Max Planck Institute of Psychiatry

CB1 and TRPV1 receptors located in periaqueductal gray matter mediate opposite effects in panic-like responses in rats

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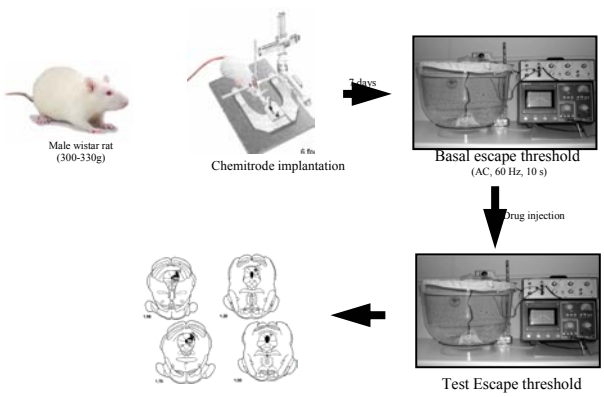
Introduction

- The midbrain dorsal periaqueductal gray (dPAG) plays an important role in defensive responses, such as panic-like behavior.
- Panic-like reactions were induced by electrical stimulation of this structure and can be pharmacologically modulated.
- Cellular and behavioral evidences support the opposite functions of cannabinoid type 1 receptors (CB1) and transient receptor potential vanilloid type-1 channel (TRPV1).

Aim

- To test the hypothesis that the cannabinoid as well as the vanilloid system are involved in the modulation of panic-like responses mediated by the dPAG.
- To verify the possibility that both CB1 and TRPV1 receptors could operate simultaneously.

Methods



For the immunofluorescence anti-CB1 receptor N-terminus (1:250) and anti-TRPV1 receptor N-terminus (1:100) diluted in PBS 0.01M containing BSA 5% and 0.3% Triton X-100.

Drugs used: ACEA (CB1 agonist, 0.01-0.5 pmol) Capsazepine (TRPV1 antagonist, 0.1-10nmol), AM251 (CB1 antagonist, 75pmol).

Results

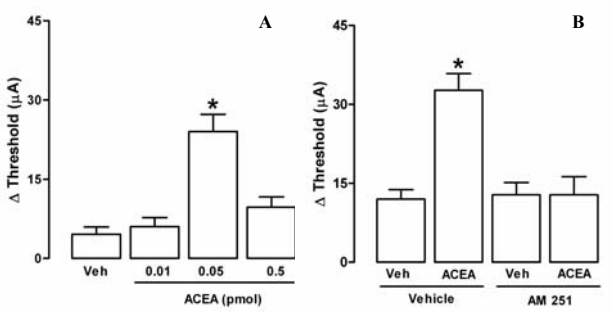


Fig.1 – Variation of the electric current threshold required to induce panic-like response after local injection of the (A) ACEA (0.01-0.5 pmol) or AM251 (75 pmol) pre-treatment (B) into the dPAG.
* $p < 0.05$

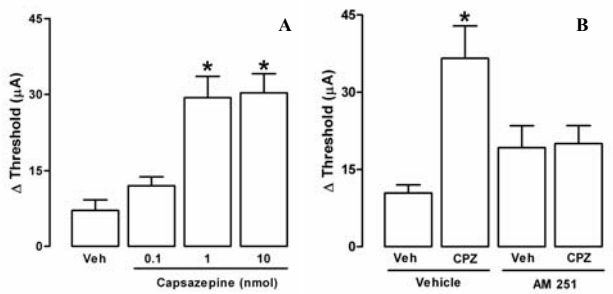


Fig.2 – Variation of the electric current threshold required to induce panic-like response after local injection of the (A) CPZ (0.1-10 nmol) or AM251 (75 pmol) pre-treatment (B) into the dPAG.
* $p < 0.05$

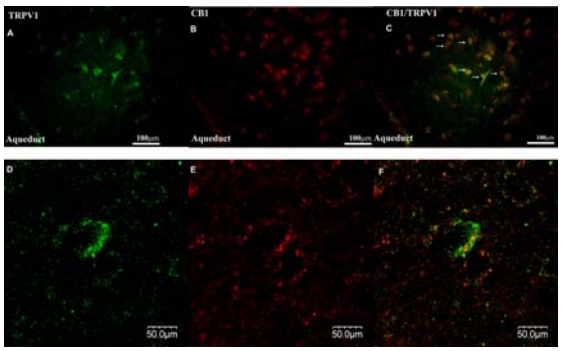


Fig.3 – Photomicrographs (25 mm thick section) of expression of CB1 and TRPV1 receptors in the dlPAG as revealed by fluorescence (A-C) and confocal (D-F) microscopy.

Conclusion

TRPV1 and CB1 receptors show opposite functions, which appear to be activated at the same time at a given synapse in the modulation of panic-like responses in the dPAG. They might work as a set-point system, representing a possible new target for the pharmacotherapy of panic and other anxiety spectrum disorders.

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