# REDOX BALANCE DISRUPTION IN ALZHEIMER'S DISEASE PATIENTS: FINDINGS FROM PLASMA AND CELLULAR BIOMARKERS

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## INTRODUCTION

Alzheimer's disease (AD) is characterized by the accumulation of β-amyloid (Aβ) plaques and neurofibrillary tangles. Oxidative stress and mitochondrial dysfunction are recognized as key contributors to its onset and progression. Increasing evidence also implicates disruption of the neurovascular unit (NVU) in intraneuronal Aβ accumulation. Thus, investigating oxidative balance and NVU alterations may be crucial for elucidating AD pathogenesis and identifying novel therapeutic targets.

## MATERIALS AND METHODS

We included 15 AD patients and three healthy controls.

This study aimed to: 1) compare plasma redox state between AD patients and healthy controls to identify disease-specific signatures; 2) investigate the impact of plasma redox state alterations on endothelial cells and astrocytes in vitro to uncover underlying pathogenic mechanisms; and 3) assess potential correlations between oxidative stress parameters and clinical progression in AD to better define the clinical relevance of oxidative stress and NVU dysfunction.

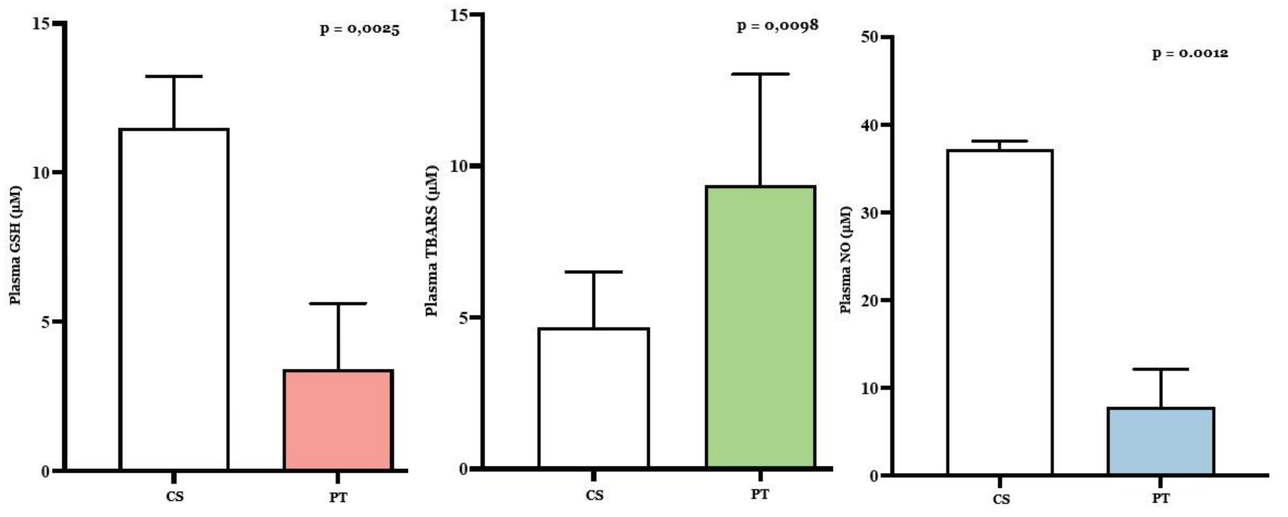


*Fig. 1 – Plasma parameters (GSH, TBARS, NO levels). CS: healthy controls; PT: patients.*

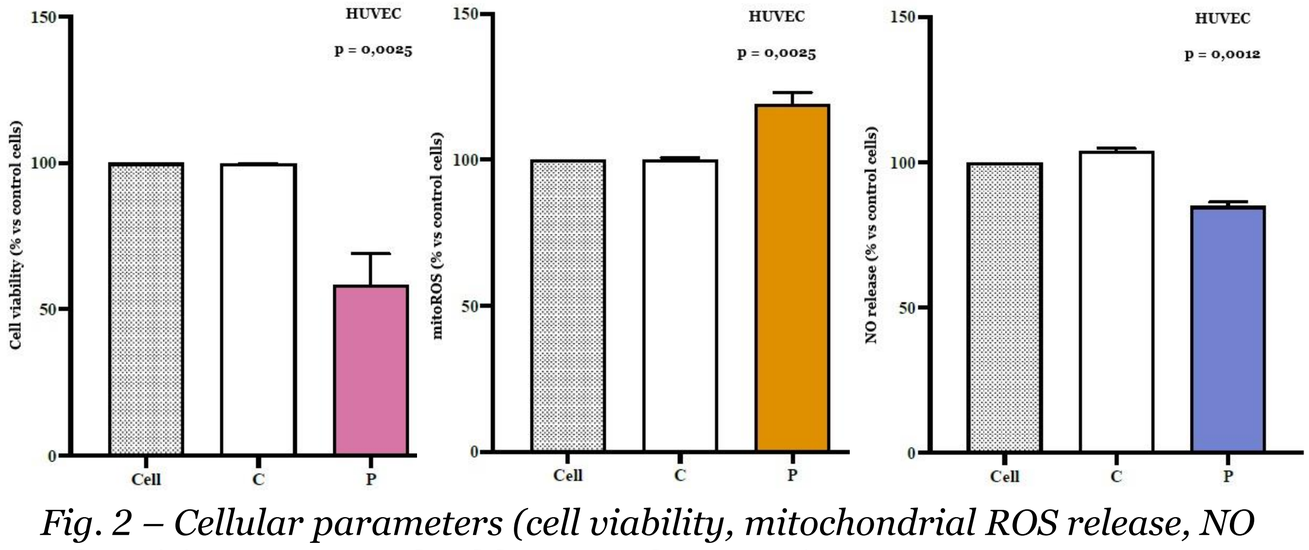


*Fig. 2 – Cellular parameters (cell viability, mitochondrial ROS release, NO release) in HUVEC. C: healthy controls; P: patients.*

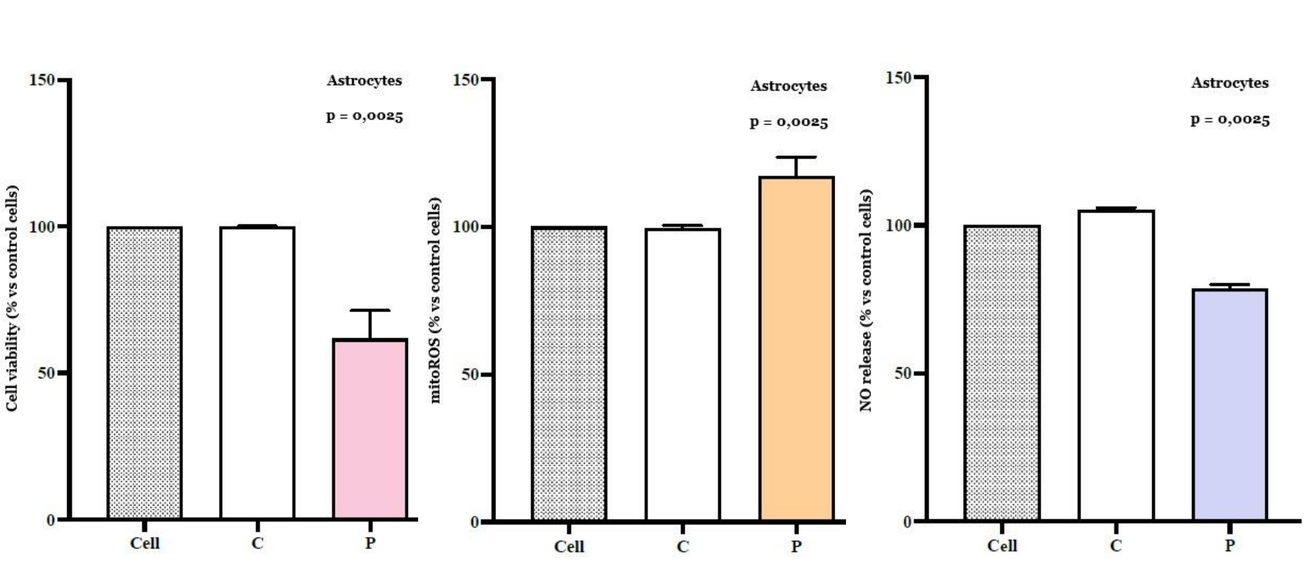


*Fig. 3 – Cellular parameters (cell viability, mitochondrial ROS release, NO release) in astrocytes. C: healthy controls; P: patients.*

## RESULTS

In the plasma of AD patients, we observed a significant reduction in GSH and NO levels, accompanied by an increase in TBARS compared to healthy controls. Moreover, in HUVEC and astrocytes treated with plasma from AD patients, both cell viability and NO were reduced, while mitoROS levels were increased. Although no correlation was found between plasma TBARS, GSH, or NO levels and CSF total tau (a primary marker of neurodegeneration), we found a significant negative correlation between plasmatic redox state markers and performance on several neuropsychological tests, including global cognitive function, memory, and attention.

## CONCLUSIONS

This study highlights a pro-oxidative shift in AD patients, supporting the view that oxidative stress and NVU dysfunction could play a central role in AD pathogenesis. Furthermore, our findings suggest that alterations in the redox state could influence the clinical progression of the disease, thereby pointing to potential biomarkers and therapeutic targets.

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