵
- We focused on blood markers commonly used in clinical settings, standardized cognitive tests, and volume of subcortical brain structures important for learning and memory (e.g., hippocampus).

METHODS

- Participants provided fasting blood samples, cognitive test data, and T1-weighted high-resolution MRIs (3T).
- Blood markers: high-sensitivity C-reactive protein (hsCRP), albumin, creatinine, high-density lipoprotein (HDL), low-density lipoprotein (LDL), triglyceride, hemoglobin-A1C (HbA1c), vitamin D.
- Cognitive tests: immediate memory recall (RAVLT), executive function (NIH Toolbox EF tasks, Trails B), and Montreal Cognitive Assessment (MoCA)
- Factor analysis of cognitive tests -> 3 factors: memory, fluid IQ, crystallized IQ.
- Brain volumes computed using Freesurfer.
- General linear models to examine relationships between blood markers, cognition, and regional volumes
- Covariates: age, sex, ethnicity, study site, total intra-cranial volume

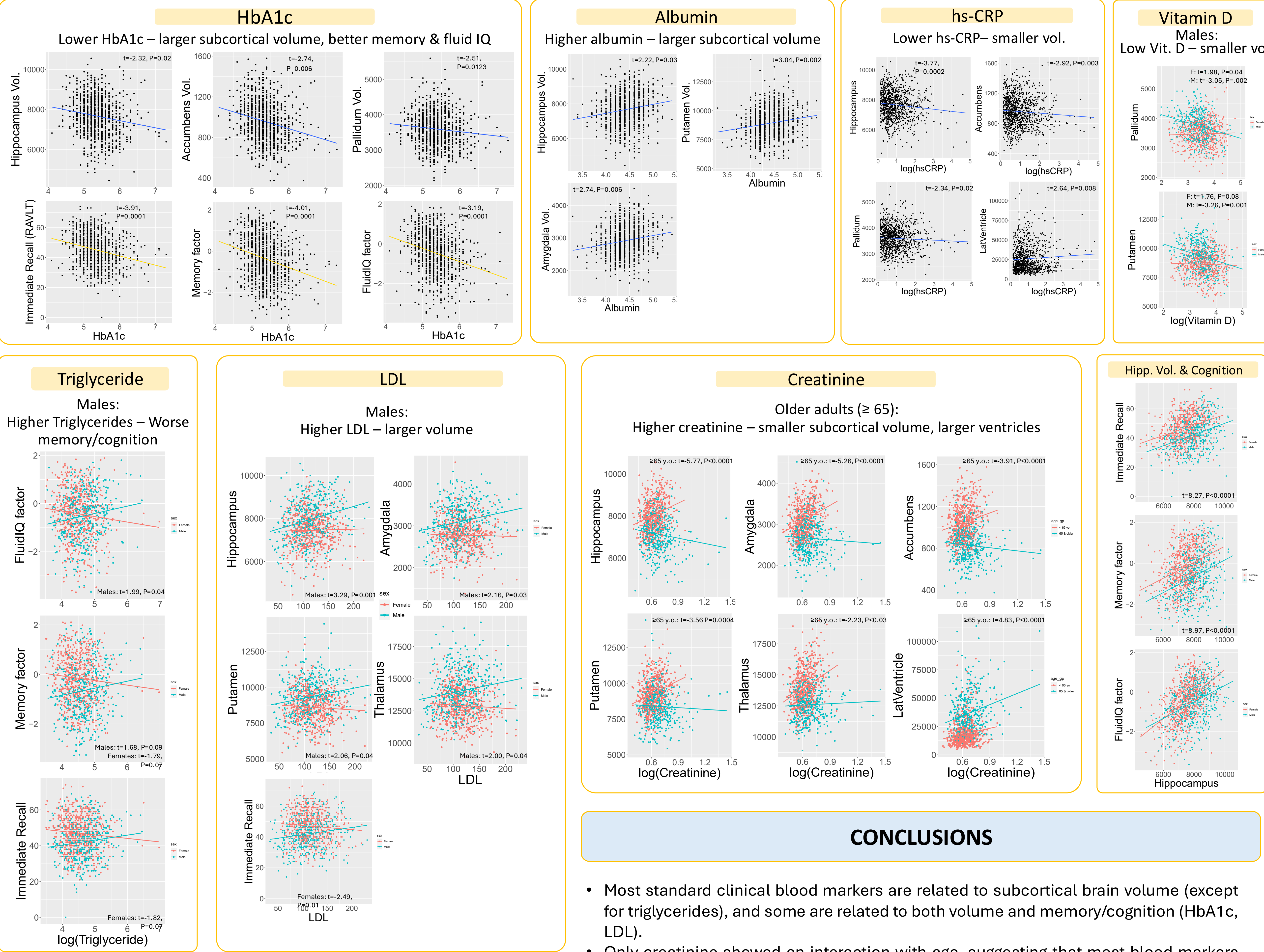
Participants	
N	1007
Age (M, SD)	M=62 (SD=15) 36-98 years
Sex (F/M)	635 / 476



Blood Markers

- Hemoglobin-A1C (HbA1c):** A measure of average blood sugar levels over the past 2-3 months, HbA1c is used to diagnose and monitor diabetes and assess long-term blood sugar control.
- Albumin:** A protein produced by the liver; helps regulate blood volume and maintain osmotic pressure. Abnormal levels may indicate liver/kidney disease, malnutrition, or inflammation.
- High-sensitivity C-reactive protein (hsCRP):** A marker of inflammation; levels rise in response to inflammation and can indicate risk for cardiovascular disease and other inflammatory conditions.
- Vitamin D:** A fat-soluble vitamin essential for bone health, immune function, and overall well-being; levels are influenced by sun exposure, diet, and supplements, and low levels may be associated with various health conditions.
- Triglyceride:** A type of fat found in the blood; stored in fat cells and released as energy when needed. Elevated levels may increase the risk of heart disease.
- High-density lipoprotein (HDL):** ("good" cholesterol); helps remove LDL cholesterol from the bloodstream, reducing the risk of heart disease.
- Low-density lipoprotein (LDL):** ("bad" cholesterol); can build up in the walls of arteries, leading to atherosclerosis and an increased risk of heart disease.
- Creatinine:** A waste product produced by muscle metabolism; is filtered out of the blood by the kidneys. Elevated levels may indicate impaired kidney function.

RESULTS



CONCLUSIONS

- Most standard clinical blood markers are related to subcortical brain volume (except for triglycerides), and some are related to both volume and memory/cognition (HbA1c, LDL).
- Only creatinine showed an interaction with age, suggesting that most blood markers may not be direct indicators of age-related brain changes.
- Interactions with sex for several markers were found, suggesting sex-specific blood biomarkers of brain health.
- Overall, high HbA1c (blood sugar), low albumin, and high hsCRP (inflammation) appear to indicate potential brain health risks (lower brain volume).
- Males are particularly susceptible to the impact of high triglycerides and LDL on brain volume.
- Poor kidney function (high creatinine) in older adults (≥65) seems to be related to poor brain health.
- Behavioral changes (e.g., diet) that modify blood markers (e.g., LDL, HbA1c) may in turn restore brain volume, in turn, improving brain and cognitive health.

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