INSTITUTO CAJAL

SEMINARIO PRESENCIAL

Martes, 30 de Mayo de 2023
12:30 h. Instituto Cajal (CSIC) Madrid

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Instituto de enfermedades raras, ISCIII

STUDY THE EFFECT OF STRESS MEMORY IN THE BRAIN FITNESS: PARENTAL ENVIRONMENT EXPERIENCE SHAPES OFFSPRING BRAIN SUSCEPTIBILITY TO GLIOBLASTOMA PROGRESSION

Abstract

Environmental exposure including modern lifestyle habits and occupational exposures describe a wide spectrum of risk factors for human health including carcinogenesis. Glioblastoma is the most common, aggressive, and lethal type of glioma. It is highly proliferative and invasive, infiltrates surrounding the brain parenchyma and it is resistant to current treatments. Patients suffering from glioblastoma have a wide heterogeneity in life expectancy even with similar genetic mutations, that can vary from weeks to years. Many potential risk factors for glioma have been studied to date, but few provide significant correlations for tumour prognosis. Besides these factors, ionizing radiation, allergies, or atopic disease have been related to a variable risk for glioma outcome. Here, I provide a new perspective on the interaction between the tumour and the resistance or the sensitivity of the brain environment to cope with a glioma depending on paternal environmental or lifestyle determinants, coined as *brain fitness hypothesis*. According to the physiological insight, maternal luminic stress exposure increases oxidative stress in F1 brains without detectable detrimental effect on central nervous system development. However, inheritable stress hallmark sensitizes brain fitness and promotes an accelerated tumour growth leading into life expectancy differences offspring-sex dependent. I compared genetic changes from RNAseq experiments done in F1 female and male flies upon maternal light stress. The results obtained determined a sex- and stress-specific hallmark in F1 brains that sensitized brain fitness. Under this continous light-stressing paradigm, *dOdf3l2,* a sperm gene active in cytoskeleton, is downregulated in F1 brains upon maternal light stress. In this work, I studied its potential role in GB progression and mechanisms beyond its modulation. *dOdf3l2* is expressed in glial cells and increased expression in brain samples of tumoural flies, suggesting a role in tumour invasion, proliferation, and tumour neurodegeneration. Among the inheritable mechanisms, ncRNAs emerge as potential vectors for the transmission of parental exposure to the subsequent generations and might explain the complexity of inheritable traits and phenotypes acquired as a pleiotropic effect.

Affiliation and short bio

I started my formation and scientific career studying a Biochemestry degree in the Universidad Autónoma de Madrid (UAM) in 2013. Then, I studied for a master's degree in Neuroscience co-directed by the Universidad Autónoma de Madrid and the Cajal Institute (CSIC). During my formation, I studied molecular neurobiology, in which I am specialized, and I had the chance to stay in neuroscientific laboratories as the Dra. Paola Bovolenta´s lab in the CBMSO and the Dr. Alberto Ferrús and Dr. Sergio Casas-Tintó´s labs in the Cajal Institute (CSIC) in 2016. During these years I have been focused on the study the effect of parental environment experiences in the offspring phenotypes and, in the progression of glioblastoma malignancy. In addition, during these years I have been actively involved in science communication about *Drosophila* research on social media.

Related publications with the topic

Corrales, T. de los R., Losada-Pérez, M., & Casas-Tintó, S. (2021). JNK Pathway in CNS Pathologies. International Journal of Molecular Sciences 2021, Vol. 22, Page 3883, 22(8), 3883. https://doi.org/10.3390/IJMS22083883

De Los Reyes, T., & Casas-Tintó, S. (2022). Neural functions of small heat shock proteins. Neural Regeneration Research, 17(3), 512. https://doi.org/10.4103/1673-5374.320975

Santana, E., de los Reyes, T., & Casas-Tintó, S. (2020). Small heat shock proteins determine synapse number and neuronal activity during development. PloS One, 15(5). https://doi.org/10.1371/JOURNAL.PONE.0233231

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