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## BACKGROUND

The central nervous system is a potential reservoir for HIV in adolescents and young adults (AYA) with perinatal HIV (PHIV). HIV persistence in the central nervous system may impact long-term cognitive outcomes in AYAPHIV.

IMPAACT 2015 examined AYAPHIV with cognitive impairment and receiving effective antiretroviral therapy (ART) to quantify HIV persistence in blood and cerebrospinal fluid (CSF).

# HIV DNA was DETECTED in CSF cells from a MAJORITY of adolescents and young adults with PERINATAL HIV INFECTION and cognitive impairment on effective antiretroviral therapy

## METHODS

- Study Description:** IMPAACT 2015 was an IRB-approved U.S.-based cross-sectional, multi-site, exploratory, observational study.
- Study Population:** AYAPHIV (13-30 years old) on suppressive ART and with cognitive impairment measured at screening. Cognitive impairment was defined as NIH Toolbox Fluid Cognition Composite standard score >1 S.D. below the normative group mean (<85).
- Study Procedures:** Participants underwent lumbar puncture (LP) to collect at least 8 ml of CSF, as well as phlebotomy and hair collection.
- Study Measurements:**
  - NIH Toolbox was used to assess cognitive function.
  - HIV RNA and HIVgag/pol DNA in blood and CSF were assayed by droplet digital PCR.
  - 11 biomarkers of inflammation and neuronal injury in blood and CSF were quantified by ELISA.
  - Hair was used to quantify ART exposure levels.
  - Exact binomial confidence intervals were calculated, and 41 comparisons evaluated with exact Wilcoxon rank sum tests.

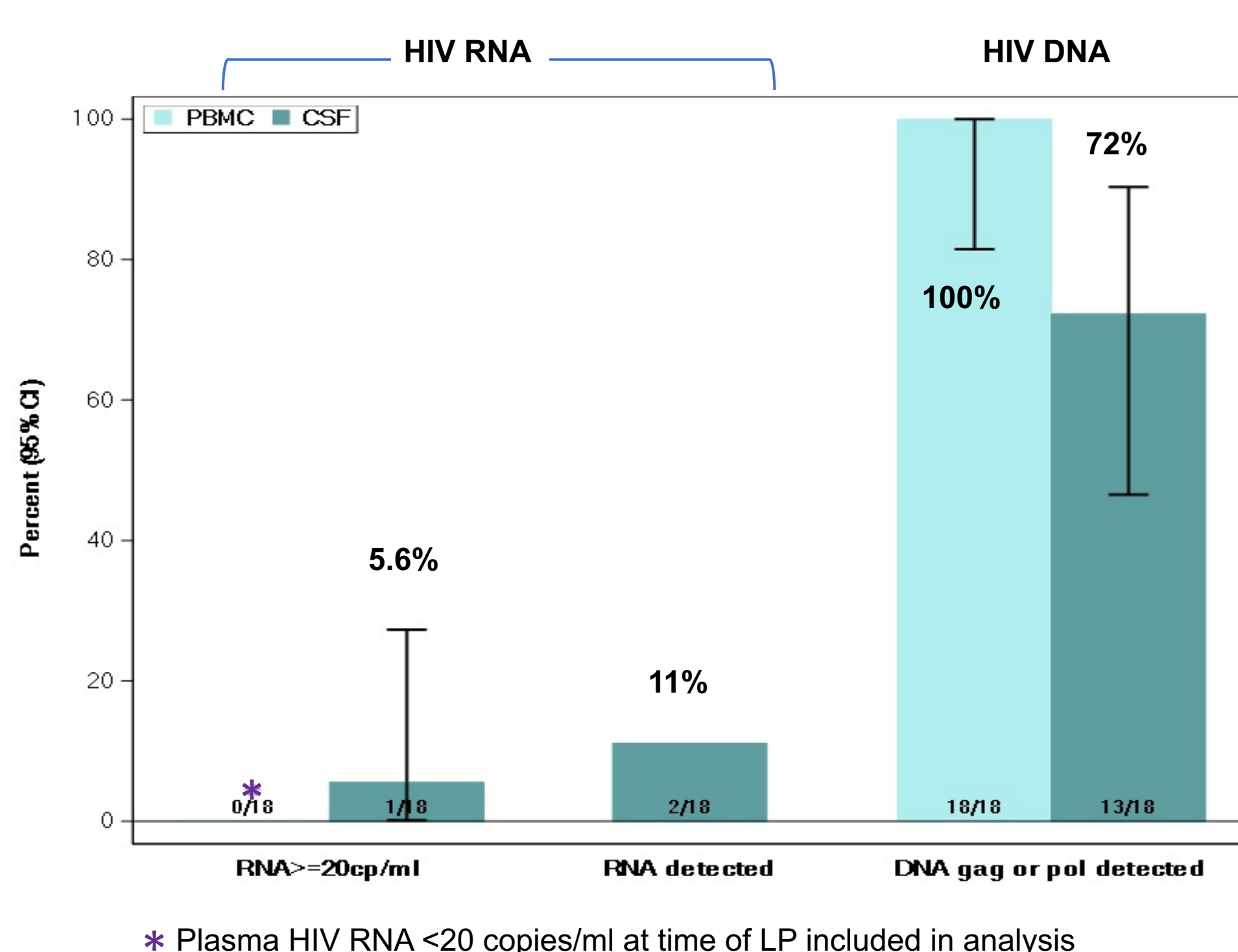
**TABLE. Study Participant Characteristics**

Characteristic (N = 18)	Median (Q1, Q3)	Min, Max
<b>Age, years</b>	20 (18, 23)	13, 27
<b>Sex</b>		
n (%) female sex at birth	9 (50%)	na
<b>Race</b>		
n (%) Black or African American	14 (78%)	na
<b>Duration of ART, years</b>	18.3 (16.8, 20.4)	8, 25.5
<b>Fluid Cognition Composite Score</b>	68 (59.0, 75.0)	53.0, 80.0
<b>Pre-entry CD4+ T cell count, cells/uL</b>	701 (430, 1012)	143, 1342
<b>CSF leukocytes, cells/uL</b>	1 (0, 2)	0, 5
<b>CSF/Plasma Albumin Ratio*</b>	0.003 (0.002, 0.004)	0.000, 0.035

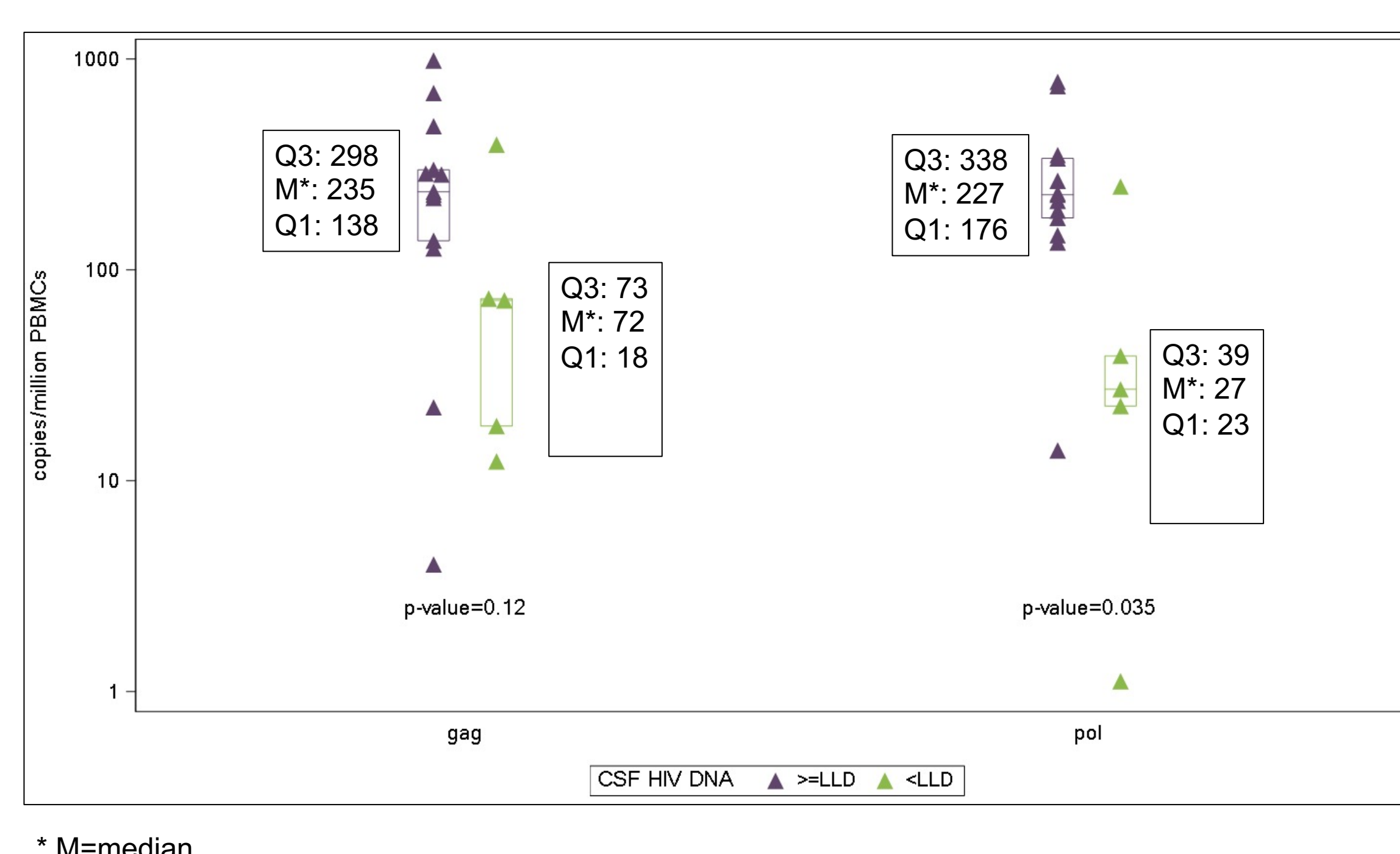
\* Data on one participant not available

## RESULTS

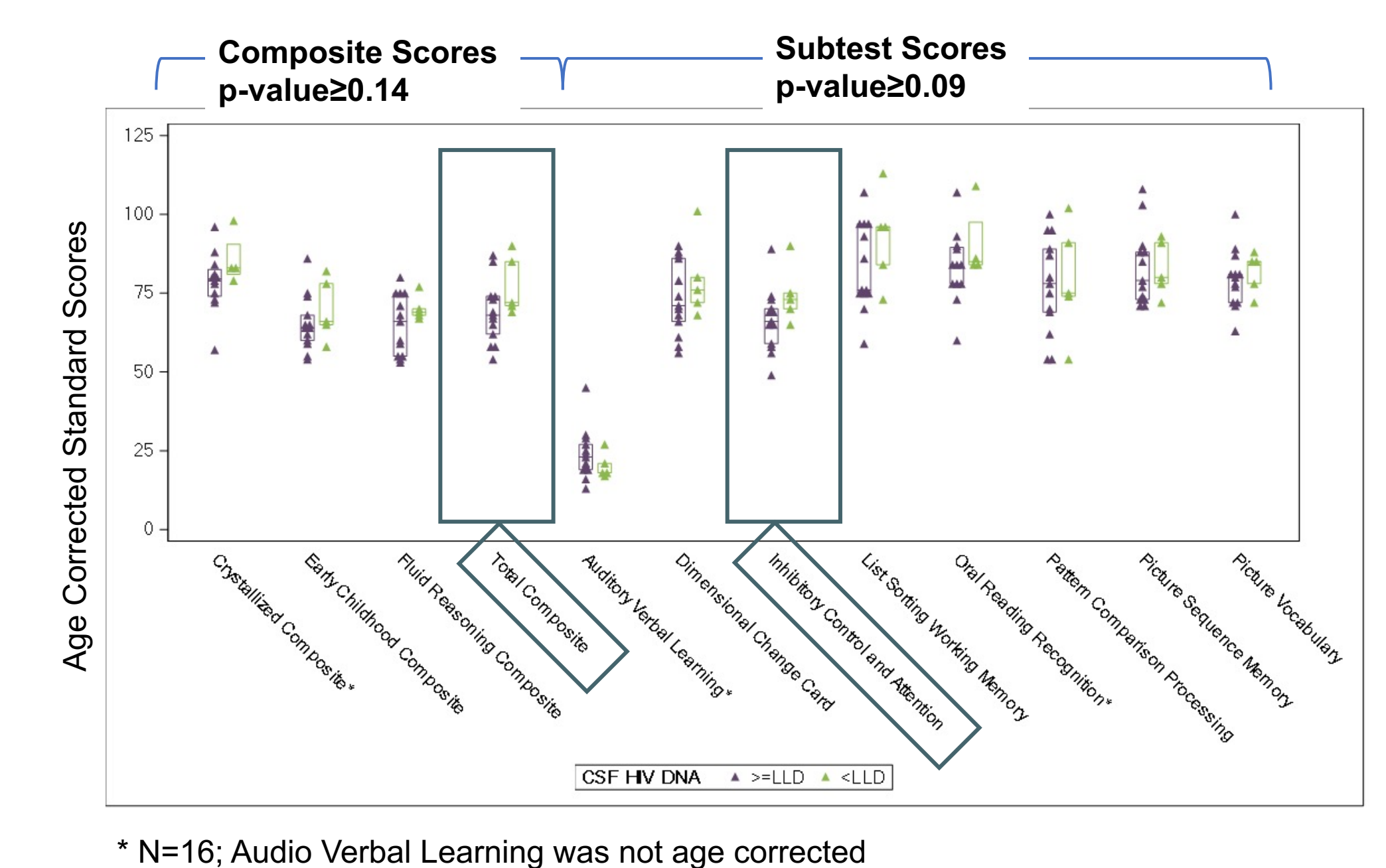
**FIGURE 1. Prevalence of HIV RNA and DNA in blood and CSF**



**FIGURE 2. Detectable HIV DNA in CSF is associated with higher HIV DNA levels in PBMCs**



**FIGURE 3. Neurocognitive scores trend lower in participants with detectable HIV DNA in CSF**



## CONCLUSIONS

Among cognitively impaired AYAPHIV on suppressive ART with a median age of 20 years:

- LP is feasible and safe as part of a research protocol
- Quantifiable CSF HIV RNA is infrequent (1/18 participants, 5.6%)
- Detectable CSF HIV DNA is common (13/18 participants, 72%)
- Detectable HIV DNA in CSF is associated with higher HIV DNA levels in PBMCs
- Detectable CSF HIV DNA may be associated with poorer neurocognitive outcomes
- There was no association between detectable HIV in the CSF and plasma/CSF biomarkers of inflammation and neuronal injury or hair antiretroviral drug levels

**Pronounced CSF reservoir in AYAPHIV warrants further study**

## LIMITATIONS

- Small sample size
- Cell numbers interrogated in CSF varied from 94-1950, limiting the sensitivity to detect HIV DNA

## ACKNOWLEDGMENTS

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