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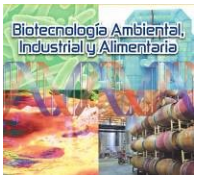

Evaluation of the looptail mutation efects on neural tube closure in early mouse embryo

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ABSTRACT

Motivation: Neural tube defects (NTDs), such as spina bifida, are defined as congenital malformations that impair proper neural tube closure in early embryonic development. There are deeply complex mechanisms behind NTDs, of which we can stand out the role of the Wnt/PCP pathway, that through cytoskeleton reorganization and cell-cell interactions drives tissue rearrangements which finally lead to neural tube closure. In this project, cellular morphology and dynamics in node cells, an essential organizer in early development, have been studied in both, its dorsal and ventral regions, to determine how affected it is in Wnt/PCP-mutant mouse embryos . It is the great importance of NTDs in current population what has motivated this study as it has been estimated that NTDs prevalence varies between 0.5-0.8/1000 births in most European countries and the USA, and it is even 20 times higher in countries such as China. Taking into account this data, it seems to exist a clear need to investigate the physiopathology of these malformations and initiate the run for further solutions.

Methods: In pursuit of valuable information, the looptail (Lp) mouse strain, carrying a mutation in one of the WNT/PCP pathway core proteins, Vangl2, has been selected as it is a great NTDs model. Whole-mount inmunohistochemistry against Zonulla Occludens-1 (ZO-1), a tight junction protein, as well as phalloidin staining, have been performed on mice embryos. Afterwards, z-images have been obtained through scannig laser confocal microscopy. Finally, segmentation has been done using the python software "SeedWaterSegmenter" and the "DVRosettes" and "CellRois" macros, both from Fiji/ImageJ.

Results: The aforementioned macros offer personalized morphological information for each cell and its interaction with neighbouring cells according to the pre-selected parameters: apical area, apical elongation, cell apical orientation and vertex order (number of cells sharing a vertex). In the previous months, this group has been working with CD1 mouse embryos in order to optimize the complex methodology and results concerning looptail embryos are expected to be available soon.

Conclusions: Morphological parameters will be crucial as we can estimate how apical constriction and cell deviation from the midline axis are affected in Lp embryos. As well as cell dynamics parameters, especially rosettes formation (5-cell unions), which play a key role in driving coordinated cell movements.

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