**Supplementary Tables**

Supplementary Table 1. Summary of demographics, methodologies, and results for studies included in systematic review.

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| **Study, Cohort, and Participants**  | **Sample Demographics** | **Vascular Profiles and Other Cognitive Risk Factors** | **Vascular Risk Assessment & Measures** | **Cognitive & Neuroimaging****Measures** | **Main Findings** |
| Becker et al. (2009)N=635 (67.4% HIV+)**Cohort / Location(s):** MACS / Pittsburgh, Baltimore, DC, Chicago, Los Angeles**Study Design:**Cross-sectional, retrospective | **Age, Mean (SD):****HIV-:** 52.0 (8.1)**HIV+:** 48.4 (6.4)**Sex:** 100% Male**Race/Ethnicity:** **HIV+:** 56.5% NH White, 43.5% non-White**HIV-:** 64.7% NH White, 35.3% non-White **Education (College degree):** **HIV+:** 45.0%**HIV-:** 54.9%**HIV Characteristics:****-cART (%):** NR**-HIV Viral Load, Mean Ln (SD):** 2.50 (1.28)**-cART Regimen:** NR | **Pre-Existing CVD (self-reported):** 0% in entire sample**T2DM:****HIV+:** 9.9%**HIV-:** 10.5%**HTN:****HIV+:** 50.1%**HIV-:** 58.8%**Smoking (pack-years):****HIV+:** 14 (19)**HIV-:** 12.4 (18)**Hepatitis C:** NR  | **Methodology:** Fasting blood sample (glucose, A1c, lipid panel, GFR); blood pressure measurement, height and weight measurement; electron beam tomography, CT, cardiac ultrasound**VRFs:** HTN, T2DM, dyslipidemia, obesity, GFR, coronary artery calcium, cIMT | **Cognitive Domains:** Psychomotor speed, memory**Cognitive Impairment Definition:** Test scores transformed to Z-scores based on HIV- reference group; Z-scores dichotomized as ≤0 = impaired, >0 = normal | Increased cIMT and lower GFR were associated with worse psychomotor speed.Abnormal coronary artery calcification was a risk factor for poorer performance on memory tasks. |
| Becker et al. (2012)N=160 (52.5% HIV+)**Cohort / Location(s):** MACS / Pittsburgh, Baltimore, DC, Chicago, Los Angeles**Study Design:** cross-sectional, retrospective | **Age, Mean (SD):****HIV+:** 56.3 (3.9)**HIV-:** 57.7 (6.3)**Sex:** 100% Male**Race/ethnicity:****HIV+:** 59% NH White, 41% non-White**HIV-:** 54% NH White, 46% non-White**Education (years), Mean (SD):****HIV+:** 15.7 (2.7)**HIV-:** 16.7 (2.5)**HIV Characteristics:****-cART Use:** NR**-Viral Load:** NR**-cART Regimen:** NR | **CVD:** 0% **T2DM:****HIV+:** 9%**HIV-:** 11%**HTN:****HIV+:** 34%**HIV-:** 28%**Smoking:** NR**Hepatitis C:** NR | **Methodology:**  Fasting blood sample (glucose, A1c, lipid panel), blood pressure measurement, electron beam tomography, CT, cardiac ultrasound**VRFs:** HTN, T2DM, dyslipidemia, coronary artery calcium, cIMT  | **Cognitive Domains:** Psychomotor speed, verbal memory, visual memory, verbal fluency, neuropsychological summary score**Cognitive Impairment Definition:** Raw scores transformed to demographically adjusted T-scores or standard scores; Global impairment score was calculated**Neuroimaging:** Brain volumes quantified using 3T MRI (correction for ICV and scanner model) | Increased age and HIV+ status were associated with lower gray matter and white matter volumes. VRFs were not associated with brain volume. |
| Ciccarelli et al. (2015)N=245 (HIV+ only)**Cohort / Location(s):** Patients at HIV outpatient clinic / Italy**Study Design:** Longitudinal, prospective | **Age, Median (IQR):** 46 (40-51) **Sex:** 77% Male**Race/Ethnicity:** 92% Italian, 8% non-Italian **Education (years), Median (IQR):** 13(8-14)**HIV Characteristics:****-cART Use:** 95%**-Viral Load (<50 copies/mL):** 88%**-cART Regimen:** NR | **T2DM:** 6%**Dyslipidemia:** 66%**Obesity:** 5%**Current Smoking:** 50%**Pathological cIMT:** 31%**Hepatitis C:** 18% | **Methodology:** Fasting blood sample (lipid panel, glucose), blood pressure measurement, height and weight measurement, medical and medication history review, family history review of CVD, electron beam tomography or CT, cardiac ultrasound**VRFs:** T2DM, dyslipidemia, obesity, cIMT, Framingham 10-year risk score, current smoker, previous cardiovascular events, family history of CVD, cIMT  | **Cognitive Domains:** Verbal memory, attention and working memory, psychomotor speed, language **Cognitive Impairment Definition:** Abnormal Z-score (≤ 1 SD) in ≥2 cognitive domains.  | Baseline CIMT was associated with cognitive impairment at 2-year follow-up.Baseline BMI was associated with memory decline. |
| Ciccarelli et al. (2019)N=140(HIV+ only)**Cohort /****Location(s):** Patients at HIV outpatient clinic / Italy**Study Design:** Cross-sectional, retrospective | **Age, Median (IQR):** 47 (41-53) **Sex:** 73% Male**Race/Ethnicity:** 95% Italian, 5% non-Italian **Education (years), Median (IQR):** 13(8-16)**HIV Characteristics:****-cART Use:** 100%**-Viral Load (<50 copies/mL):** 88%**-cART Regimen:** NR | **T2DM:** 5%**Dyslipidemia:** 41%**HTN:** 15%**Previous Cardiovascular Event:** 3%**Hepatitis C:** 20% | **Methodology:** Fasting blood sample (lipid panel, glucose), blood pressure measurement, height and weight measurement, medical and medication history review, family history review of CVD**VRFs:** T2DM, dyslipidemia, hypertension, previous cardiovascular events | **Cognitive Domains:** Verbal memory, attention and working memory, psychomotor speed, language **Cognitive Impairment Definition:** Abnormal Z-score (≤ 1 SD) in ≥2 cognitive domains. | Alexithymia was independently associated with impaired psychomotor speed.Cardiovascular risk factors were not significantly associated with HAND. |
| Crystal et al. (2011)N=1426 (66.9% HIV+)**Cohort / Location(s):** WIHS / San Francisco, Los Angeles, Chicago, DC, New York City**Study Design:** Cross-sectional, retrospective | **Age, Mean (SD):****HIV+:** 38.5 (10.1)**HIV-:** 43.1 (8.8)**Sex:** 100% Female**Race/Ethnicity:****HIV+:** 66% AA; 17.7% Latinx; 9.7% NH White; 3.3% Other**HIV-:** 63.4% AA; 22.3% Latinx; 13% NH White; 4.5% Other**Education:** NR**HIV Characteristics:****-cART Use:** NR**-Viral Load:** NR**-cART Regimen:** NR | **T2DM:****HIV+:** 17.2%**HIV-:** 18.6%**HTN:****HIV+:** 31.3%**HIV-:** 27.7%**MI:****HIV+:** 1.7%**HIV-:** 2.9%**Smoking:** NR**Hepatitis C:** NR | **Methodology:** Fasting blood sample (lipid panel, GFR), blood pressure measurement, medical and medication history review, cardiac ultrasound**VRFs:** Dyslipidemia, GFR, HTN, history of MI, self-reported T2DM, cIMT | **Cognitive Domains:** Attention, processing speed, executive functioning **Cognitive Impairment Definition:** N/A | Carotid lesions and increased cIMT were associated with worse performance on an executive functioning test.  |
| Ding et al. (2017)N=690 (50% HIV+)**Cohort / Location(s):** Community cohort / China**Study Design:** Cross-sectional, retrospective | **Age, Mean (SD):****HIV+:** 52.7 (9.5)**HIV-:** 52.8 (9.4)**Sex:****HIV+:** 77.7% Male**HIV-:** 77.7% Male**Race/Ethnicity:** NR, Chinese cohort**Education (< Middle School)****HIV+:** 47%**HIV-:** 47%**HIV Characteristics:****-cART Use:** 87%**-Viral Load (<400 copies/mL):** 92.6%**-cART Regimen:** NR | **Previous Cardiovascular Event:****HIV+:** 3.8%**HIV-:** 3.8%**T2DM:****HIV+:** 5.5%**HIV-:** 6.1%**HTN:****HIV+:**  23.8%**HIV-:** 31.9%**Current Smoking:****HIV+:** 25.5%**HIV-**: 29.9%**Hepatitis C:** NR | **Methodology:** Blood pressure measurement, height and weight assessment, medical and medication history review**VRFs:** T2DM (self-reported), previous cardiovascular events, HTN, obesity, current smoker | **Cognitive Domains:** Used cognitive screening measure only (MMSE and International HIV Dementia Scale [IHDS])**Cognitive Impairment Definition:** IHDS cutoff score of 10; MMSE cut-offs adjusted for literacy and education level | Older age and HIV+ status were associated with worse performance on the International HIV Dementia Scale and MMSE composite scores.In the HIV+ group, older age, smoking, and HTN were associated with neurocognitive impairment. |
| Dufouil et al. (2015)N=400 (HIV+ only)**Cohort / Location(s):** ANRS CO3 Aquitaine cohort / France**Study Design:** Longitudinal, prospective | **Age, mean (SD):** 47.2 (10.2)**Sex:** 79.2% Male**Race/Ethnicity:** NR, French cohort**Education (Bachelor’s degree):** 50.2%**HIV Characteristics****-cART Use:** 95%**-Viral Load (<500 copies/mL):** 84.5% **-cART Regimen:** 15.0% current efavirenz use; 52.3% history of stavudine use, 51.5% history of didanosine use, 71.3% history of idanovir use  | **Prior cerebro-/cardiovascular event:** 6.5%**T2DM / Pre-T2DM:** 10% / 8.2%**HTN:** 19.9%**Hypercholesterolemia:** 43.9%**Hypertriglyceridemia:** 50.6%**Current Smoking:** 49.8%**Hepatitis C:** 7.2%**IV Drug Use:** 15.0% | **Methodology:** Blood sample (glucose, lipid panel), blood pressure measurement, height and weight measurement, medical and medication history review**VRFs:** T2DM, hyperglycemia, HTN, dyslipidemia, obesity, current smoker, history of cerebro- or cardiovascular event | **Cognitive Domains:** Attention, processing speed, executive functioning, verbal and visual memory, motor function**Cognitive Impairment Definition:** Normal, asymptomatic cognitive impairment, mild neurocognitive disorder, and HIV-associated dementia classifications based on cognitive Z-scores and functional impairment | HIV+ participants with T2DM performed worse on all cognitive tests.HIV+ participants with prediabetes scored worse than participants with euglycemia on five tests.HIV+ participants with T2DM at baseline had greater decline on executive functioning and memory tests. |
| Elicer et al. (2018)N=78 (HIV+ only)**Cohort / Location(s):** MHBB / New York City **Study Design:** Longitudinal, prospective | **Age, Mean (SD):** 52 (8.8)**Sex:** 41.2% Male**Race:** 57.3% Black/AA; 34.1% White; 4.3% Multi-racial; 4.3% Unknown**Ethnicity:** 71.3% NH, 28.7% Hispanic**Education (years), Mean (SD):** 12.26 (3.12)**HIV Characteristics:** **-cART Use:** 87.8%**-Viral Load (<500 copies/mL):** 74.3% **-cART Regimen:**NR | **CVD:** 15.9%**Cerebrovascular Disease:** 12.2%**T2DM:** 19.5%**HTN:** 36.6%**Obesity:** 25.0%**Hyperlipidemia:** 39.6%**Current Smoking:** 42.1%**Hepatitis C:** NR | **Methodology:**  Medical and medication history review, height and weight measurement, neuroimaging review for evidence of a prior parenchymal infarct or hemorrhage (when available)**VRFs:** Self-reported HTN, T2DM, and dyslipidemia, current smoker, obesity, self-reported sudden onset of neurologic event compatible with a CNS vascular event | **Cognitive Domains:** Motor, executive functioning, working memory, learning, verbal fluency, processing speed**Cognitive Impairment Definition:** Cognitive group classification based on cognitive change between baseline and follow-up visits (e.g. stable, improved, declined)  | Motor dysfunction was associated with cognitive impairment and presence of cerebrovascular disease.   |
| Fabbiani et al. (2013)N=245 (HIV+ only)**Cohort / Location(s):** Patients at HIV outpatient clinic / Rome, Italy**Study Design:** Cross-sectional, retrospective | **Age, Median** **(IQR):** 46 (39-52)**Sex:** 75.5% Male**Race/Ethnicity:** NR, Italian sample **Education (years), Median (IQR):** 11(8-13)**HIV Characteristics:****-cART Use:** 93.9%**-Viral Load (<50 copies/mL):** 84.1%**-cART Regimen:** 51.7% PI; 39.1% NRTI; 9.1% Other combinations  | **Previous Vascular Event:** 4.9%**T2DM:** 6.1%**HTN:** 15.1 %**Dyslipidemia:** 61.2%**Current Smoking:** 54.3%**cIMT ≥0.9 mm:** 31.8%**Framingham 10-year Risk Score, Median (IQR):**  4 (1-9)**Hepatitis C:** 23.7% | **Methodology:**  Fasting blood sample (glucose, lipid panel), blood pressure measurement, height and weight measurement, medical and medication history review, ultrasonography to measure carotid intima-media thickness**VRFs:** Previous CV events, family history of CV events, obesity, T2DM, HTN, dyslipidemia, cIMT, Framingham 10-year risk score, current smoker | **Cognitive Domains:** Memory, attention, executive functioning, psychomotor speed, language**Cognitive Impairment Definition:** Individual test scores below age-, gender- and education-adjusted normative cut-off (-1 SD); Global cognitive impairment (GCI) score obtained by summing binary scores assigned to each test (0 if normal and 1 if impaired) | T2DM and increased cIMT were independently associated with lower cognitive performance. Current smoking was associated with slower psychomotor speed.Cognitive impairment was more prevalent in those with two or more VRFs, abnormal cIMT, and T2DM. |
| Foley et al. (2010)N=98 (HIV+ only)**Cohort / Location(s):** Community sample / Los Angeles**Study Design:** Cross-sectional, retrospective | **Age, Mean (SD):** 44.2 (7.6)**Sex:** 80.6% Male**Race/Ethnicity:** 15.7% NH White; 70.4% AA; 9% Latinx; 1.6% Asian; 3.3% Other**Education (years), Mean (SD):** 13.1 (1.9)**HIV Characteristics:****-cART Use:** NR**- Viral Load, Mean Ln (SD):**  8.1 (2.4)**-cART Regimen:** NR  | **T2DM:** 6.7%**HTN:** 19.1%**Hepatitis C:** 0% (Study exclusion criteria) | **Methodology:** Medical and medication history review for following medical conditions: T2DM, HTN, MI, CHF**VRFs:** Self-reported T2DM, HTN, MI, and CHF | **Cognitive Domains:** Verbal fluency, executive functioning, processing speed, attention and working memory, learning and memory, motor function**Cognitive Impairment Definition:** N/A  | Cerebrovascular risk was associated with slower processing speed.Participants with untreated cerebrovascular risk had worse performance on processing speed, learning/memory, and executive functioning relative to treated participants.  |
| Gomez et al. (2017)N=288 (HIV+ only)**Cohort / Location(s):** Patients at Southern Alberta HIV Clinic / Calgary, Canada**Study Design:** Cross-sectional, retrospective | **Age, Mean:** 46.84**Sex:**87.08% Male**Race/Ethnicity:** 69.2% NH White**Education (>12 years):** 70.1%**HIV Characteristics:****-cART Use:** 94%**Viral load (<50 copies/mL):** 82.6% **-cART Regimen:** NR | **Cardiac Conditions:** 17.25% **T2DM:** 8.6% **Lipodystrophy:** 7.15% **Dyslipidemia:** 20.4% **Smoking:** NR**Hepatitis C:** 6.4%  | **Methodology:**  Medical and medication history via chart review**VRFs:** T2DM, cardiac conditions (unspecified), lipodystrophy, dyslipidemia | **Cognitive Domains:** Attention/working memory, learning, memory, motor, language, executive functions, decision-making**Cognitive Impairment Definition:** HAND status defined by cognitive performance ($\leq $ -1 SD) in $\geq $2domains, neurological evaluation, and functional impairment assessment  | The HAND group was impaired on all Game Dice Task measures, while the neurocognitively normal group was not.In the HAND group, older age, presence of metabolic conditions, and cART side effects predicted poorer Game Dice Task performance. |
| Grima et al. (2012)N=116 (HIV+ only)**Cohort / Location(s):** Patients at HIV outpatient clinic / Italy**Study Design:** Cross-sectional, retrospective | **Age, Median (IQR):** 44 (37-49)**Sex:** 78.4% Male **Race/Ethnicity:** 95.7% Italian born; 4.3% non-Italian born **Education (years), Median (IQR):** 9 (8-13)**HIV Characteristics:****-cART Use:** 97.4%**Viral load (<20 copies/mL):** 79.3% **-cART Regimen:** 37.1% PI; 50.4% NNRTI; 12.3% Other combinations | **Previous Cardiovascular Event:** 3.4%**T2DM:** 6.0%**HTN:** 16.4%**Dyslipidemia:** 54.3%**Current Smoking:** 54.3%**Hepatitis C:** 31.9% **Past IV Drug Use:** 31% | **Methodology:**  Medical and medication history review, ultrasonographic assessment of ophthalmic artery resistance index (abnormal if above 0.72 at left or right side)**VRFs:** Obesity, T2DM, HTN, dyslipidemia, current smoking, family history of CVD | **Cognitive Domains:** Fluency, attention, processing speed, memory, executive function, motor function**Cognitive Impairment Definition:** Impaired cognitive function ($\leq $ 1 SD) relative to normative group in $\geq $2 domains adjusted for age, gender, education; Used global cognitive impairment score  | Abnormal ophthalmic artery resistance index was independently associated with increased risk of neurocognitive impairment.Abnormal ophthalmic artery resistance index was independently associated with worse performance on tasks of attention and executive functioning, and psychomotor speed. |
| Gustafson et al. (2013)N=1690 (70.8% HIV+)**Cohort / Location(s):** WIHS / San Francisco, Los Angeles, Chicago, DC, New York City**Study Design:** Cross-sectional, retrospective | **Age, Mean (SD):****HIV+:** 42.5 (8.9)**HIV-:** 38.4 (10.1)**Sex:** 100% Female**Race/Ethnicity:****HIV+:** 62.4% AA; 21.5% NH White; 12.7% Latinx; 2.8% Other**HIV-:** 67.2% AA; 18.2% NH White; 11.1% Latinx; 3.4% Other**Education (**$\geq $**12 years):****HIV+:** 64.1%**HIV-:** 67.8%**HIV Characteristics:****-cART Use :** >80%**-Viral load, Mean (SD):** 20,626.1 (107073.0)**-cART Regimen:** NR | **T2DM:****HIV+:** 7.1%**HIV-:** 6.6%**HTN:** **HIV+:** 45.4%**HIV-:** 37.3%**BMI** $\geq $ **30:** **HIV+**: 7.5% **HIV-**: 8.3%**Smoking:** NR, but included as covariate**Hepatitis C:** NR**Recent Marijuana Use:** 19.9% | **Methodology:**  Comprehensive medical history interview, fasting blood sample (lipid panel), standard blood pressure measurement, anthropomorphic measurements**VRFs:** Dyslipidemia, HTN, MI, self-reported T2DM | **Cognitive Domains:** Attention, processing speed, executive functioning**Cognitive Impairment Definition:** N/A | In HIV+ women, obese BMI was associated with better performance on set-shifting, and worse performance on response inhibition. In HIV- women, obese BMI was associated with worse performance on a processing speed task. |
| Gutierrez, Byrd, Yin, & Morgello (2019)N=94 (HIV+ only)**Cohort / Location(s):** MHBB / New York City**Study Design:** Longitudinal, retrospective, post-mortem | **Age, Mean (SD):** 56 (3.8)**Sex:** 68% Male**Race/Ethnicity:** 54% NH Black; 26% Latinx; 20% NH White**Education:** NR**HIV Characteristics:****-cART Use:** 68%**-Viral Load (<50 copies/mL):** 28%**-cART Regimen:** NR | **HTN:** 61%**T2DM:** 19%**Dyslipidemia:** 30%**Smoking:** 56%**Hepatitis C:** 44% | **Methodology:**  Medical and medication history review, blood sample, lumen diameter and arterial wall thickness quantification during autopsy**VRFs:** Arterial thickness, HTN, T2DM, dyslipidemia, and smoking | **Cognitive Domains:** Motor, processing speed, verbal fluency, working memory, executive functioning**Cognitive Impairment Definition:** American Academy of Neurology nosology of HIV-associated dementia and minor cognitive-motor disorder; Age, education, gender-corrected norms for domain and global scores | Greater arterial thickness was associated with worse global cognition, verbal fluency, and processing speed. HAND diagnosis at time of death was associated with greater arterial thickness and smaller arterial lumen.Use of cART and viral suppression at time of death was associated with larger luminal diameter. |
| Huck et al. (2018)N=1662 (72% HIV+)**Cohort / Location(s):** WIHS / San Francisco, Los Angeles, Chicago, DC, New York City**Study Design:** Longitudinal, prospective | **Age, Median (IQR):** **HIV+:** 42 (36-48)**HIV-:** 38 (31-46)**Sex:** 100% Female**Race/Ethnicity:****HIV+:** 59% NH Black, 29% Latinx; 10% NH White**HIV-:** 64% NH Black; 27% Latinx; 7% NH White**Education proxy (WRAT-3 Reading Score), Median (IQR):** **HIV+:** 93 (77-105)**HIV-:** 93 (79-107)**HIV Characteristics:****-cART Use:** 64%**-Baseline Viral Load (<50 copies/mL):** 51%**-cART Exposure, Median years (IQR):** PI: 1.5 (0-5.0); NNRTI: 0.5 (0-3.0); NRTI: 5.0 (2.0-8.0) | **T2DM:****HIV+:** 21%**HIV-:** 21%**HTN:****HIV+:** 27%**HIV-:** 27%**Smoking:** **HIV+:** 42%**HIV-:** 51%**Hepatitis C:****HIV+:** 29% **HIV-:** 18%**IV Drug Use History:** **HIV+:** 26%**HIV-** 18% | **Methodology:** Fasting blood sample (lipid panel, GFR), standard blood pressure measurement, anthropomorphic measurements, ultrasonography for carotid arterial stiffness**VRFs:** HTN, T2DM, dyslipidemia, coronary heart disease, GFR, Framingham 10-year all-CVD risk | **Cognitive Domains:** Attention, processing speed, executive functioning**Cognitive Impairment Definition:** N/A | Greater carotid stiffness was associated with cognitive decline on attention/processing speed, executive functioning, and psychomotor speed over 10 years. HIV+ participants had greater carotid stiffness, but HIV status did not modify the relationship between vascular stiffness and cognitive functioning.  |
| Jumare et al. (2019)N=761(HIV+ only)**Cohorts/Location(s):** China, India, Nigeria**Study Design:** Longitudinal, prospective | **Age, Median (IQR):** 35(9)**Sex:** 58.2% Male**Cohort Study Population, N (%):** China 115(85); India 52(26); Nigeria 44(28)**Education, Median (IQR):** 9(5)**HIV Characteristics:****-cART Use:** Antiretroviral naïve in Indian and Nigerian cohorts, mixed naïve and cART use in Chinese cohort**-Viral Load, log-transformed Mean (SD):** 3.88(1.27)**-cART Regimen:** NR | **T2DM:** 1.5%**HTN: 14%** | **Methodology:** General medical assessment, anthropomorphic measures**VRFs:** Hypertension, BMI | **Cognitive Domains:** Motor, executive functioning, attention/working memory, learning, memory, verbal fluency, processing speed**Cognitive Impairment Definition:** Global Deficit Score ≥0.5 | Odds of global neurocognitive impairment (NCI) were 48% higher among the overweight vs. normal weight participants. |
| Khuder et al. (2019)N=119 (HIV+ only)**Cohorts / Location(s):** CHARTER, MACS / Baltimore, New York City, San Diego, Galveston, Seattle, St. Louis, Pittsburgh, DC, Chicago, Los Angeles**Study Design:** Longitudinal, prospective | **Age, Mean:** 43.02**Sex:** 91.0% Male**Race/Ethnicity:** 41.75% NH White; 31% NH Black; 11.25% Latinx; 7% Other**Education (years), Mean:** 14.35**HIV Characteristics:****-cART Use:** NR**-Viral Load (<50 copies/mL):** 51%**-cART Regimen:** 36.9% PI | **Hepatitis C:** 17.5% | **Methodology:** Medical and medication history review, fasting blood sample (lipid panel, insulin)**VRFs:** Hyperinsulinemia, plasma c-peptide levels, dyslipidemia | **Cognitive Domains:** Fluency, attention, processing speed, memory, executive function, motor function**Cognitive Impairment Definition:** Global Deficit Score ≥0.5. Summary regression change distribution used to define cognitive trajectory (e.g. cognitively stable, improved, or declined) | Participants exhibiting cognitive decline had hyperinsulinemia and elevated plasma c-peptide levels at baseline.  |
| Lake et al. (2015)N=780 (65.3% HIV+)**Cohort / Location(s):** MACS / Pittsburgh, Baltimore/DC, Chicago, Los Angeles**Study Design:** Cross-sectional, retrospective | **Age, Median (IQR):** **HIV+:** 53 (48-58)**HIV-:** 55 (51-62)**Sex:** 100% Male**Race/Ethnicity:****HIV+:** 64% White/Other; 37% AA**HIV-:** 72% White/Other; 28% AA**Education (>12 years):****HIV+:** 77%**HIV-:** 85%**HIV Characteristics:****cART Use:** 98%**-Viral Load (<50 copies/mL):** 81% **-cART Regimen:** 51% PI; 91% NRTI; 48% NNRTI | **T2DM:****HIV+:** 16%**HIV-:** 13%**Metabolic Syndrome:** **HIV+:** 32%**HIV-:** 24%**Dyslipidemia:** **HIV+:** 77%**HIV-:** 73%**Current Smoking:****HIV+:** 32%**HIV-:** 21%**Past Smoking****HIV+:** 43%**HIV-:** 54%**Hepatitis C:** **HIV+:** 13%**HIV-:** 6% | **Methodology:** Medical and medication history review, height and weight measurement, fasting blood sample, non-contrast CT of adipose tissue**VRFs:** Obesity, visceral, subcutaneous abdominal adipose tissue, and subcutaneous thigh adipose tissue | **Cognitive Domains:** Attention, processing, speed, executive functioning**Cognitive Impairment Definition:** N/A | In HIV+ men, greater adiponectin, and inflammation were associated with worse cognition. Greater visceral adipose tissue was associated with better neuropsychological performance.  In HIV+ men, inflammatory markers were not associated with visceral adipose tissue, but it was correlated in HIV- men. |
| McCutchan et al. (2012)N=130 (HIV+ only)**Cohort / Location(s):** CHARTER / Baltimore, New York City, San Diego, Galveston, Seattle, St. Louis**Study Design:** Cross-sectional, retrospective | **Age, Mean (SD):** 46.2 (8.8)**Race/Ethnicity:** 57% NH White 57%; 43% Other **Sex:** 87% Male**Education (years), Mean (SD):** 13.1(2.6)**HIV Characteristics:****-cART Use:** 82%**-Viral Load (<50 copies/mL):** 65% **-cART Regimen:** NR | **T2DM:** 8%**BMI, Mean (SD):** 26 (5)**Smoking:** NR**Hepatitis C:** NR | **Methodology:** Self-reported medical conditions or medication use, standard blood pressure measurement, anthropometric measurements, fasting blood samples (glucose, lipid panel, insulin)**VRFs:** T2DM, HTN, adiposity, dyslipidemia, insulin, insulin resistance (HOMA-IR), leptin | **Cognitive Domains:** Individual tests not described, but utilized 12 test battery**Cognitive Impairment Definition:** Global Deficit Score ≥0.5  | Obesity, greater waist circumference, and T2DM were associated with neurocognitive impairment.  |
| Montoya et al. (2017)N=108 (66.7% HIV+)**Cohort / Location(s):** UCSD California HNRP Successfully Aging Seniors with HIV Study / San Diego, California**Study Design:** Cross-sectional, retrospective | **Age, Mean (SD):** **HIV+:** 58.2 (6.5)**HIV-:** 59.0 (5.9)**Sex:****HIV+:** 76.9% Male**HIV-:** 61.1% Male**Race/Ethnicity:** **HIV+:** 84.7% NH White**HIV-:** 63.9% NH White**Education, Mean (SD):** **HIV+:** 14.6 (2.6)**HIV-:** 14.3 (2.7)**HIV Characteristics:****-cART Use:** 100%**-Viral Load (<50 copies/mL):** 100% **-cART Regimen:** 50% protease inhibitor use | **T2DM:** **HIV+:** 27.8%**HIV-:** 19.4%**HTN:** **HIV+:** 44.4%**HIV-:** 36.1%**Current Smoking: HIV+:** 34.3%**HIV-:** 37.5%**Past Smoking:** **HIV+:** 41.7%**HIV-:** 41.7%**Hepatitis C:** **HIV+:** 22.2%**HIV-:** 16.7% | **Methodology:**  Medical interview of comorbid conditions, blood sample, anthropomorphic measurements, immunoassay for vascular remodeling-related biomarkers**VRFs:** HTN, BMI, dyslipidemia, smoking plasma vascular remodeling biomarkers (angiopoietin 2, Tie-2, and vascular endothelial growth factor; VEGF) | **Cognitive Domains:** Processing speed, learning, memory, executive functioning, verbal fluency, working memory, motor **Cognitive Impairment Definition:**  N/A | Plasma vascular remodeling biomarkers were associated with worse cognitive function among HIV+ participants (lower Tie2 and higher VEGF values).  |
| Mukerji et al. (2016)N=789 (34.6% HIV+)**Cohort / Location(s):** MACS / Pittsburgh, Baltimore/DC, Chicago, Los Angeles**Study Design:** Longitudinal, prospective | **Age, Median (IQR):** **HIV+:** 50 (50-52)**HIV-:** 51.5 (50-55)**Sex:** 100% Male**Race/Ethnicity:** **HIV+:** 75.8% NH White; 18.3% NH Black; 2.2% Latinx, 1.8% Other**HIV-:** 83.1% NH White, 12% NH Black, 2.9% Latinx, 1.95% Other**Education (>12 years):** **HIV+:** 87.5%**HIV-:** 89.7**HIV Characteristics:****-cART Use:** >95%**-Viral Load, Median (IQR):** 40 (40-40)**-cART Regimen:** 34.8% azidothymidine; 41.8% efavirenz; 69.6% PI; 38.8% didanosine, stavudine, nucleoside analogue zalcitabine; 36.2% abacavir  | **Statin Use:** **HIV+:** 51.3%**HIV-:** 31.8%**Current Smoking: HIV+:** 30.8% **HIV-:** 24.8%**Hepatitis C:** **HIV+:** 14.3%**HIV-:** 6.8% | **Methodology:**  Medical and medication history review, fasting blood sample (lipid panel)**VRFs:** Lipid panel markers (total cholesterol, LDL-C, HDL-C, triglycerides) | **Cognitive Domains:** Processing speed, learning, memory, executive functioning, verbal fluency, working memory, and motor functioning**Cognitive Impairment Definition:** N/A  | Higher cholesterol and LDL-C levels were associated with cognitive decline.Higher HDL-C levels were associated with attenuated cognitive decline.Statin use in HIV+ men with high cholesterol was associated with a slower rate of decline. |
| Nakamoto et al. (2012)N=22 (HIV+ only)**Cohort / Location(s):** HAHC / Hawaii**Study Design:** Cross-sectional, retrospective | **Age, Mean (SD):** 58 (6)**Sex:** 86% Male**Race/Ethnicity:** 77% NH White; 9% Asian; 5% Hispanic; 5% Native Hawaiian; 5% Native American **Education (years), Mean (SD):** 16 (2)**HIV Characteristics:****cART Use:** 95%**Viral Load (<50 copies/mL):** 82% **cART Regimen:** 18% protease inhibitor; 82% other (unspecified) | **T2DM:** 18% **HTN:** 45%**Elevated LDL:** 50% **Low HDL:** 64%**Current or Prior Smoking:** 45% **WMHs on MRI:** 36% | **Methodology:** Medical and medication history review, fasting blood sample, blood pressure measurement; MRI scan**VRFs:** T2DM, HTN, hypercholesterolemia, smoking, WMHs | **Cognitive Domains:** Psychomotor speed, verbal memory, visual memory, verbal fluency, attention/working memory, language, executive functioning, motor functioning, global cognition**Cognitive Impairment Definition:** N/A**Neuroimaging:** Brain volumes quantified using diffusion-weighted MRI (correction for ICV and scanner model) | Impaired glucose metabolism (i.e., impaired fasting glucose, impaired glucose tolerance, or T2DM) was associated with significantly higher mean diffusivity in the caudate but lower fractional anisotropy in the hippocampus and caudate.No significant correlations between neuroimaging measures and any cognitive domains were found. |
| Nakamoto et al. (2011)N=281 (56.2% HIV+)**Cohort / Location(s):** HAHC / Hawaii**Study Design:** Cross-sectional, retrospective | **Age, Mean (SD):** **HIV+:** 55 (5.3)**HIV-:** NR**Sex:** **HIV+:** 70% male**HIV-:** NR**Race/Ethnicity:** **HIV+:** 70% non-Hispanic**HIV-:** NR**Education (years), Mean (SD):** **HIV+:** 14.6 (2.6)**HIV-:** NR**HIV Characteristics:** **cART Use:** 75%**Viral Load (copies/mL log10), Mean (SD):** 2.6 (1.3)**cART Regimen:** NR | **T2DM:** **HIV+:** 11%**HIV-:** NR**HTN: HIV+:** 45%**HIV-:** NR**Hypercholesterolemia:** **HIV+:** 37%**HIV-:** NR**Current or Prior Smoking:** **HIV+:** 70%**HIV-:** NR | **Methodology:** Medical and medication history review, fasting blood sample, standard blood pressure measurement**VRFs:** T2DM, HTN, hyper-cholesterolemia, smoking  | **Cognitive Domains:** Psychomotor speed, motor function, memory, working memory/attention, global cognition**Cognitive Impairment Definition:** N/A | HIV+ status, T2DM, and smoking were independent predictors of global cognitive function.HIV+ status, and HTN were independently associated with working memory, concentration, and attention. No interactions between HIV status and cerebrovascular risk factors on composite neuropsychological scores. |
| Okafor et al. (2017)N=90 (HIV+ only)**Cohort / Location(s):** The Miriam Hospital/Brown University cohort / Providence, Rhode Island**Study Design:** Cross-sectional, retrospective | **Age, Mean (SD):** 45.9 (9.4)**Sex:** 64.4% female**Race/Ethnicity:** 64.4% non-Hispanic White, non-White 35.6%**Education (>12 years):** 40%**HIV Characteristics:** **% on cART:** 87%**Viral Load:** NR**cART Regimen:** NR | **Obesity:** 15%**Hepatitis C:** 34%**Lifetime Substance Abuse/Dependence (alcohol and/or illicit drugs):** 80% | **Methodology:**  Medical and medication history review, fasting blood samples**VRFs:** BMI | **Cognitive Domains:** Information processing, attention/working memory, executive functioning, learning, memory, psychomotor speed**Cognitive Impairment Definition:**  Deficit scores were calculated for all domains  | Obesity was associated with slower processing speed compared to participants with normal BMI. Inflammatory marker IL-16 was associated with slower processing speed, but did not mediate the relationship between obesity and processing speed.  |
| Patel et al. (2013)N=366 (HIV+ only)**Cohort / Location(s):** Community sample / Los Angeles**Study Design:** Cross-sectional, retrospective | **Age, Mean:** 42.94**Sex:** 80.6% Male **Race/Ethnicity:** 65.6% AA; 17.6%NH White; 11.1% Latinx; 4% Other **Education (years), Mean:** 13.06**HIV Characteristics:** **-cART Use:** 100%**­-Viral Load (<50 copies/mL):** 37.7%**-cART Regimen:** NR | **Vascular risk present (T2DM, HTN, heart failure, stroke, MI):** 34.0%**Hepatitis C:** 16.8%**Current Stimulant Use, Abuse, or Dependence:** 29.9% | **Methodology:** Self-reported health conditions**VRFs:** HTN, T2DM, MI, CHF, or stroke | **Cognitive Domains:** Attention/working memory, processing speed, learning and memory, verbal fluency, executive functioning, motor**Cognitive Impairment Definition:** N/A | Higher CVD risk scores were associated with greater cognitive impairment relative to lower CVD risk scores.Higher CVD risk severity in the younger group (age <50) was more predictive of attention/working memory and executive functioning, whereas in the older group, CVD risk severity was more predictive of verbal fluency and learning/memory. |
| Portilla et al. (2019)N=84 (HIV+ only)**Cohort / Location(s):** Alicante, Spain**Study Design:** Cross-sectional, retrospective | **Age, Mean (SD):** 46.02(7.5)**Sex:** 77.4% male**Race/Ethnicity:** Spanish cohort **Education:**Primary: 35.7Secondary: 28.6University: 35.7**HIV Characteristics:** **-cART Use:** 100%**­-Viral Load (<50 copies/mL):** NR, but all participants had to have viral load of <50 copies/mL in the past 12 months to be eligible for study**-cART Regimen:** NR | **Current smokers:** 15.5% | **Methodology:** Self-reported conditions (study excluded comorbid T2DM, hypertension, CVD), medical chart review**VRFs:** subclinical atherosclerosis | **Cognitive Domains:** Attention/working memory, processing speed, learning and delayed recall, verbal fluency, executive functioning, motor**Cognitive Impairment Definition:** Impaired cognitive function ($\leq $ -1 SD) relative to normative group in $\geq $2 domains adjusted for age, gender, education | Subclinical atherosclerosis was not associated with cognitive impairment. However, participants with subclinical atherosclerosis had significantly lower delayed recall performance. |
| Rubin et al. (2019)N = 972(32.5% HIV)**Cohort/Location(s):** MACS / Los Angeles; Pittsburgh/Columbus, Ohio; Baltimore/Washington, DC; Chicago**Study Design:** Cross-sectional and longitudinal, retrospective | **Age, Mean(SD):** HIV+: 49.1(6.6)HIV-: 51.4(8.1)**Sex:** HIV+: 100% maleHIV-: 100% male**Race/Ethnicity:** White:HIV+: 62.7%HIV-: 75.7% Black:HIV+: 29.4%HIV-: 17.8% Other:HIV+: 7.9%HIV-: 6.5%**Education (years), Mean:** High School:HIV+: 18.4%HIV-: 12.7%Any College:HIV+: 53.2%HIV-: 49.5%Graduate:HIV+: 28.4%HIV-: 37.9%**HIV Characteristics:** **-cART Use:** 100%**­-Viral Load (<50 copies/mL):** 92.4%**-cART Regimen:** Efavirenz use: 25.3%Stavudine use: 16.5%Other: 58.2% | **HTN:** HIV+: 37.7%HIV-: 36.9%**Current tobacco use:**HIV+: 33%HIV-: 24%**Former tobacco use:**HIV+: 37.7%HIV-: 42.7%**Hepatitis C:**HIV+: 5.3%HIV-: 10.8% | **Methodology:**  Medical and medication history review, standard blood pressure measurement**VRFs:** HTN, BMI, waist circumference | **Cognitive Domains:** Attention/working memory, processing speed, learning, memory, verbal fluency, executive functioning, motor**Cognitive Impairment Definition:**  Did not explicitly state cutoffs, but reported small to medium effect sizes as defined by 2- to 4-point T-score differences or 0.2–0.4 SDs, greater decline as 1-2 SDs below mean T-score | Higher adiposity was associated with worse cognition cross-sectionally in both the HIV+ and HIV- groups. Higher adiposity was associated with greater cognitive decline over a 10-year average follow-up period in HIV- group, while higher adiposity appeared to be protective for the HIV+ group. |
| Saloner et al. (2019)N=857 (85.6% HIV+)**Cohort / Location(s):** CHARTER / Baltimore, New York City, San Diego, Galveston, Seattle, St. Louis**Study Design:** Cross-sectional, retrospective | **Age, Mean:** 55.0 (HIV+ only)**Sex:** 84.6% Male (HIV+ only)**Race/Ethnicity:** 58.6% NH White (HIV+ only)**Education (years), Mean:** 13.58 (HIV+ only)**HIV Characteristics:** **-cART Use:** 88.4%**­-Viral Load (<50 copies/mL):** 72.8%**-cART Regimen:** NR | **T2DM:** 16.2% (HIV+ only)**HTN:** 42.6% (HIV+ only)**Hepatitis C:** 36.7% (HIV+ only) | **Methodology:**  Medical and medication history review, fasting blood sample**VRFs:** HTN, hyperlipidemia, BMI, T2DM | **Cognitive Domains:** Verbal fluency, executive functioning, processing speed, learning, memory, attention/working memory, motor skills**Cognitive Impairment Definition:** SuperAger defined as demographically corrected (sex, race, education) global neurocognitive performance within normal range for 25-year-old | Absence of T2DM, younger age, higher verbal IQ were associated with increased likelihood of SuperAger status. |
| Sanford et al. (2019) N=174 (68.3% HIV+)**Cohort / Location(s):** Washington University in St. Louis (WUSTL); St. Louis, MO**Study Design:** Cross-sectional and longitudinal, retrospective | **Age, Mean (SD):****HIV+:** 55.8 (7.9)**HIV-:** 56.2 (11.7)**Sex:****HIV+:** 81% Male**HIV-:** 51% Male**Race/Ethnicity:** African American**HIV+:** 56%**HIV-:** 58%**Education, Mean (SD):****HIV+:** 13.2(2.8)**HIV-:** 13.8(2.2)**HIV Characteristics:** **-cART Use:** 100%-**Viral Load, <50 copies/mL (%):** 92.6%**-cART Regimen:** NNTI: 72%NRTI: 6%PI: 52%II: 18%FI: 2% | **HTN:** HIV+: 19%HIV-: 13%**Current Smoking:** HIV+: 52%HIV-: 35%**WMH lesion loads cm3, Mean (SD):**HIV+: 1.4 (0.8-3.0)HIV-: 1.4 (0.9, 2.2) | **Methodology:** Medical and medication history review, blood pressure measurement, MRI for WMH**VRFs:** HTN, adiposity (BMI, waist circumference, waist-to-hip ratio), WMH | **Cognitive Domains:**Verbal learning and memory, attention/working memory, executive functioning, verbal fluency**Cognitive Impairment Definition:** Rasch analysis used to estimate cognitive ability as a continuous measure, no normative data used | Hypertension, smoking, BMI and waist circumference, were not associated with cognitive performance.Higher WMH lesion loads in both HIV+ and HIV- participants were associated with reduced subcortical volumes, thinner cortical thickness and worse cognitive functioning. |
| Sattler et al. (2015)N=152 (HIV+ only)**Cohort / Location(s):** CHARTER / Baltimore, New York City, San Diego, Galveston, Seattle, St. Louis**Study Design:** Cross-sectional, retrospective | **Age, median (IQR):** 49 (22-69)**Sex:** 85% Male**Race/Ethnicity:** 52% NH White; 32% AA; 14% Latinx**Education (years), Median (IQR):** 13 (7-20)**HIV Characteristics:** **-cART Use:** 99%**­-Viral Load (<50 copies/mL):** 82%**-cART Regimen:** NR | **T2DM:** 10%**Obesity:** 33.6%**Smoking History Ever:** 79%**Hepatitis C:** 26%**IV Drug Use Ever:** 25% | **Methodology:**  Medical and medication history review, anthropometric measurements, fasting blood sample**VRFs:** BMI, waist circumference, T2DM | **Cognitive domains:** Global deficit score calculated from 12-test battery**Cognitive Impairment Definition:** Global deficit score $\geq $0.50, and mildly impaired performance on at least half of the tests | Waist circumference and IL-6 were associated with worse global deficit score.Waist circumference was associated with global deficit score both directly and indirect path mediated by IL-6.  |
| Schouten et al. (2016)N=177 (58.2% HIV+)**Cohort / Location(s):** AGEhIV / Amsterdam, Netherlands **Study Design:** Cross-sectional, retrospective | **Age, Median (IQR):****HIV+:** 54 (49-62)**HIV-:** 54 (49-61)**Sex:** 100% Male**Race/Ethnicity:** NR, Dutch sample**Education (International Standard Classification of Education), Median (IQR):****HIV+:** 5(5-6)**HIV-:** 5(5-6)**HIV Characteristics:** **-cART Use:** 100%**­-Viral Load (<40 copies/mL):** 100%**-cART Regimen:** 21% current efavirenz use; 47% prior efavirenz use | **CVD:** **HIV+:** 8% **HIV-:** 6%**T2DM:****HIV+:** 4%**HIV-:** 6% **HTN:** **HIV+:** 39%**HIV-:** 38% **Current Smoking: HIV+:** 30%**HIV-:** 19%**Prior Smoking: HIV+:** 46%**HIV-:** 44%**Hepatitis C:** **HIV+:** 1%**HIV-:** 0%**IV Drug Use History:** **HIV+:** 0%**HIV-:** 1% | **Methodology:**  medical and medication history review, height and weight measurement, blood sample (lipid panel, GFR)**VRFs:** HTN, T2DM, BMI, waist-to-hip ratio, dyslipidemia, CVD, family history CVD, estimated GFR | **Cognitive Domains:** Fluency, attention, information processing speed, executive function, memory, motor function**Cognitive Impairment Definition:** Multivariate normative comparison; Hotelling’s T2 statistic reflects the degree of cognitive deviation of each HIV-1-infected participant compared with the HIV-reference group | Decreased cognitive performance was associated with history of prior CVD, impaired renal function, T2DM, and elevated waist-to-hip ratio.Cognitive impairment was associated with history of prior CVD, impaired renal function, and T2DM.  |
| Soontornniyomkij et al. (2014)N=144 (HIV+ only)**Cohort / Location(s):** CNTN / California**Study Design:** Cross-sectional, retrospective, post-mortem | **Age at Death, Median (IQR):** 45 (13.3)**Sex:** 83.3% Male**Race/Ethnicity:** 57.6% NH White; 21.5% Latinx; 16% NH Black; 3.5% Asian; 1.4% Other**Education:** NR**HIV Characteristics:** **-cART Use:** 44.4%**­-Viral Load:** NR**-cART Regimen:** 79.7% PI | **T2DM:** 11.3%**HTN:** 29.1%**Dyslipidemia:** 14.9%**Lifetime Smoking History:** 32.4%**Hepatitis C:** 41.5% | **Methodology:**  Medical and medication history review, standard histopathology**VRFs:** Cerebral small vessel disease (CSVD) quantification, self-reported HTN, T2DM, dyslipidemia, and smoking | **Cognitive Domains:** Processing speed, attention/working memory, learning, memory, verbal fluency, executive functioning, motor/psychomotor**Cognitive Impairment Definition:** At least mild impairment in $\geq $2 cognitive domains | Mild and moderate/severe CSVD were associated with protease inhibitor-based HAART exposure after adjusting for T2DM mellitus. Moderate/severe CVSD was associated with T2DM controlling for CART exposure.HIV-Associated Neurocognitive Disorder was associated with mild CVSD.  |
| Su et al. (2016)N=173 (59.5% HIV+)**Cohort / Location(s):** AGEhIV / Amsterdam, Netherlands**Study Design:** Cross-sectional, retrospective | **Age, Median (IQR):****HIV+:** 54 (49-61)**HIV-:** 53 (49-50)**Sex:** 100% Male**Race/Ethnicity:** NR, Dutch sample**Education proxy (Dutch Adult Reading), Median (IQR):****HIV+:** 101(95-112)**HIV-:** 103(96-112)**HIV Characteristics:** **-cART Use:** 100%**­-Viral Load (<40 copies/mL):** 100%**-cART Regimen:** 40% PI | **T2DM:** **HIV+:** 6%**HIV-:** 4% **HTN:** **HIV+:** 40%**HIV-:** 36% **Smoking (pack-years):** **HIV+:** 9.0 (0.0-31.6)**HIV-:** 2.3 (0.0-11.8)**Hepatitis C:** **HIV+:** 1%**HIV-:** 0% | **Methodology:**  Medical and medication history review, pulse wave velocity to measure vascular stiffness, blood sample (A1c, lipid panel), blood pressure measurement, WMH **VRFs:** HTN, T2DM, adiposity (BMI, waist circumference, waist-to-hip ratio), dyslipidemia, history of CVD, arterial stiffness, WMH | **Cognitive Domains:** Fluency, attention, processing speed, memory, executive function, motor function**Cognitive Impairment Definition:** Multivariate normative comparison; significant deviation from the HIV- control group | In HIV+ men, higher total WMH was associated with poorer global cognitive function, and poorer performance on verbal fluency.HIV+ status was associated with worse cognitive function, but these differences were attenuated when accounting for WMH. |
| Su et al. (2017)N=169 (59.2% HIV+)**Cohort / Location(s):** AGEhIV / Amsterdam, Netherlands**Study Design:** Cross-sectional, retrospective | **Age, Median (IQR):****HIV+:** 54 (48-61)**HIV-:** 53 (49-60)**Sex:** 100% Male**Race/Ethnicity:** NR, Dutch sample**Education:** NR**HIV Characteristics:** **-cART Use:** 100%**­-Viral Load (<40 copies/mL):** 100%**-cART Regimen:** 47% PI | **CVD:** **HIV+:** 8%**HIV-:** 6%**T2DM:** **HIV+:** 5%**HIV-:** 4%**HTN:** **HIV+:** 39%**HIV-:** 35%**Lipid-lowering medication:****HIV+:** 12%**HIV-:** 10%**Smoking (pack-years), Median (IQR):** **HIV+:** 19.8 (7.7-34.5)**HIV-:** 8.0 (2.4-19.5)**Hepatitis C:** NR | **Methodology:**  Medical and medication history review, blood pressure measurement, anthropomorphic measurement, blood sample (lipid panel, A1c), arterial spin labeling (ASL) for measuring cerebral blood flow**VRFs:** HTN, T2DM, adiposity (BMI, waist circumference, waist-to-hip ratio), dyslipidemia history of CVD, arterial stiffness | **Cognitive Domains:** Fluency, attention, processing speed, memory, executive function, motor function**Cognitive Impairment Definition:**  Multivariate normative comparison; impaired if cognitive profile significantly deviates from those of the HIV- control group | CBF was decreased in the HIV+ group relative to controls, and was associated with increased waist circumference and triglycerides, and prior AIDS.HIV+ participants had decreased gray matter volume relative to controls.  |
| Valcour et al. (2006)N=145 (HIV+ only)**Cohort / Location(s):** HAHC / Hawaii**Study Design:** Cross-sectional, retrospective | **Age, Mean:** 46.44**Sex:** 78.67% Male**Race/Ethnicity:** 56% NH White**Education (years), Mean:** 14.23 **HIV Characteristics:****-cART Use:** 73%**-Viral Load (<50 copies/mL):** 50.33%**-cART Regimen:** 76% NRTI; 56% PI  | **T2DM:** NR**HTN:** 17.9%**Smoking:** NR**Hepatitis C:** NR | **Methodology:**  Medical and medication history review, fasting blood samples, standard blood pressure measurement, insulin resistance estimate using homeostasis model of insulin resistance**VRFs:** HTN, BMI, insulin resistance, T2DM | **Cognitive Domains:** Verbal and visual memory, working memory/attention/concentration, learning, executive functioning, language, motor function**Cognitive Impairment Definition:** Global Deficit Score approach using a cut-off of 0.85 for HIV-associated dementia; cut-off of 0.40 for diagnosis of Minor Cognitive Motor Disorder  | Participants were at increased risk of more cognitive impairment as insulin resistance increased. Among nondiabetic participants, higher insulin resistance was associated with lower performance on cognitive summary scores. |
| Valcour et al. (2012)N=1547 (77.6% HIV+)**Cohort / Location(s):** WIHS / New York City, Los Angeles, San Francisco, DC, and Chicago**Study Design:** Cross-sectional, retrospective | **Age, Mean (SD):** **HIV+:** 42 (8.9)**HIV-:** 37 (9.8)**Sex:** 100% female**Race/Ethnicity:**11.2% NH White; H White 9.5%;60.3% NH; 3.3% H Black; 12.7% Other Hispanic; 0.6% Asian/Pacific Islander; 0.6% Native American/Alaskan; 1.6% Other**Education (>12 years):** 34%**HIV Characteristics:** **-cART Use:** 63.4%-**Viral Load, Mean (SD):** 21,790**-cART Regimen:** NR | **T2DM:** 0% (T2DM excluded)**HTN:** 39.6%**Smoking:** 41.4%**Hepatitis C:**17.9% | **Methodology:** Medical and medication history review, fasting blood samples, insulin resistance estimate using homeostasis model of insulin resistance**VRFs:** HTN, insulin resistance, adiposity (BMI, waist-to-hip ratio), smoking, current cocaine or heroin use | **Cognitive Domains:** Attention, executive functioning, processing speed**Cognitive Impairment Definition:** N/A | Increased insulin resistance was associated with worse performance on one processing speed task. HIV status did not modify the relationship between insulin resistance and processing speed performance. |
| Valcour et al. (2015)N=994 (66.3% HIV+)**Cohort / Location(s):** WIHS / New York City, Los Angeles, San Francisco, DC, and Chicago**Study Design:** Cross-sectional, retrospective | **Age, Mean (SD):** 45.1 (9.3)**Sex:** 100% Female**Race/Ethnicity:** 66.2% NH Black; 20.0% Latinx; 10.5% NH White; 3.3% Other**Education (years), Mean:** 12.45**HIV Characteristics:** **-cART Use:** >60%**-Viral Load (<50 copies/mL):** 54% -**cART Regimen:** NR | **T2DM:** 0% (participants with T2DM excluded)**HTN:** 35%**Current Smoking:** 28.9%**Past Smoking:** 43.2%**Hepatitis C:** 17.7% | **Methodology:**  Medical and medication history review, fasting blood samples, anthropomorphic measurements **VRFs:** HTN, insulin resistance, cholesterol, BMI, waist-to-hip ratio, smoking, current cocaine or heroin | **Cognitive Domains:** Learning/memory, attention, processing speed, executive functioning, language, motor function**Cognitive Impairment Definition:** N/A | Increasing insulin resistance was associated with lower performance on attention, and verbal memory recognition tasks.An HIV status by insulin resistance interaction was found in attention tasks, with worse performance in HIV+ women. |
| Watson et al. (2017)N=90 (67.8% HIV+)**Cohort / Location(s):** UCSF community / San Francisco**Study Design:** Longitudinal, retrospective | **Age, Median (IQR):****HIV+** 63 (60-80)**HIV-** 65 (61-69)**Sex:****HIV+:** 90% Male**HIV-:** 94% Male**Race/Ethnicity:****HIV+:** 92.3% NH White**HIV-:** 96.5% NH White**Education (years), Mean (SD):****HIV+:** 16.4 (2.3)**HIV-:** 17.9 (1.8)**HIV Characteristics:** **-cART Use:** 97%**-Viral Load (<50 copies/mL):** 62.3%**-cART Regimen:** NR | **T2DM:****HIV+:** 11% **HIV-:** 0%**HTN:****HIV+:** 63%**HIV-:** 48%**Hypercholesterolemia:****HIV+:** 63%**HIV-:** 31%**Smoking:** NR**Hepatitis C:** NR | **Methodology:**  Medical and medication history review, standard blood pressure measurement, fasting blood sample**VRFs:** HTN, T2DM, obesity, dyslipidemia, smoking history | **Cognitive Domains:** Psychomotor speed, attention, memory, visuospatial, executive functioning**Cognitive Impairment Definition:** N/A**Neuroimaging:** WMHs, brain volume, diffusion tensor imaging | HIV+ participants had less cerebral white matter relative to controls, and were more likely to have WMH above the 95th percentile. Total WMH volume was associated with HTN, and inversely associated with performance on executive functioning, and psychomotor speed. |
| Wright et al. (2010)N=292 (HIV+ only)**Cohort / Location(s):** SMART / Thailand, Australia, Brazil, North America**Study Design:** Cross-sectional, retrospective | **Age, Median (IQR):**40 (35-45.5)**Sex:** 58.2% Male**Race/Ethnicity:** 50.7% Asian; 19.5% Black; 29.8% Other/Unknown**Education (**$\leq $**12 years):** 53.8%**HIV Characteristics:** **-cART Use:** 92.5%**-Viral Load (<400 copies/mL):** 87.6% -**cART Regimen:** NR | **Pre-existing CVD or stroke:** 3.4%**T2DM:** 3.8%**Lipid-lowering drugs:** 8.6%**Current Smoking:** 23.3%**Recreational Drug Use:** 5.5% | **Methodology:**  Medical and medication history review, blood sample (lipid panel)**VRFs:** CVD, T2DM, HTN, dyslipidemia; BMI, current smoking | **Cognitive Domains:** Attention, processing speed, executive functioning, motor function**Cognitive Impairment Definition:** Average of the 5 Z-scores from the individual tests in the battery. Score below 0 indicates below-average performance | Prior CVD, HTN, and hypercholesterolemia were associated with worse cognitive performance. Smoking, T2DM, higher BMI, higher LDL were not associated with cognitive impairment, but were associated with worse performance on some tests.  |
| Wright et al. (2015)N= 608 (HIV+ only)**Cohort / Location(s):** START / Thailand, United Kingdom/Australia, Brazil, Europe, Argentina/Chile**Study Design:** Cross-sectional, retrospective | **Age, Mean (SD):** 34 (27-42)**Race/Ethnicity:** 47.9% NH White; 16.3% Latinx; 15.6% Asian; 15% NH Black; 5.3% Other**Sex:** 89% male**Education (>12 years): 55%****HIV Characteristics:** **-cART Use:** 0% (cART naïve) **-Viral Load (<400 copies/mL):** 4.1% **cART Regimen:** N/A | **Prior CVD Diagnosis:** 1.3%**T2DM:** 4%**HTN:** 16%**Hyperlipidemia:** 11%**Smoking:** 37%**Hepatitis B or C:** 6.1% | **Methodology:**  Medical and medication history review, standard blood pressure measurement, fasting blood sample (glucose, lipid panel)**VRFs:** HTN, T2DM, dyslipidemia, Framingham risk score, smoking | **Cognitive Domains:** Processing speed, verbal learning/memory, language fluency, motor function**Cognitive Impairment Definition:** Internally standardized Z-scores 1 SD below the sample mean in ≥2 cognitive domains | Higher BMI was associated with better neuropsychological performance. T2DM and higher Framingham risk score were associated with worse neuropsychological performance.  |
| Yaldizli et al.(2006)N=87 (54.0% HIV+)**Cohort / Location(s):** Community outpatient STD clinic / Germany**Study Design:** Cross-sectional, retrospective | **Age, Mean (SD):****HIV+:** 46 (12)**HIV-:** 42 (12)**Sex:****HIV+:** 87.2% Male**HIV-:** 47.5% Male**Race/Ethnicity:** NR **Education (High School Degree):****HIV+:** 28.9%**HIV-:** NR**HIV Characteristics:** **-cART Use:** 85.1%-**Viral Load, Mean (SD):** 38,907 (105,690)**-cART Regimen:** 44.7% PI | **T2DM:** **HIV+:** 6.4%**HIV-:** 0%**HTN****HIV+:** 10.6%**HIV-:** 5%**Hypercholesterolemia:****HIV+:** 40.4%**HIV-:** 0%**Smoking:****HIV+:** 55.3%**HIV-:** 22.5%**Hepatitis C:** NR | **Methodology:**  Medical and medication history review, extracranial duplex sonography for cIMT**VRFs:** HTN, T2DM, dyslipidemia, cIMT, smoking | **Cognitive Domains:** Attention, executive functioning, memory, motor function**Cognitive Impairment Definition:** Scores below the 15th percentile or below 2 SD of data in the literature for healthy subjects in the same age range | HIV+ participants had higher cIMT relative to controls. In HIV+ participants, cIMT measurements did not correlate with neuropsychological performance or severity of immunodeficiency.  |
| Yang et al. (2018)N = 2049 (43.9% HIV+) **Cohort / Location(s):** MACS / Baltimore/DC, Chicago, Los Angeles, and Pittsburgh **Study Design:** Longitudinal, prospective | **Age (**$\leq $**50 years):****HIV+:** 70%**HIV-:** 85%**Sex:** 100% Male**Race/Ethnicity:****HIV+:** 51.7% NH White; 37.1% NH Black; 11.2% Other**HIV-:** 64.9% NH White; 28.2% NH Black; 6.9% Other**Education (College):****HIV+:** 69.4%**HIV-:** 79.3%**HIV Characteristics:** **-cART Use:** NR**-Viral Load (<50 copies/mL):** 82.4% **-cART Regimen:** NR | **T2DM:****HIV+:** 7.9%**HIV-:** 7%**HTN:** **HIV+:** 26.5%**HIV-:** 30.7%**Current Smoking:****HIV+:** 41.2%**HIV-:** 34.2%**Past Smoking**:**HIV+:** 31.6%**HIV-:** 37.3%**Hepatitis C:** **HIV+:** 9.9%**HIV-:** 5.9%**IV Drug Use:****HIV+:** 2.2%**HIV-:** 1.8% | **Methodology:**  Medical and medication history review, fasting blood sample (glucose), self-reported T2DM**VRFs:** glycemic status (impaired or normal), T2DM | **Cognitive Domains:** Attention, visuoconstruction, verbal, executive functioning, memory, motor**Cognitive Impairment Definition:** N/A | Glucose metabolism abnormalities were greater among HIV+ participants compared to controls and was associated with worse cognitive performance.Participants with T2DM had worse motor, executive functioning, and verbal performance, with uncontrolled diabetics performing the worst. |
| Yu et al. (2019)N= 201 (54.2% HIV+)**Cohort / Location(s):**  UCSD Multi-dimensional Successfully Aging Study / San Diego, California**Study design:** Cross-sectional, retrospective | **Age, Mean (SD):****HIV+:** 50.5 (8.5)**HIV-:** 51.1 (2.3)**Sex:****HIV+:** 83.5% Male**HIV-:** 69.6% Male**Race/Ethnicity:** Non-Hispanic White:**HIV+:** 53.2%**HIV-:** 69.6%Non-Hispanic Black:**HIV+:** 19.3%**HIV-:** 14.1%Hispanic:**HIV+:** 19.3%**HIV-:** 15.2%Other:**HIV+:** 8.3%**HIV-:** 1.1%**Education, Mean (SD):****HIV+:** 13.9(2.4)**HIV-:** 15.1(2.3)**HIV Characteristics:** **-cART Use:** 95.4%-**Viral Load, <50 copies/mL (%):** 92.6%**-cART Regimen:** NR | **T2DM:****HIV+:** 27.5%**HIV-:** 14.1%**HTN:****HIV+:** 51.4%**HIV-:** 40.2%**Hypertriglyceridemia:****HIV+:** 43.1%**HIV-:** 18.5%**Metabolic Syndrome:****HIV+:** 39.5%**HIV-:** 20.7% | **Methodology:** Self-reported medical conditions or medication use, standard blood pressure measurement, anthropometric measurements, fasting blood samples (glucose, lipid panel, insulin)**VRFS:** Hypertension, diabetes, hypertriglyceridemia, metabolic syndrome | **Cognitive Domains:**Global, verbal fluency, learning, recall, executive function, working memory, processing speed, motor**Cognitive Impairment Definition:** global and domain deficit scores computed from demographically-corrected T-scores | In the HIV+ group, metabolic syndrome was significantly associated with worse global functioningMetabolic syndrome was most strongly associated with domains of learning, motor, and executive functionDiabetes and elevated triglycerides were most strongly linked with greater global impairment in HIV+ group |
| Yuen et al. (2017)N=91 (HIV+ only)**Cohort / Location(s):** CHARTER /Baltimore, New York City, San Diego, Galveston, Seattle, St. Louis **Study Design:** Longitudinal, prospective | **Age, Median (IQR):** 45 (40-50)**Sex:** 73.8% Male**Race/Ethnicity:** 51.8%Non-Black **Education (years), Median (IQR):** 12 (11-15)**HIV Characteristics:** **-cART Use:** 98.3%**-Viral Load (<50 copies/mL):** 98.2%**-cART Regimen:** 30.4% efavirenz; 63.4% tenofovir DF | **CVD:** 1.1%**Cerebrovascular Disease:** 3.1%**T2DM:** 5.2%**HTN:** 9.4%**Hyperlipidemia:** 3.7%**Smoking (past 30 days):** 47.1%**Hepatitis C:** 31.4%**Substance Abuse History:** 50.8% | **Methodology:** Medical evaluation, standard blood pressure measurement, lumbar puncture**VRFs:** HTN, T2DM, hyperlipidemia, cerebrovascular disease, GFR | **Cognitive Domains:** Processing speed, executive functioning, verbal fluency, attention/working memory, learning, memory, motor function**Cognitive Impairment Definition:** Deterioration in performance (≥ 0.5 SD) on at least one cognitive test in the first 3 years of follow-up | Baseline GFR, but not any other VRFs, predicted neurocognitive decline over three-year period. Smoking, obesity, and cerebrovascular disease were no longer significant after adding GFR to the model.  |

*Abbreviations.* BMI = body mass index; cART = combined antiretroviral therapy; CHARTER = CNS HIV Antiretroviral Therapy Effects Research Study; CHF = congestive heart failure; CNTN = California NeuroAIDS Tissue Network; CT = computerized tomography; CVD = cardiovascular disease; cIMT = carotid intima media thickness; FI = fusion inhibitor; FLAIR = fluid-attenuated inversion recovery; GFR = glomerular filtration rate; HDL = high-density lipoprotein; HNRP = HIV Neurobehavioral Research Program; ICV = intracranial volume; II = integrase inhibitor; IQR = interquartile range; IV = intravenous; LDL = low=density lipoprotein; MACS = Multicenter AIDS Cohort Study; MHBB = Manhattan HIV Brain Bank; MI = myocardial infarction; MPRAGE = Magnetization Prepared - Rapid Gradient Echo; MRI = magnetic resonance imaging; NNRTI = non-nucleoside reverse-transcriptase inhibitors; NRTI = nucleoside reverse transcriptase inhibitor; Not Reported = NR; PI = protease inhibitor; SD = standard deviation; SMART = Strategies for Management of Antiretroviral Therapy cohort; START = Strategic Timing of the Antiretroviral Treatment study; STD = sexually transmitted disease; T2DM = type 2 diabetes mellitus; VRF = vascular risk factor; WIHS = Women’s Interagency HIV Study; WMH = white matter hyperintensity