

# SALIVARY INTERLEUKINS ARE ASSOCIATED WITH COGNITIVE FUNCTION

## Authors

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## Introduction

Ageing is a key risk factor for cognitive impairment, often linked to biomarkers like cortisol and cytokines, which are associated with neuroinflammation (Sapolsky, 2000; Buie *et al.*, 2019). However, inconsistencies in current research limit the validity of findings. Saliva, as a non-invasive biofluid, offers a promising alternative for assessing these biomarkers, potentially leading to improved diagnostics and therapies for dementia-related diseases.

## Aim

To assess the suitability of a simple saliva collection method in an older adult population and determine whether salivary cortisol, interleukin-6 (IL-6) and interleukin-1-beta (IL-1 $\beta$ ) are associated with cognitive function.



## Method

Saliva was collected after waking up from 50 participants (median age = 73 [69.75,76.25]) using the passive-drool method and analysed for cortisol, IL-6 and IL-1 $\beta$  using ELISA kits (Salimetrics, State College, PA). Cognitive function was assessed with the Montreal Cognitive Assessment (MoCA), adjusted for years in education. Data were analysed using the Mann-Whitney U test and multiple regression.

## Results

Median MoCA score was 27 (24, 28). Median salivary levels were: cortisol 0.43 (0.34, 0.57)  $\mu\text{g/dL}$ , IL-6 0.01 (0.00, 0.02) ng/mL and IL-1 $\beta$  1.00 (0.39, 1.88) ng/mL. No significant differences were found between cognitively normal (n = 30) and mild cognitive impairment (n = 20) participants in these biomarkers (see Table 1 and Figure 1). However, salivary IL-6 and IL-1 $\beta$  levels were significantly negatively associated with adjusted MoCA scores (p = 0.012 and p = 0.006 respectively), as illustrated in table 2.

Biomarker	Mann-Whitney U	Standardized Test Statistic (z)	p-value
Cortisol levels ( $\mu\text{g/dL}$ )	250.00	-0.99	0.32
IL-6 levels (ng/dL)	234.50	-0.20	0.84
IL-1 $\beta$ levels (ng/mL)	231.00	-0.83	0.41

Table 1: No significant difference in salivary biomarker levels between cognitively normal and mild cognitive impairment participants.

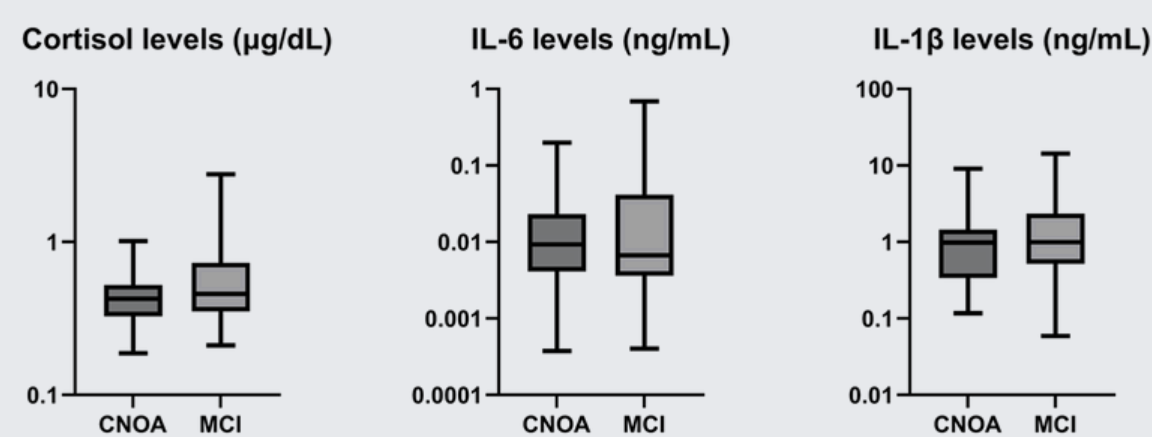


Figure 1: No differences in salivary biomarker levels between cognitively normal older adults (CNOA) and mild cognitive impairment (MCI) participants. MCI subjects however had increased variability in biomarker levels.

Model	b	SE B	$\beta$	p
Step 3				
Constant	27.688 (26.230, 29,146)	0.721		0.001
Cortisol levels ( $\mu\text{g/dL}$ )	-1.815 (-3.754, 0.124)	0.959	-0.247	0.066
IL-6 levels (ng/mL)	-9.327 (-16.468, -2.186)	3.531	-0.345	0.012
IL-1 $\beta$ levels (ng/mL)	-0.439 (-0.743, -0.135)	0.150	-0.384	0.006

Table 2: Negative association between salivary IL-6 and IL-1 $\beta$  levels and adjusted MoCA scores. 95% confidence intervals reported in parenthesis.

## Conclusion

This pilot study links higher salivary IL-6 and IL-1 $\beta$  levels with lower cognitive function, suggesting their potential as biomarkers for dementia-related diseases. It is part of a broader research involving standing balance, which aims to develop objective methods for early cognitive assessment and diagnosis.

## References

- Buie, J.J., Watson, L.S., Smith, C.J., Sims-Robinson, C. (2019) Obesity-related cognitive impairment: The role of endothelial dysfunction. *Neurobiology of Disease*. 132, 104580.
- Sapolsky, R.M. (2000) Glucocorticoids and Hippocampal Atrophy in Neuropsychiatric Disorders. *Archives of General Psychiatry*. 57(10), 925



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