CSF Lactate Levels in Isolated REM Sleep Behavior Disorder

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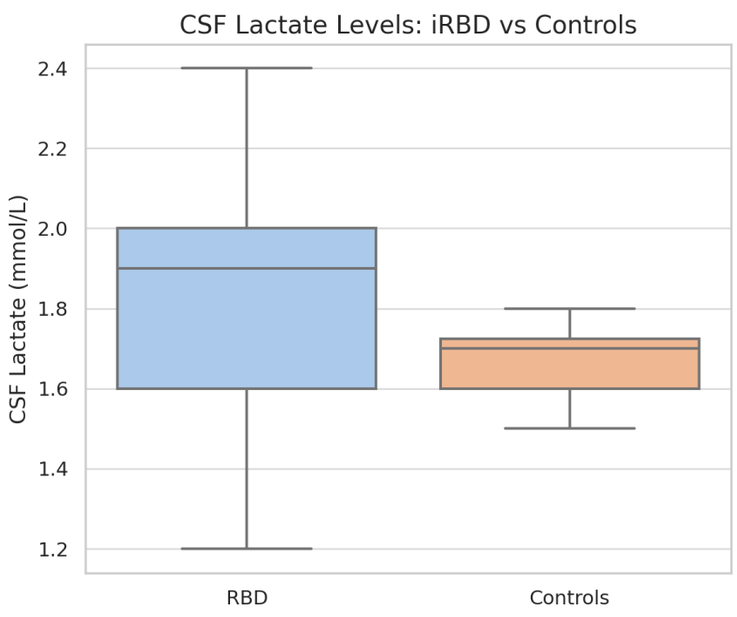
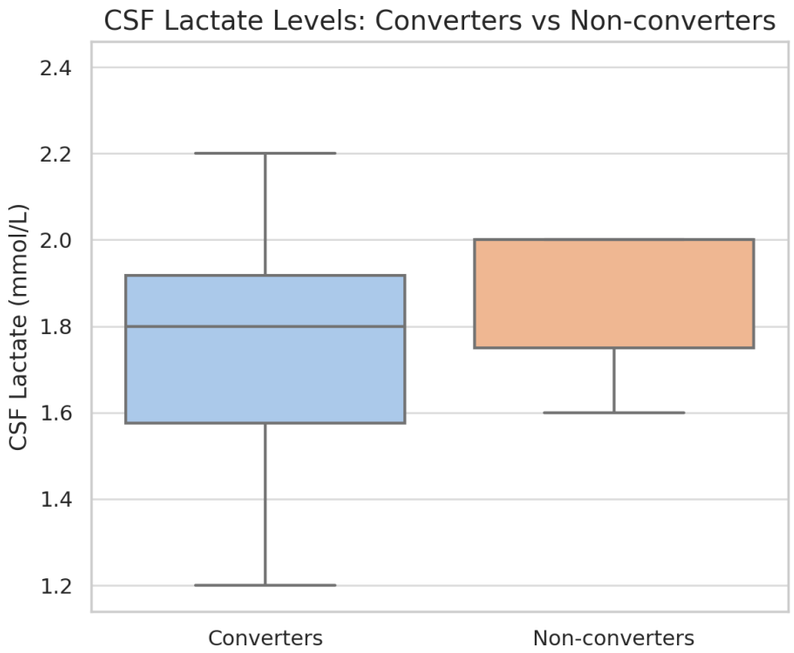
Introduction and objectives

Isolated REM sleep behavior disorder (iRBD) represents a prodromal stage of alpha-synucleinopathies. Cerebrospinal-fluid (CSF) lactate can represent a marker of cerebral glucose metabolism, and its levels can change in the neurodegenerative processes. This study aimed to evaluate **CSF lactate levels** in iRBD patients compared to controls and to explore their associations with **clinical variables** and other **CSF biomarkers.** Additionally, the study examined whether CSF lactate levels differ between patients who converted to alpha-synucleinopathies and those who remained disease-free.

Summary Table: iRBD vs Controls

	iRBD patients	Controls	p-value
	Mean ± SD	Mean ± SD	
Age	67.12 ± 8.14	67.96 ± 7.87	0.68
MMSE	26.99 ± 1.91	28.85 ± 0.95	<0.01
UPDRS-III	2.94 ± 2.36	NA	NA
t-tau (pg/mL)	248.97 ± 165.56	190.40 ± 73.05	0.077
p-tau (pg/mL)	44.21 ± 17.24	37.00 ± 9.00	0.046
Aβ42 (pg/mL)	687.12 ± 225.35	843.60 ± 221.77	0.011
Qalb ratio	7.57 ± 2.58	5.07 ± 1.82	<0.01
CSF Lactate (mmol/L)	1.79 ± 0.27	1.68 ± 0.10	0.032



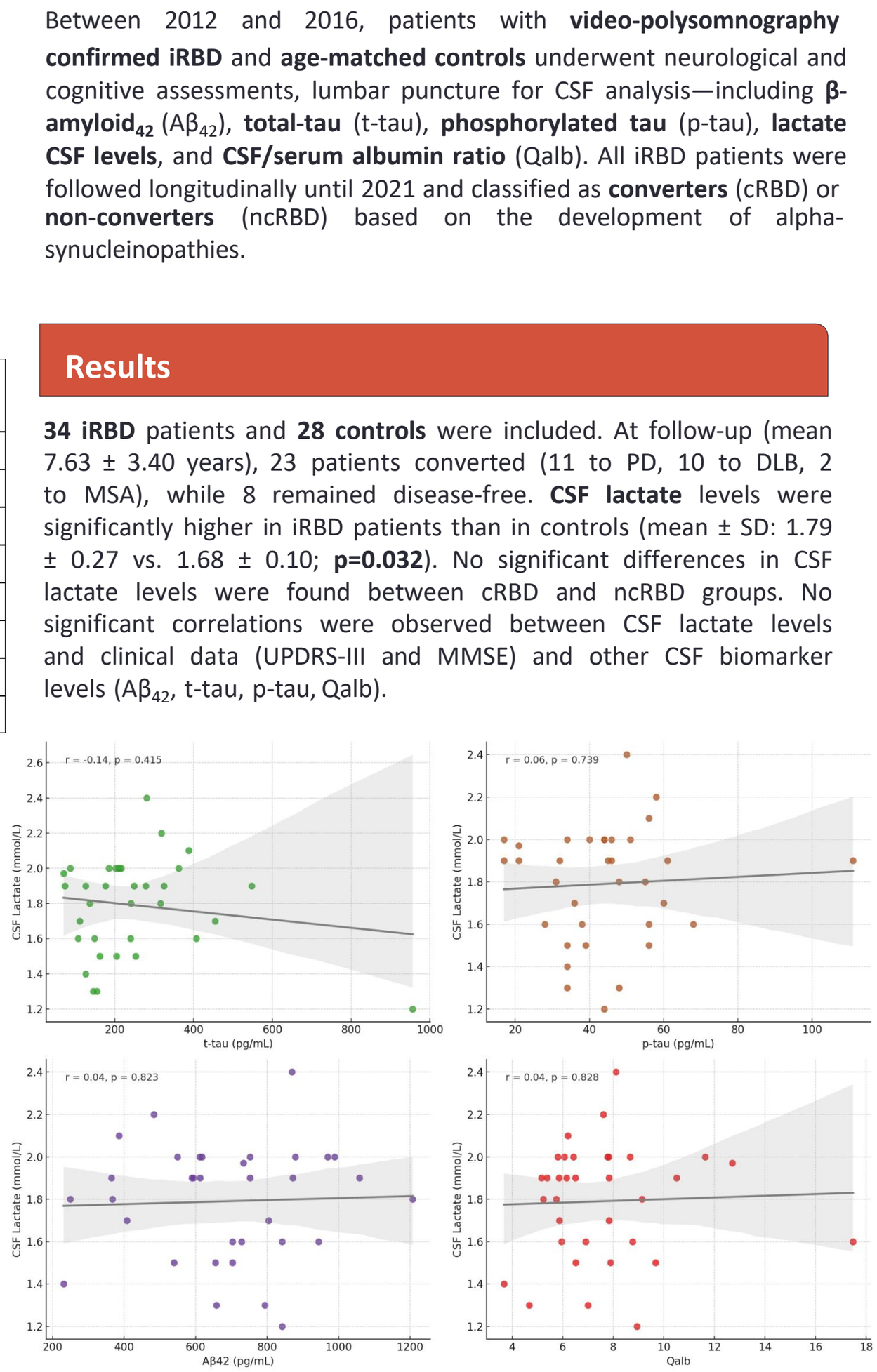


Methods

Between 2012 and 2016, patients with **video-polysomnography confirmed iRBD** and **age-matched controls** underwent neurological and cognitive assessments, lumbar puncture for CSF analysis—including **β-amyloid$_{42}$** ($A\beta_{42}$), **total-tau** (t-tau), **phosphorylated tau** (p-tau), **lactate CSF levels**, and **CSF/serum albumin ratio** (Qalb). All iRBD patients were followed longitudinally until 2021 and classified as **converters** (cRBD) or **non-converters** (ncRBD) based on the development of alpha-synucleinopathies.

Results

34 iRBD patients and **28 controls** were included. At follow-up (mean 7.63 ± 3.40 years), 23 patients converted (11 to PD, 10 to DLB, 2 to MSA), while 8 remained disease-free. **CSF lactate** levels were significantly higher in iRBD patients than in controls (mean ± SD: 1.79 ± 0.27 vs. 1.68 ± 0.10; **p=0.032**). No significant differences in CSF lactate levels were found between cRBD and ncRBD groups. No significant correlations were observed between CSF lactate levels and clinical data (UPDRS-III and MMSE) and other CSF biomarker levels ($A\beta_{42}$, t-tau, p-tau, Qalb).



Conclusion

CSF lactate levels are elevated in patients with iRBD compared to controls, supporting the hypothesis of **early metabolic dysregulation in prodromal alpha-synucleinopathies**. Lactate levels did not distinguish between converters and non-converters, suggesting a role as a general **marker of disease vulnerability** rather than a predictor of phenoconversion subtype. Further longitudinal studies are warranted to clarify its prognostic value.

Bibliography

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