Neurofilament light is related to cardiorespiratory and metabolic health in HIV

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BACKGROUND

- Neurofilament light chain (NfL) may be a potential biomarker of neuronal injury and cognitive impairment in people with HIV (PWH)
- In people without HIV (PWoH), NfL levels correlate with lifestyle factors (e.g. physical activity) and measures of metabolic health (e.g. diabetes, glucose)
- PWH are often more sedentary and have a higher risk of diabetes compared to PWoH

METHODS

- 64 PWH: age ≥50 years; undetectable viral load (<50 copies/mL); male *n*=51, female *n*=13; 16% diagnosed with diabetes
- Cardiorespiratory and physical fitness assessed through a stationary bike graded exercise test (VO_2 maximum (VO_2 max; ml/kg/min)), a six-minute walk test (SMWT) and a one-week wrist Actigraph (moderate-to-vigorous physical activity (MVPA) derived from step counts)
- Blood draw: NfL (Quanterix, single molecule array (SIMOA)), glucose, HbA1C, triglycerides, cholesterols; CD4 t-cell count, CD8 t-cell count
- Cognitive performance: 15-test neuropsychological battery; test Z-scores averaged into domain Z-scores (learning, delayed recall, executive functioning, psychomotor speed, language)
- Regression analyses adjusted for sex examined relationships between log-transformed NfL and cardiorespiratory/physical fitness, metabolic blood markers, cognitive performance, and HIV variables (CD4 t-cell count, CD8 t-cell count, CD4:CD8 ratio)

Better cardiorespiratory, physical and metabolic health, but not markers of HIV disease or cognition, were associated with lower levels of a biomarker that may reflect neuronal damage (NfL) in older PWH.

RESULTS

- Lower concentrations of plasma NfL associated with higher VO_2 max (*r*=-0.34, *p*=.003), more time spent in MVPA (*r*=-0.3, *p*=.009), and greater distance walked during the SMWT (*r*=-0.30, *p*=.01).

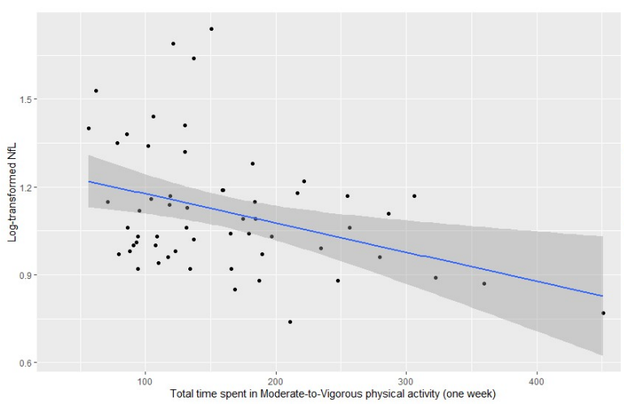

Figure 1. Lower neurofilament light chain concentrations correlated to higher total minutes spent in moderate-to-vigorous physical activity over one week

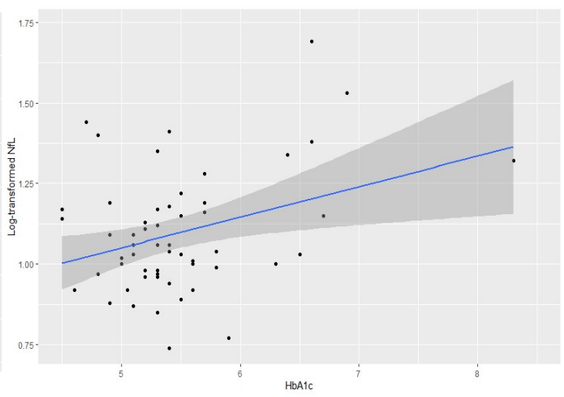

Figure 2. Greater HbA1C concentrations associated with higher neurofilament light chain concentrations in older PWH.

RESULTS continued

- Lower levels of NfL also associated with lower glucose levels (*r*=0.21, *p*=.04), lower triglycerides (*r*=0.21, *p*=.04), and lower HbA1C values (*r*=0.26, *p*=.02) but not diabetes diagnosis (*p*>.05).
- Plasma NfL concentrations did not significantly associate with any cognition or HIV clinical variables (*p*-values >.05).

CONCLUSIONS

- Lower NfL concentrations were associated with better cardiorespiratory health, increased physical activity, and better metabolic health, but not markers of HIV disease or cognition, in older PWH
- NfL may not be a specific biomarker of cognitive ability in PWH, but longitudinal and interventional studies are needed to examine how changes to cardiorespiratory and metabolic health may improve NfL levels over time, and how those changes may relate to changes in brain integrity in older PWH

ADDITIONAL KEY INFORMATION

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