

Exploring ECG Variability and Complexity in Disorders of Consciousness: Insights from a Clinical Trial Investigating Ketamine

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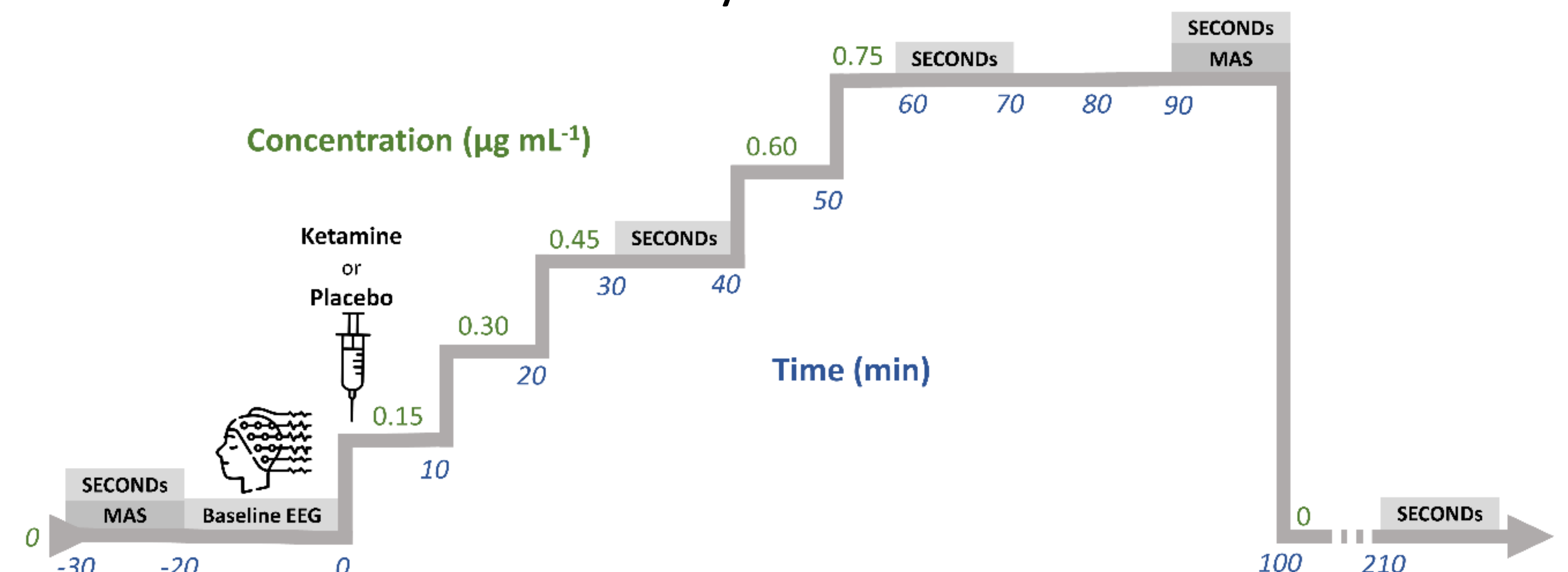
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Introduction

- **Brain complexity**, the degree of integration and differentiation of brain activity, covariates with state of consciousness¹⁻³
- Patients with chronic disorders of consciousness (**DoC**) have low complexity. Their consciousness could be increased by enhancing complexity^{4,5} via sub-anesthetic ketamine (psychedelic effect)
- **ECG complexity** has recently been proposed as a complementary tool to assess psychedelic interventions⁶

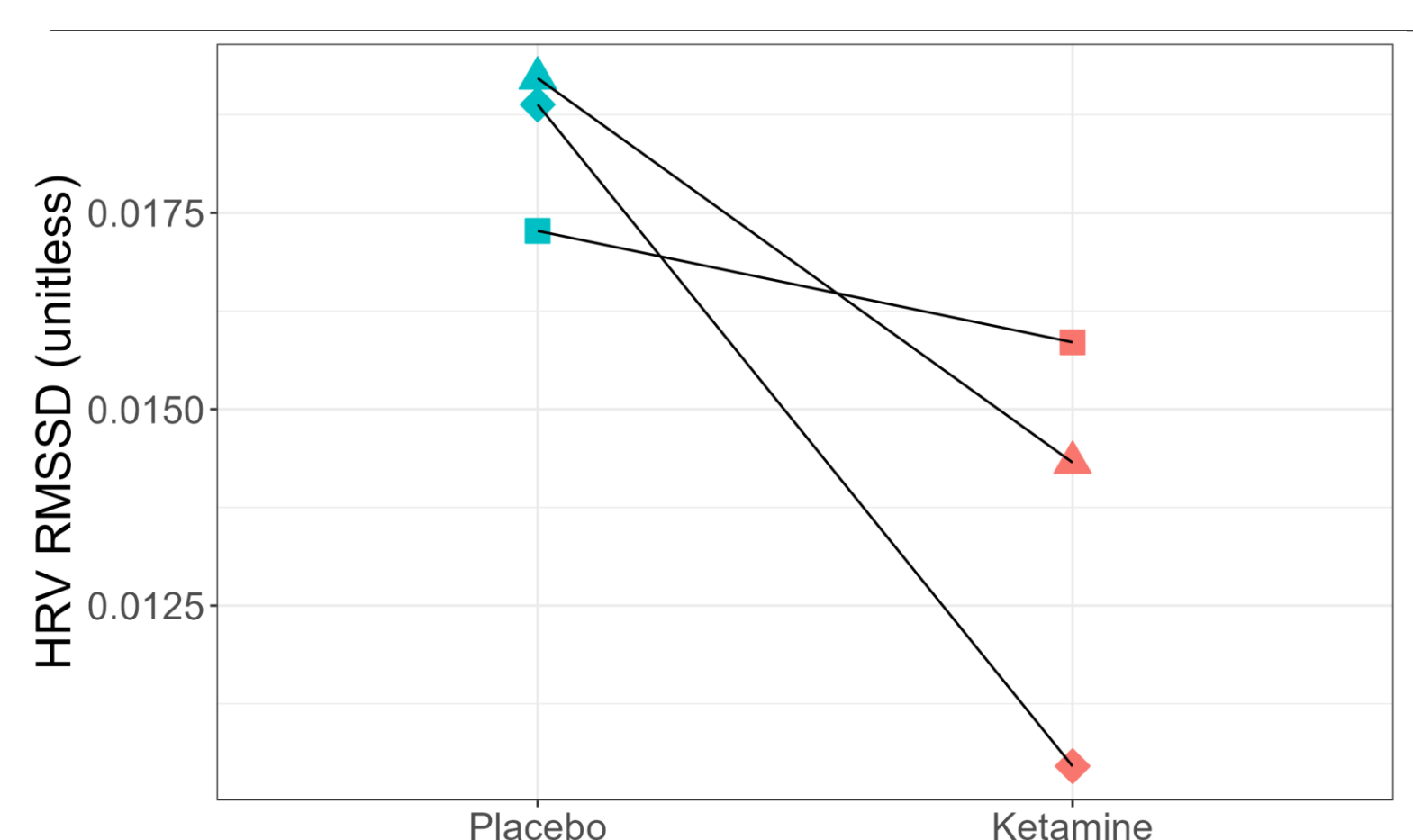
Methods

- Double-blind, randomized, placebo-controlled pilot study (N=3)
- Incremental IV ketalar with TCI (0.15 µg/ml steps every 10', max 0.75 µg/ml). High-density EEG and ECG measurements
- We measured heart-rate variability (HRV) with RMSSD, HRV complexity with ApEn and SampEn, brain complexity with LZC. Measures were corrected for the Mean NN if they correlated with it



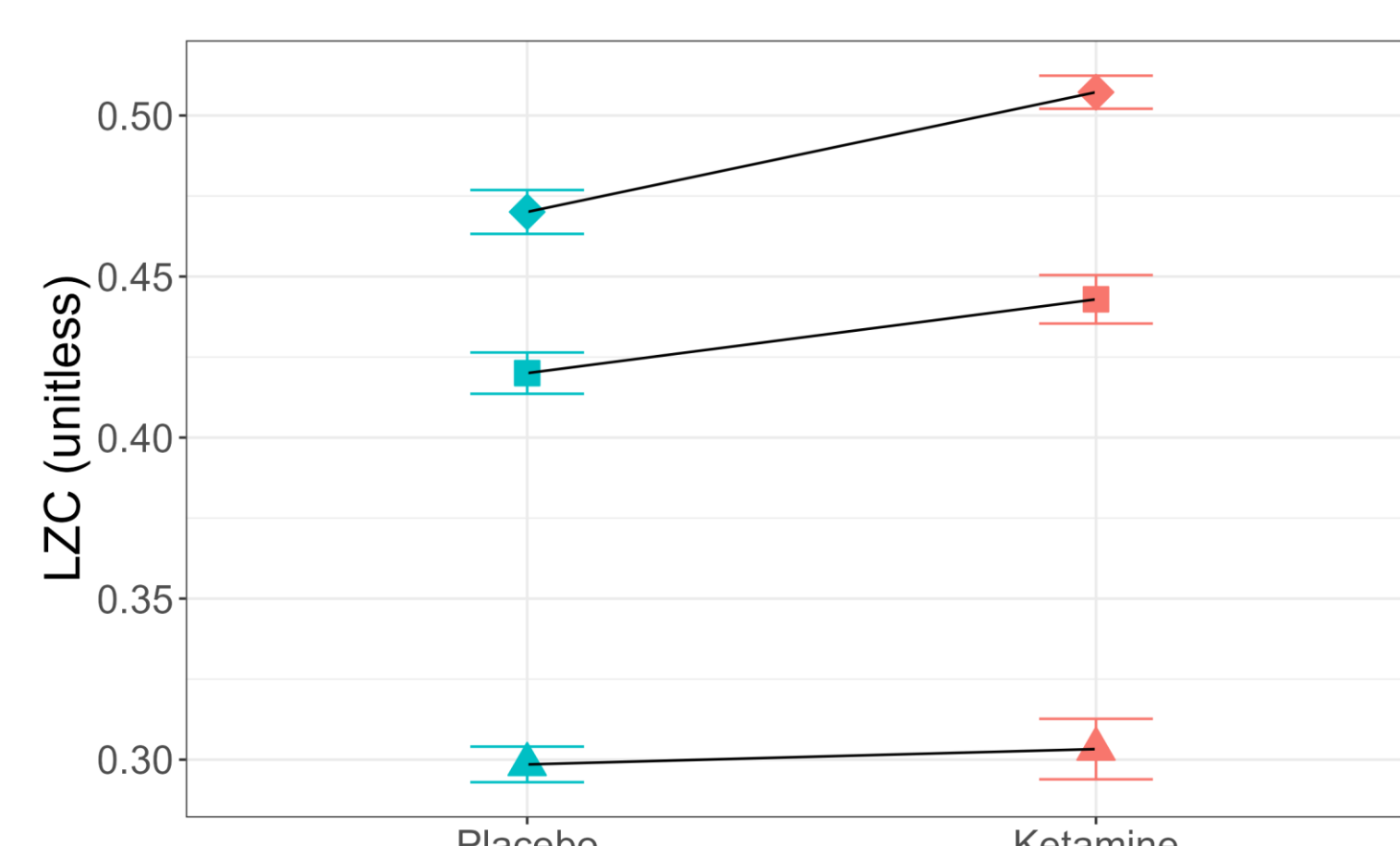
Results

HRV



- Corrected RMSSD seems to decrease under ketamine, compared to placebo

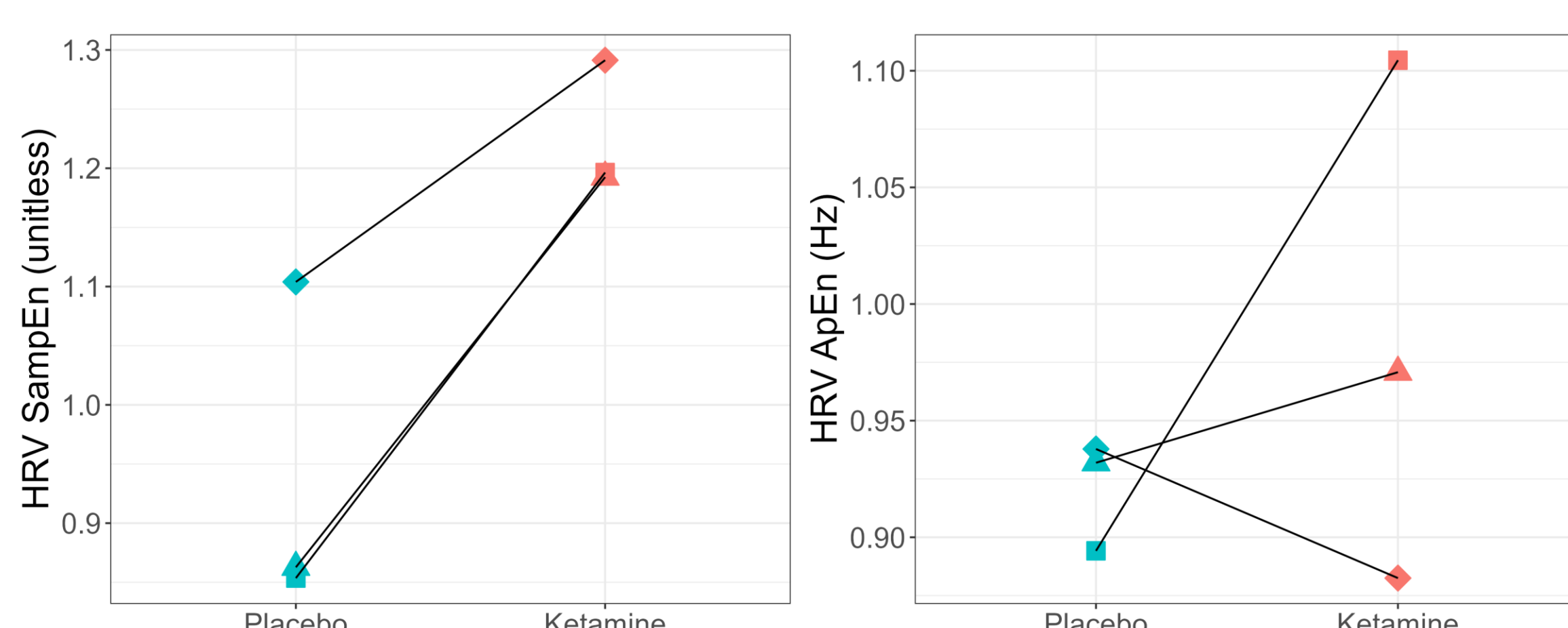
Brain complexity



- EEG LZC increases during ketamine
- Highest increase in the MCS+ patient

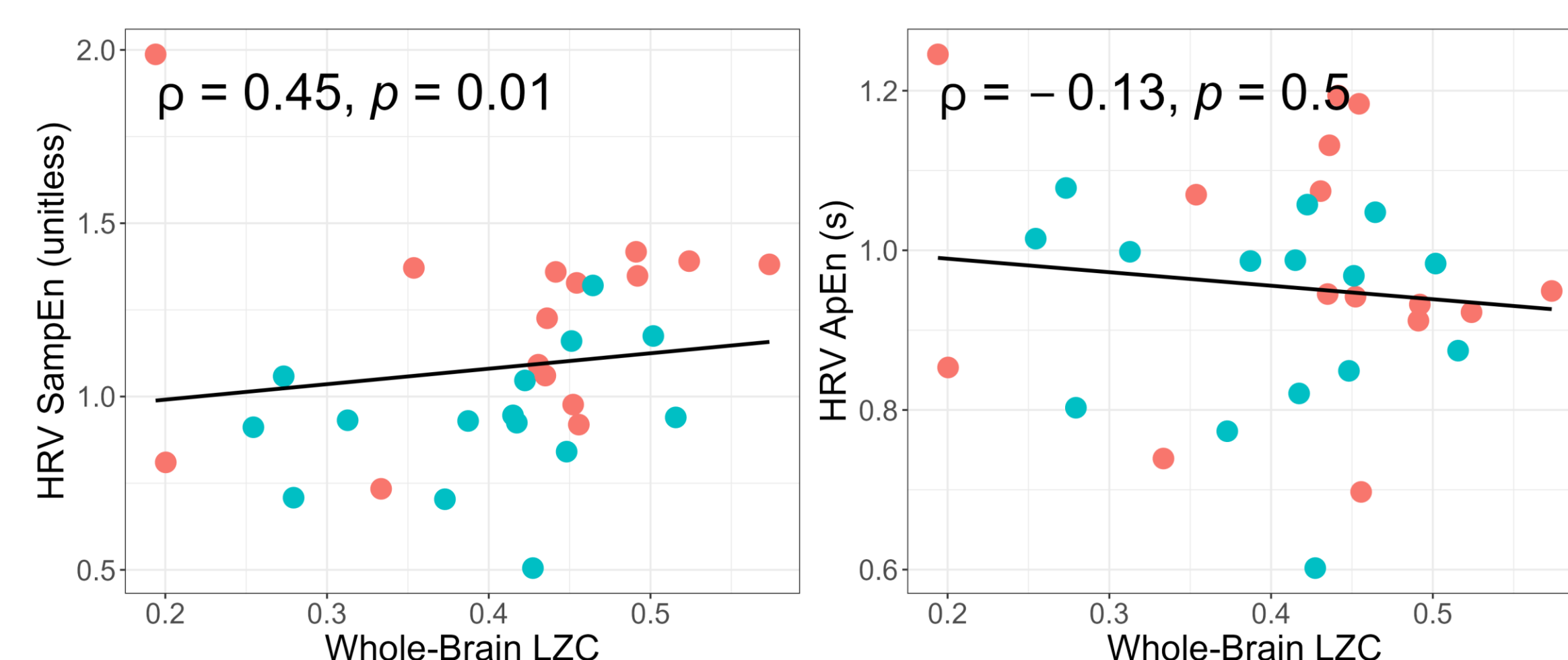
Subject
△ UWS
□ MCS-
◇ MCS+

HRV complexity



- SampEn increases during ketamine compared to placebo
- ApEn, once corrected, is less clear

Correlation between HRV and brain complexity



- Considering all concentrations, significant correlation between LZC and SampEn, but not between LZC and ApEn

Session
● Ketamine
● Placebo

When taking into consideration the concentration, there is no clear effect over measure of interest

Conclusions

1. No adverse effect reported. Ketamine could be safely administered in patients with DoC
2. ECG might be a valuable tool to investigate pharmacological interventions in DoC
3. SampEn and EEG complexity correlate
4. More work with more patients on (non-)pharmacological intervention is needed

Opinion paper
on Psychedelics and DoC



Bibliography

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