All Time GABBA - Associação de Alumni do Programa Doutoral GABBA

Maria de Sousa Summer Research Program

3ª Edição

Projeto: Explorar o autismo no laboratório usando "mini-cérebros" 3D
Local: CNC - Centro de Neurociências e Biologia Celular, Coimbra
Investigador Responsável: Catarina Seabra

É cada vez maior o número de crianças diagnosticadas com perturbações do espetro do autismo. Esta condição afecta cerca de 1% da população mundial e 1 em cada 1000 crianças em idade escolar em Portugal. O autismo surge devido a alterações durante o desenvolvimento do cérebro, o que leva ao aparecimento de dificuldades tanto na comunicação e interacção social e à presença de interesses restritos e comportamentos repetitivos. Para melhor compreender estes distúrbios é essencial o acesso a amostras de pacientes, por isso, um objectivo principal deste estudo passa pela colheita e utilização de células estaminais presentes em dentes de leite e dentes do siso provenientes de indivíduos com autismo. Um outro objectivo é desenvolver organóides cerebrais 3D a partir dessas células estaminais. Os organoides cerebrais são também conhecidos como "mini-cérebros" por mimetizarem o processo de maturação cerebral e servem para estudar as características fundamentais do autismo. Ao serem desenvolvidos no laboratório, pode-se prestar especial atenção às mudanças morfológicas dos neurónios e à sua comunicação entre sinapses. O grupo de Circuitos Neuronais e Comportamento está localizado no CNC (Centro de Neurociências e Biologia Celular, Coimbra) e foca-se em usar uma combinação de abordagens de genética molecular, microscopia e electrofisiologia para estudar doenças do foro do neurodesenvolvimento.

Projeto: The role of autophagy and mitophagy in protein aggregation during ageing
Local: iBiMED - Institute of Biomedicine, Aveiro
Investigador Responsável: Diogo Trigo

Protein aggregation is the biological process by which misfolded and aberrant proteins accumulate and clump together. The regulation of mitochondria function by mitophagy, a process believed to play a major role in cellular homeostasis, declines with ageing, and recent results have associated gradual increase of protein aggregation associated with the process of ageing.
The selected student will be involved characterising cellular autophagy and mitophagy in ageing human cells, helping unravel the role of mitochondria regulation to potentiate healthy ageing. Using cultured human fibroblast cell lines, the student will apply biochemical and molecular biological tools to characterise differently challenged human cells.

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Projeto: Dopamine-dependent activity in the development of obesity

Local: Fundação Champalimaud, Lisboa

Investigador Responsável: Albino Oliveira Maia

Obesity has become of the one of the greatest threats to public health in the developed world, and currently there is no evidence that we are close to understand the underlying mechanisms in the control of feeding behaviors. Several lines of evidence indicate that dopaminergic neuronal signals are related to compulsive food intake and weight gain. One of the proposed mechanisms is that dopamine signaling leads to overeating as a means to compensate for decreased activation of reward circuits. However, due to limitationsin measuring neuronal activity in deep brain areas, such as the ventral tegmental area (VTA), where dopamine neuron cell bodies are found, causal correlations between dopamine synthesis and the onset and development of obesity are unknown. Taking advantage of a novel in vivo imaging technique that allows for observation of activity, of well-defined neuronal populations, in deep brain structures, it is possible to measure, for the first time, the level of activation of dopamine-producing neurons during consumption of food.

Projeto: Understanding apical-basal polarity in Drosophila epithelial tissue

Local: i3S- i3S - Instituto de Investigação e Inovação em Saúde, Porto

Investigador Responsável: Eurico Morais de Sá

Epithelial tissues are critical compartmentalization barriers for multicellular organisms, providing specialized functions including the protection from the environment and the directional transport of selected molecules across tissues. These functions rely on the establishment of apical-basal cell polarity in epithelial cells, where cellular components, such as evolutionarily polarity protein complexes and cell-cell junctions, are asymmetrically distributed along an apical-basal axis, giving rise to functionally distinct subcellular domains. In the basolateral domain, the polarity protein and tumor suppressor Lethal Giant Larvae (Lgl) act together with Discs Large (Dlg) and Scribble (Scrib) to regulate cell polarity by antagonizing the apical domain, thus ensuring the identity of the basolateral domain. However, how these three proteins cooperate to maintain interphase cell polarity, namely the basolateral localization of Lgl, is still largely unknown. In this project, the student will have an unique opportunity to learn basic concepts of fly genetics and handling, biochemical techniques and quantitative microscopy analysis using embryos and Drosophila follicle epithelium, while contributing to a current ongoing project which aims to understand the mechanisms that control the subcellular localization of the tumor suppressor and regulator of epithelial polarity Lgl.