19 | A cross-talk between fat and sweet taste modalities

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Introduction: Obesity is currently a major health problem of our modern society. Food abundance and composition are linked to the increase obesity incidence. Besides, it is now recognized that high daily consumption of sugar, fat and a lack of physical exercise contribute to obesity. Some studies have shown that the consumption of dietary fatty acids promotes sweetness perception. In this study, we investigate the interaction between fat and sweet gustatory modalities.
Methods: We employed, in vivo, behavioural approach in control and high-fat diet obese mice, using the double choice test. To investigate the interaction between fat (CD36 and GPR120) and sweet (T1R2/T1R3) receptors we performed, in-vitro, experiment on taste bud cells (TBC) such as calcium signalling, immunocytochemistry and RT-PCR
Results: We observed that sweet taste perception was enhanced by fat (linoleic acid) and vice versa in control mice. However, fat taste perception was suppressed and sweet taste was reduced in obese mice. Interestingly, in these obese mice, the sweet taste perception was curtailed by fat component (linoleic acid). We also observed that TBC co-expressed fat receptors (CD36 and GPR120) and sweet receptors (T1R3) and sweet and fat components exerted additive calcium signalling response.
Conclusion: The reduction of fat and sweet taste sensitivity and the absence potentiation between these two gustatory modalities, in obese mice, could result from the decreases the expression of CD36-fat taste receptor (but not GPR120) and sweet receptors (T1R2/T1R3) and by the fact that GPR120 and T1R2/T1R3 shared a commune calcium-signalling pathway

20 | A novel function of type-I gustatory cells

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Introduction: The sense of taste informs the organism about the quality of ingested food. This sense is exposed to many external pathogens and its dysfunction impacts negatively the quality of life. Although immune cells are rarely found in taste bud cells, while high levels of cytokines are observed in taste buds. Yet, the origin of these cytokines in the lingual epithelium remains clarified.
Methods: In this study, using an immunomagnetic approach we isolated type I taste bud cells (TBC) which share many features with astrocytes. Then, characterization of type 1 TBC cells was assessed by immunocytochemistry, flow cytometry and qRT-PCR.
Results: We observed that the isolated type I gustatory cells express F4/80 a specific marker of macrophage. They also express CD11b and CD11c found in glial cells. Furthermore, in inflammatory conditions (cells incubation with LPS), the addition of IL-4 in culture medium triggered an increase in mRNA expression of Arginase 1, F4/80 and IL-4; and decreased mRNA expression of TNFα. Conversely, the addition of LPS+anti-IL-4 increased the mRNA expression of TNFα, IL-1β and IL-6.
Conclusion: These findings provide evidence that type I gustatory cells share many features with macrophage and are involved in the inflammatory process with the ability to react according to the inflammatory situation.

21 | Asymmetries in Cerebellar Activation during Finger Movements: A Functional Near-Infrared Spectroscopy Study

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Introduction: Research about cerebellar functions has become a trendy field of study, especially regarding the cerebellum involvement in sensorimotor control. The

heterogeneity of the findings encourages further investigations in cerebellar activation, hemisphere specificity, but also calls for new techniques to allow easier, cheaper routine assessments. In this study, we investigated hemispheric cerebellar activation during finger movements of the dominant and subdominant hand using functional near-infrared spectroscopy (fNIRS).

Methods: One healthy right-handed subject performed a finger-tapping task consisting of six repetitive blocks (task + rest), respectively, for the left and right hands. The task was repeated twice for each hand changing the activity periods: first, 10 seconds of tapping followed by 30 seconds of rest; then, 20 seconds of tapping followed by 30 seconds of rest. Cerebellar responses for each repetition were time-locked averaged.

Results: Similar haemodynamic responses were observed ipsilaterally and contralaterally for both tasks (10 vs 20 seconds activity). The dominant hemisphere (right-handed subject) proved to be involved even during subdominant hand movements. Higher synchronization of the right hemisphere for left-hand movement was observed and validated using frequency domain analysis.

Conclusion: fNIRS proved to be a good technique to capture cerebellar haemodynamics in a non-clinical setting. Furthermore, the observed asymmetries in cerebellar activation fully agree with similar fMRI studies that suggest the existence of different layers of controls from the cerebellum in the two hemispheres.

22 | Activity of the infusion extract of coffee parchment on in vitro cell proliferation and redox status of T lymphocytes

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Introduction: Waste from the food industry has become an economic and ecological burden on the planet. The valorization of residual products has become a necessity. Among these products, coffee parchment, considered as waste whose composition is poorly or little known, could be used for various applications in the chemical, pharmaceutical, cosmetic and food industries.

This work focuses on the evaluation of the polyphenolic extract obtained by infusion of coffee parchment on the activity of T lymphocytes in vitro.

Methods: The lymphocytes are isolated from the blood of a volunteer in a histopaque gradient. The lymphocytes are stimulated by the specific mitogenic agent, Concanavalin A. The T lymphocytes are cultured with different concentrations of the extract [1 μM -10 μM -25 μM -50 μM -100 μM] for 48 hours of incubation, to determine the rate of cell proliferation and the oxidant-antioxidant lymphocytic status (intracellular glutathione and catalase activity, carbonyl protein contents and malondialdehydes contents).

Results: Our results show that the extract (25 and 100 μM) stimulates the proliferation of lymphocytes with a decrease in MDA content in a dose-dependent manner.

The carbonyl protein contents are increased at the concentrations of 1 and 50 μM.

The lymphocyte levels of GSH are significantly increased in the presence of the extract in a dose-dependent manner.

Conclusion: The parchment coffee extract induces an immunostimulatory effect and increases antioxidant defence of T lymphocytes.

23 | Assessment of within-breath pulmonary acinar deformation by dynamic in vivo synchrotron lung microscopy in anaesthetized rat

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Introduction: The magnitude and distribution of strain imposed on the peripheral airspaces by mechanical ventilation at the microscopic level and the consequent deformations are unknown despite their importance for understanding the mechanisms occurring at the onset of ventilator-induced lung injury.

Methods: Here a four-Dimensional (3D + time) image acquisition and processing technique is developed to assess pulmonary acinar biomechanics at microscopic resolution. Synchrotron radiation phase-contrast CT with an isotropic voxel size of 6 μm^3 is applied in three live anaesthetized rats under controlled mechanical ventilation.