The Effects of Phytocannabinoids and HIV-1 Tat on Animal Behavior and Microglia-Mediated Neurotoxicity


Background

- HIV leads to cognitive decline\(^2\), anxiety\(^19\), pain\(^18\), motor problems even when treated.
- Symptoms are likely driven by Tat (neurotoxic HIV protein)-induced, microglia-mediated neuroinflammation\(^23,25\).
- Cannabinoids (e.g., CBD, THC) are anti-inflammatory and may help\(^17,13\).
- Effects of CBD and THC on HIV-related symptoms require investigation.
- Further need for characterization of in vitro impact of CBD on microglia-mediated neurotoxicity.

Possible Sex Differences in Cognitive Function

CBD May Be Anxiolytic; THC May Be Anxiogenic

CBD Eliminated Tat Toxicity

Methods

- Behavioral studies: Assessments of HIV Tat (via inducible transgenic mouse model) and CBD and THC (via acute injections) on:
  - Cognition (novel object recognition)
  - Anxiety (elevated plus maze)
  - Pain (tail flick and hot plate)
  - Motor function (rotarod and locomotor activity)
- Cell culture studies:
  - Primary culture microglia (DIV-14) were treated with vehicle, CBD, and/or Tat for 24 hours.
  - Extracted media was applied to primary culture neurons (DIV-21).
  - Neurotoxicity was measured by intracellular calcium influx.

Discussion

- Possible lack of success of novel object recognition protocol.
- Cannabinoid findings complicated by effects on locomotion.
- Complex sex effects observed in anxiety.
- Surprising Tat antinociception; mirrored by literature suggesting Tat-induced neuronal dysfunction in the short term.
- Unlike opioid effects, THC is independent of Tat-related reductions in analgesic efficacy.
- Highly intriguing in vitro results; CBD completely eliminated Tat-induced, microglia-mediated neurotoxicity in a very small sample size. More investigation is needed.

More Information and References:

- Further need for characterization of in vitro impact of CBD on microglia-mediated neurotoxicity.