OC01 - **How the brain responds to bacterial molecules in the gut**

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Rationale: Understanding the complex interplay between gastroenteric information (from food or bacteria) and brain functioning requires a deep analysis of the neuronal substrate where gut-derived information is processed in the brain. In this work we decided to undertake the analysis of the mouse brain responsivity pattern to intraluminal administration of molecules of bacterial origin, in order to understand which networks the brain employs to analyse microbiota-related information travelling along the gut-brain axis.
Methodology: We mapped cortical and subcortical responses to intraluminal stimulation in C57BL/6 mice by functional ultrasound imaging, performed through a cranial window exposing the whole brain in the medio-lateral direction, and spanning a length of ±2 mm around bregma in the rostrocaudal direction. The stimulation was performed by injecting LPS from *E. coli*, the short fatty acid Propionate, water and 10% glucose, as comparisons. To distinguish responses related to the injection procedure (e.g. piercing of the gut wall) from the ones linked with the administration of bacterial or nutritional molecules, we separated the two events in time (10 seconds apart).
Results: We found that the administration of bacterial molecules in the gut lumen evokes responses mainly from hypothalamic (homeostatic) and limbic regions, with an extensive activation of all the major nuclei of the amygdala. In this regard, bacteria-related inputs resemble much closely water-induced responses, which are known to activate extensive homeostatic control networks, involved in fluid balance and blood pressure management, than glucose-induced responses, which are mainly limited to interoceptive sensory areas, such as the Insular cortex. Moreover, bacterial molecules do also elicit pronounced activity in the hippocampus, whose physiological meaning will require further and deep investigations.