

Introduction

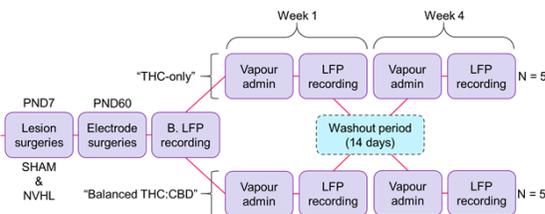
Background

- Schizophrenia (SZ) is a risk factor for lifetime cannabis use¹
- As many as 80% of patients will use cannabis in their lifetime²
- Clinical and preclinical studies report similar patterns of altered neural oscillations linked with SZ and cannabinoid exposure^{3,4,5}
- Few studies have investigated altered oscillations in a highly translational, preclinical model of cannabis use and SZ
- We investigated altered neural oscillations in the neonatal ventral hippocampal lesion (NVHL) rat model after exposure to different cannabis strains

Hypotheses

- Cannabis vapour exposure differentially suppresses corticolimbic oscillations in NVHL rats vs. controls
- The presence of cannabidiol (CBD) in the vapour opposes the effects of cannabis vapour containing Δ^9 -tetrahydrocannabinol (THC)

Methods



Sprague-Dawley rats

- SHAM rats = Artificial cerebrospinal fluid infusion
- NVHL rats = Ibotenic acid lesion of neonate ventral hippocampi

Cannabis flower

- "THC-only" vapour = 10% THC and 0% CBD
- "Balanced THC:CBD" vapour = 10% THC and 10% CBD

Target brain regions

- PFC = Prefrontal cortex
- Cg = Cingulate cortex
- Nac = Nucleus accumbens
- HIP = Hippocampus

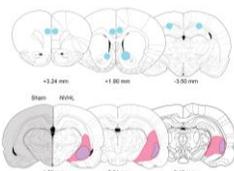


Figure 1. Experimental design; PND = postnatal day

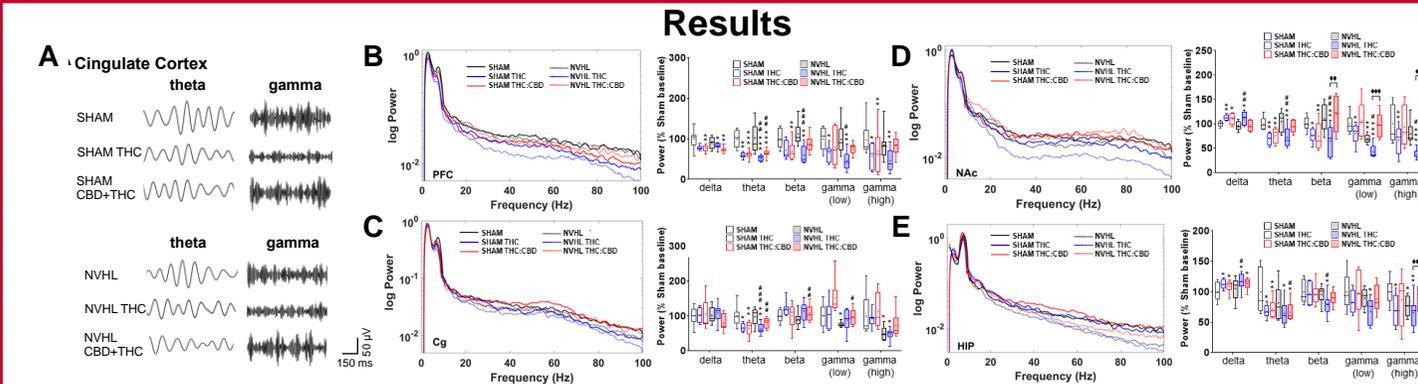


Figure 2. NVHL rats exhibit reduced baseline spectral power, especially in the gamma range (>32-100Hz), compared to SHAM rats (C-E). THC-only vapour reduced oscillatory power in all rats (A-E). Balanced THC:CBD vapour selectively reduced oscillatory power in all rats (A-E) and in some instances enhanced power above baseline in NVHL rats (D-E). *P<0.05; **P<0.01 compared to sham control baseline; ##P<0.05 compared to NVHL rat baseline; ϕ P<0.05 compared THC-only treated rats to THC:CBD treated rats.

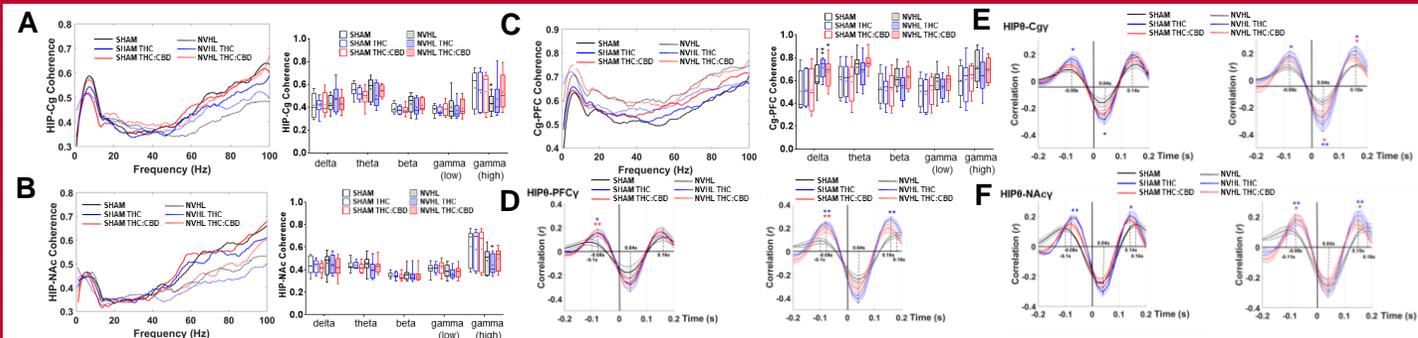


Figure 3. NVHL rats exhibited reduced baseline coherence between HIP-Cg (A); THC-only vapour worsened NVHL HIP-Nac coherence (B), and both exposures increased NVHL Cg-PFC delta coherence (C). NVHL rats exhibited reduced HIP theta to gamma coupling compared to SHAMs (D-F). THC-only vapour enhanced coupling for all rats (D-F) and balanced THC:CBD selectively enhanced coupling, for NVHL rats more than SHAM rats (D-F). *P<0.05; **P<0.01 compared to sham control baseline.

Conclusions

- NVHL rats exhibit reduced power and coherence compared to SHAM rats
- THC-only vapour suppresses power/coherence in SHAM rats & worsens NVHL deficits; balanced THC:CBD vapour mitigates some of the THC-only vapour induced deficits
- Cross-frequency coupling impacted by both types of cannabis vapour, with a greater magnitude of effect in NVHL rats
- Acute cannabis vapour exposure without CBD worsens existing neural circuit dysfunctions in the NVHL rat model of schizophrenia

References

- Pasman et al., (2018) - PMID: 30150663
- Volkow (2009) - PMID: 19325163
- Tada et al., (2016) - PMID: 25452567
- Cortés-Briónes et al., (2015) - PMID: 25709097
- Skosnik et al., (2016) - PMID: 29604295