



XXV Congresso de Iniciação Científica da Unicamp

October 18 to 20 Campinas | Brazil

25
anos



2017



Comparative analysis of the dentate gyrus of naive Wistar rats and human tissue using molecular tools.

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Abstract

The hippocampus is a paired structure – one in each cerebral hemisphere, whose curved shape resembles that of a seahorse (“hippocampus” from Greek, hippos = horse, kampi = sea monster). Belonging to the limbic system, the hippocampus is located in the mesial temporal lobe, beneath the cortical surface of the brain. Recently, this structure has been the subject of many studies as a result of its role in long-term memory, spatial navigation and its association with various diseases such as mesial temporal lobe epilepsy (MTLE), Alzheimer’s disease and depression. Together with the hippocampus, engendering the hippocampal formation, with the subiculum and the entorhinal cortex, we have the dentate gyrus, responsible for the episodic and autobiographical memory. Such structure will be studied for comparative purposes, in order to contrast the regulation and the profile of the gene expression between rats and human tissue, through the analysis of the transcriptome and proteomics, with parametric objectives for future researches concerning the study of the dentate gyrus itself and animal models.

Key words:

Hippocampus, proteomics, transcriptomics.

Introduction

Much of the studies related to the hippocampus are aimed at elucidating diseases that affect it, such as mesial temporal lobe epilepsy (ELTM) and Alzheimer's disease. However, in order to understand the pathophysiology of these diseases, which have not yet had their mechanisms adequately clarified, we must turn not only to the hippocampus but to a set of structures that appear to be in fact associated with such pathologies, hippocampal formation - composed by the hippocampus, dentate gyrus, subiculum and the entorhinal cortex¹. These diseases, in turn, are investigated by means of animal models - mainly rats – that despite remarkable similarities in the human gills to these rodents, it is necessary to understand the exordial differences between them², so that the models as close as possible to human pathology³. This comparative characterization between humans and rats will be performed using advanced molecular tools that will allow the analysis of the gene expression - transcriptomics and the proteomics.

Results and Discussion

We are currently establishing the most appropriated methods in order to carry out the study.

Conclusions

We believe that our results will shade some light into the most relevant molecular pathways in different parts of the dentate gyrus in humans and rats.

Acknowledgement

This project is part of the Brazilian Institute of Neuroscience and Neurotechnology (BRAINN) and is supported by FAPESP.

¹ Amaral, D.G.; Lavenex, P. *Hippocampal Neuroanatomy*. In *The Hippocampus Book*. 2009, Oxford University Press. p. 2-3

² Amaral, D.G.; Scharfman, H.E.; Lavenex, P. *The dentate gyrus: fundamental neuroanatomical organization (dentate gyrus for dummies) – Prog Brain Res*. 2007; 163: 3-22

³ Lothman, E.W.; Rempe, D.A. e Mangan, P.S. *Changes in excitatory neurotransmission in the CA1 region and dentate gyrus in a chronic model of temporal lobe epilepsy*. *J Neurophysiology*. 1995.