形態形成セミナー

Function of the Dbx1 transcription factor and Cajal-Retzius neurons in mammalian brain development and evolution

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Neural stem cells (NSCs) can be regarded as multipotent progenitor cells characterized by their self-renewing capacity and their potential to give rise to all neural cell types. During brain development, the apical side of NSCs faces the ventricles that is filled with membrane particle-rich cerebrospinal fluid and whose basal side faces the basal lamina that is a rich source of extracellular molecules including morphogens and growth factors that is colonized by blood vessels. This highly dynamic and rich micro-environment provides "stem cell niche–like" features to NSCs, thus differentially regulating neurogenesis and contributing to neuronal diversity. In my talk, I will discuss the mechanistic insights regarding how cell intrinsic and extrinsic mechanisms are involved in the NSCs fate switch from proliferative to neurogenic progenitor cells in the developing mouse cerebral cortex. Upon differentiation, NSCs change their division mode from proliferative symmetric to neurogenic asymmetric to generate neuronally committed progenitor cells by lengthening their total cell cycle length specifically due to the lengthening of the G1 phase. Recently, using a new approach to measure the cell cycle length, it has been shown that NSCs initially shorten their S phase length rather than lengthen their G1 phase during the progression of neurogenesis indicating the importance of the S-phase duration in the maintenance of the proliferative properties of stem cells. As the second part, the importance of the apical plasma membrane asymmetry in the release of the midbody, which is known to be a key feature for NSCs differentiation, will be presented. Finally, I will introduce the function of the Dbx1 transcription factor and Cajal-Retzius (CR) neurons as an ideal 'motile stem-cell niche' for NSCs by releasing morphogens during mammalian brain development and evolution.

共催
新学術領域研究

動く細胞と
場のクロストークによる
秩序の生成

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