DEVELOPMENT OF A DYNAMIC SH-SY5Y 3D CULTURE MODEL FOR BIOLOGICAL EVALUATION OF ALZHEIMER-INDUCED PATHOLOGY

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Alzheimer's disease is the neurodegenerative pathology with the highest incidence in the world population. The technological advance for its diagnosis and development of drugs for its treatment goes through the development of cellular models that allow the pathology to be reproduced both in vitro and in vivo. Currently, the use of bioassays in 2D monolayer culture modality allows carrying out research to evaluate the potential neuroprotective effect of different molecules in early stages. However, the prevalence of cell-support interactions over cell-cell interaction doesn't simulate the behavior exhibited by tissues in vivo. The objective of this project is to develop a dynamic 3D culture model to more efficiently simulate cell-cell and cell-matrix interaction in SH-SY5Y neuroblastoma cell culture.

Obtaining cell self-aggregates or spheroids (3D) will be carried out first by the static method with the Hanging drop technique, where the spheroids will be generated. Subsequently, the stability of the spheroids will be evaluated dynamically in shaking cultures (Techne). Then, the spheroids will be induced to produce beta-amyloid peptide (disease marker) with 27-hydroxycholesterol, which activates the expression of the peptide, thus finally being able to carry out the biological evaluation of molecules with therapeutic potential.
Initial results indicate that the variables in static culture 72 hours and 1000 cells/drop allow reaching spheroids of 400um with cell viability over 97%, testing the following concentrations: 5000 cells/drop (the report for SH-SY5Y), 2500 cells/drop, 500 cells/drop. Also, we test at 48 and 96 hours of spheroid formation, as we show at Figure 1. It is proposed to study the variables in a dynamic system: agitation speed, number of spheroids, together with the evaluation of bioactive molecules from the coffee industry.