The Effects of Ayahuasca on the Neural Proliferation and Maturation

Riba J, Morales-García J, Rodriguez-Franco MI, Pérez-Castillo A, de la Fuente Revenga M, Feilding A. *Manuscript In Preparation*

Beckley / Sant Pau Research Programme

What is this study about?

This is the first-ever study to examine the effects of ayahuasca, a hallucinogenic beverage from the Amazon, on neurogenesis – birth of new brain cells. Ayahuasca is made with plants containing hallucinogenic DMT and beta-carbolines, such as harmine, harmaline and tetrahydroharmine, which are monoamine oxidase inhibitors, thus enabling DMT to produce psychedelic effects.

What did we do?

- Neural stem cells (NSC) were extracted from the subgranular zone of the dentate gyrus of the hippocampus of adult mice.
- NSC were induced to proliferate → "Neurosphere" formed
- Test compounds were added: Saline / Harmine / Tetrahydroharmine (0.5µM).
- We then assessed the capacity of compounds to promote:
  - Early stages of Neurogenesis (young neurons): TuJ1 staining (green)
  - Neuronal Maturation (mature neurons): MAP-2 staining (red)

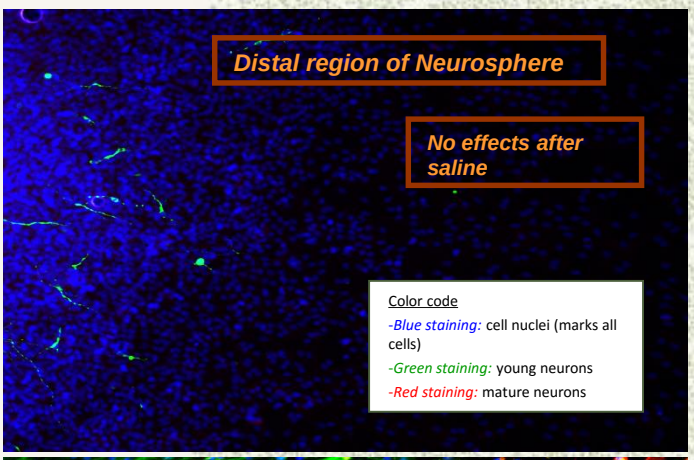
Why did we do this study?

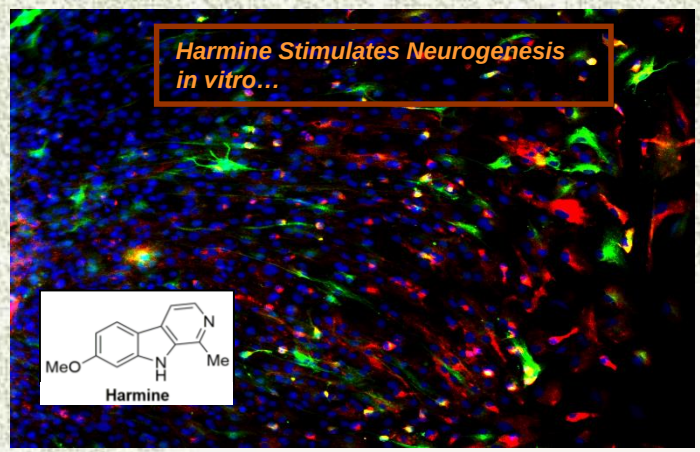
- Since the late 1990's, the old paradigm of an immutable brain has been challenged by experimental evidence showing the birth of new neurons in the adult mammal brain. This process, known as **neurogenesis**, takes place in two brain areas: around the ventricles and in a region of the hippocampus.
- The **hippocampus** plays a key role in important cognitive tasks such as **learning and memory**. Its function declines with the normal aging process, and more dramatically so in certain devastating neurodegenerative disorders such as Alzheimer's disease and other dementias.
- **We wanted to know: Do the components of ayahuasca have an effect on neurogenesis?**

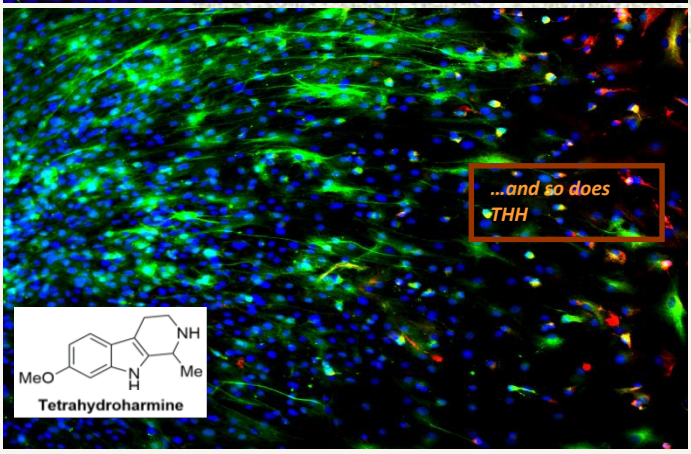
About the research team

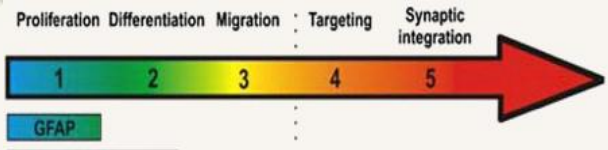
Amanda Feilding is the Founder and Director of the Beckley Foundation. She and Jordi Riba are Co-Directors of the Beckley/Sant Pau Research Programme. The study has been done in collaboration with researchers from the Spanish National Research Council (CSIC): Jose Morales-García, María Isabel Rodriguez-Franco, Ana Pérez-Castillo and Mario de la Fuente Revenga.

What have we found so far?









We found that harmine and tetrahydroharmine, the alkaloids present in highest amounts in ayahuasca, have potent neurogenic properties. The addition of harmine and tetrahydroharmine to cultures containing neural stem cells dramatically increased their differentiation and maturation into neurons.

What is coming next?

- We are currently conducting additional experiments to **quantify the magnitude** of the observed effects, in addition to **studies in live animals**.

Why is this important?

- The replication of the present findings in vivo would open a **new avenue of research** for ayahuasca and its active principles.
- **Potential applications** could range from brain damage associated with stroke or trauma to psychiatric and neurodegenerative disorders like Alzheimer's and Parkinson's disease.

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