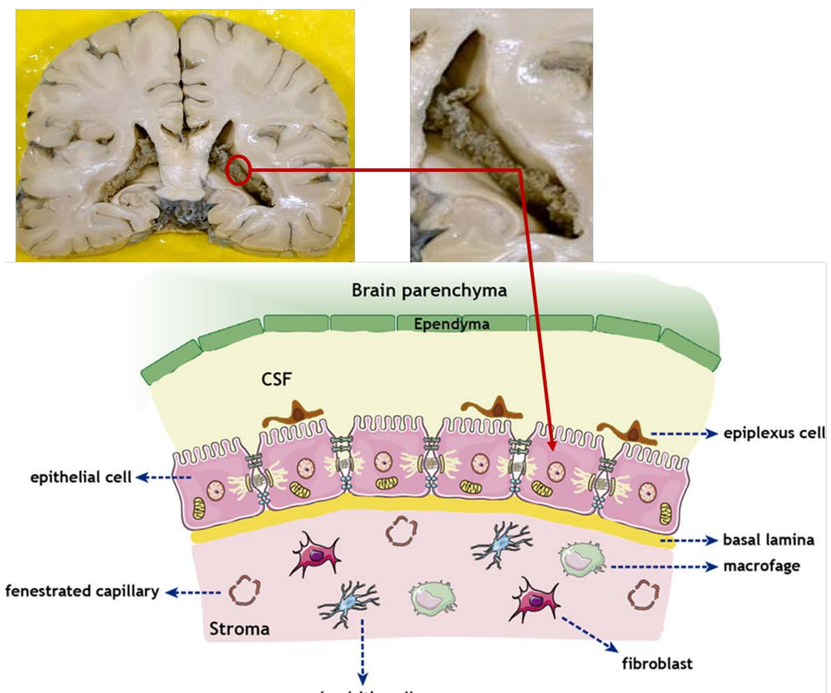
# The senses of the choroid plexus: unveiling the mechanisms of chemical surveillance at brain barriers

**Joana Tomás, Isabel Gonçalves, Ana Catarina Duarte, Telma Quintela, Cecília R. A. Santos**

CICS-UBI – Health Sciences Research Centre, University of Beira Interior, Avenida Infante D. Henrique, 6200-506 Covilhã, Portugal

## The blood-cerebrospinal fluid barrier (the choroid plexus):

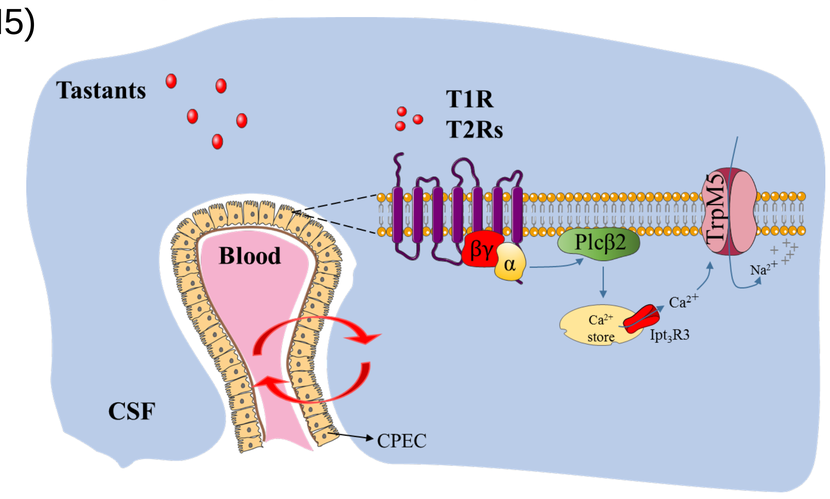



- Cerebrospinal fluid production
- Source of neurotrophic and growth factors
- Immune surveillance
- **Brain detoxification**
- **Chemical surveillance of blood and cerebrospinal fluid**

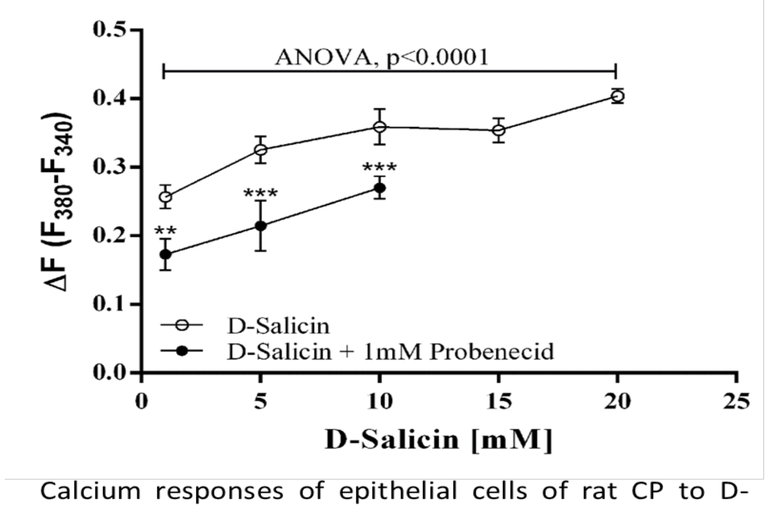
HOW??

## The components of the taste and olfactory machineries are expressed and functional in the choroid plexus (CP)

- The CP cells contain **sweet, umami and bitter taste receptors** and downstream signalling molecules (α-Gustducin, Plcβ2, ItpR3 and TrpM5)




- **Taste receptors** in the CP detect bitter compounds like salicin

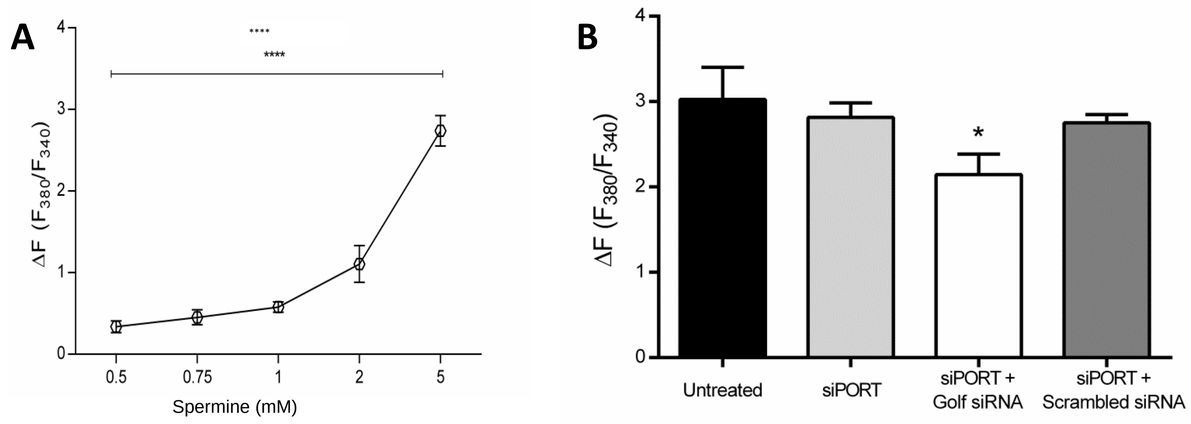



Calcium responses of epithelial cells of rat CP to D-Salicin with and without the T2Rs blocker Probenecid.

Tomás, J., Santos, C.R.A., Quintela, T., Gonçalves, I. "Tasting" the cerebrospinal fluid: Another function of the choroid plexus? (2016) Neuroscience, 320, pp. 160-171.

- The CP cells contain **odorant receptors**, and downstream signaling molecules (olfactory G-protein (Gαolf), adenylate cyclase 3 and cyclic nucleotide-gated channel 2).

- **Odorant receptors** in the CP detect polyamines like cadaverine, putrescine, spermine and spermidine and possibly many other compounds




(A)-CP epithelial cell line Ca2+ responses to spermine. (B)- Ca2+ responses of CP epithelial cells were inhibited after Gαolf silencing with 10nM of siRNA . Fluorescence ratio changes ΔF(F380/F340), loaded with Fura-2AM and stimulated with 5mM of spermine.

Gonçalves, I., *et al*. Smelling the cerebrospinal fluid: Olfactory signaling molecules are expressed in and mediate chemosensory signalling from the choroid plexus (2016) FEBS Journal, 283 (9), pp. 1748-1766.

## What's next?

➡ **Do these receptors regulate efflux transporters and detoxifying enzymes in response to chemical stimulants??**

➡ **Are these receptors capable of detecting neuroactive and anti-cancer drugs and preventing their entrance into the brain ??**

FCT Fundação para a Ciência e a Tecnologia · COMPETE 2020 · PORTUGAL 2020 · UNIÃO EUROPEIA Fundo Europeu de Desenvolvimento Regional