

RESEARCH GROUP DEVELOPMENTAL DISORDERS

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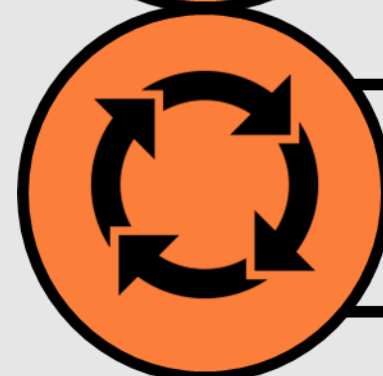
EARLY EEG-MARKERS OF AUTISM SPECTRUM DISORDER IN HIGH-RISK INFANTS

Background

Autism spectrum disorder (ASD)



Deficits in social communication & interaction



Repetitive, restricted behaviour/interests

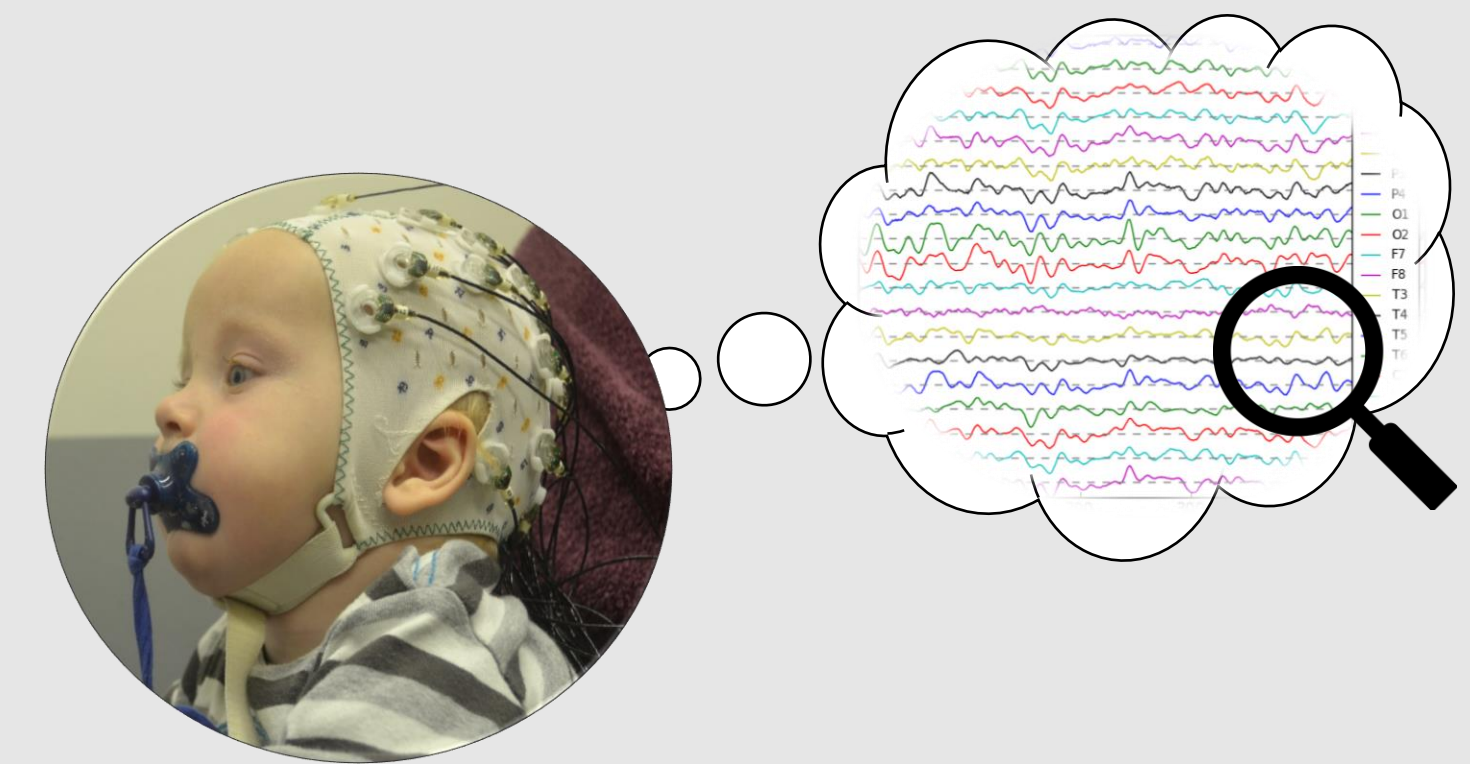
Clinical importance

- Prevalence: 1% in general population
- Up to 20x more prevalent in high-risk groups
- **Early** onset and **chronic** disorder
- Increased risk of health, mental & social issues
- Early detection & treatment → better prognosis

Research objective

Discover early & robust EEG-markers of ASD

- Does the neural response to one's own name predict ASD?
- Can certain resting-state EEG characteristics predict ASD?
- Is EEG feasible in a clinical-diagnostic context of early ASD?



Method

Tracking Infants At Risk for Autism



Prospective longitudinal design

- **High-risk** infants versus controls
 - ➔ Premature/sibling/feeding difficulties (n=200)
- Behavioural, metabolic, neurophysiological data
- 36M = outcome: retrospectively look for **predictors**

Data acquisition	Name task design	Analysis & results
<p>EEG measurements:</p> <ul style="list-style-type: none"> ➤ 32 channels (BV actiCHamp) ➤ At 10 & 14 months of age <ul style="list-style-type: none"> • Early prediction ➤ Watching social/non-social video's <ul style="list-style-type: none"> • Resting state simulation ➤ Hearing names varying in familiarity <ul style="list-style-type: none"> • ERP design ➤ Relate to observational data <ul style="list-style-type: none"> • Neural vs. behavioural response? 	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; border-radius: 10px; padding: 10px; text-align: center;"> <p>Auditory stimulus 1500ms</p> </div> <div style="border: 1px solid black; border-radius: 10px; padding: 10px; text-align: center;"> <p>Intertrial interval 1800-2200ms</p> </div> </div> <ul style="list-style-type: none"> ➤ Passive listening paradigm ➤ Conditions: own vs. familiar vs. unfamiliar name ➤ 3 blocks of 30 trials (semi-randomized) 	<ul style="list-style-type: none"> ➤ Acquisition still in progress ➤ Name task: ERP-analysis (BVA) <ul style="list-style-type: none"> • Fronto-temporal activity ➤ Resting-state paradigm: <ul style="list-style-type: none"> • Quantitative EEG (Fourier, wavelet analysis) • Contemporary biomarkers (e.g. modified multiscale entropy)

References

- Bosl, W., Tierney, A., Tager-Flusberg, H., & Nelson, C. (2011). EEG complexity as a biomarker for autism spectrum disorder risk. *BMC Medicine*, 9(1), 18. <https://doi.org/10.1186/1741-7015-9-18>
- Orekhova, E. V., Elsabbagh, M., Jones, E. J., Dawson, G., Charman, T., & Johnson, M. H. (2014). EEG hyper-connectivity in high-risk infants is associated with later autism. *Journal of Neurodevelopmental Disorders*, 6(1), 40. <https://doi.org/10.1186/1866-1955-6-40>

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