A mechanism of nerve cell production from stem cells of the embryonic brain -Cyclin D2 is inherited by one of the two daughter cells and maintains it undifferentiated-

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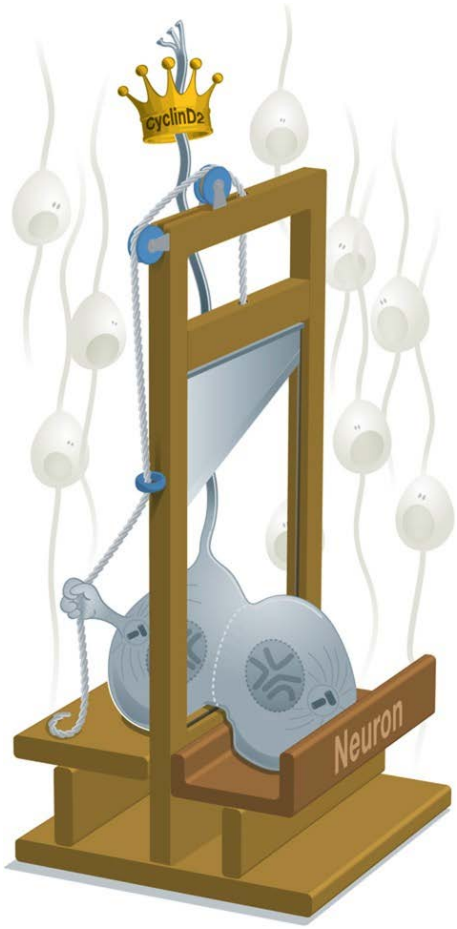
It is very important that many neuronal cells are produced by cell proliferation and differentiation in the development of mammalian brains. A research group led by Professor Noriko Osumi at Tohoku University Graduate School of Medicine and Research Fellow Yuji Tsunekawa (currently at the Scripps Research Institute) has discovered that Cyclin D2, a cell cycle regulation factor, localizes at the tip of the basal process, the most surface side the brain premordium, in the mammalian neural progenitor cells. This study has also revealed that Cyclin D2 is inherited by one of the two daughter cells with the basal process during cell divisions of neural progenitors into two daughter cells, and it plays a role to maintain the cell fates undifferentiated. In addition, since this kind of conservation of undifferentiated cells by Cyclin D2 is observed only in mammals, this mechanism can be considered to be acquired during evolution. Further studies will be expected to elucidate the mechanism for production of enormous nerve cells and growth of the human brain.



CyclinD2 crowns stem cell identity. Loss of stemness represents a revolutionary event allowing the generation of differentiated cells. According to the model by Tsunekawa et al, radial glial cells during mammalian cortical development ensure that daughter cells without basal process would lengthen G1 upon cytokinesis thereby triggering asymmetric cell fate change and neurogenesis. This model elegantly links the subcellular localization of a cell cycle regulator with asymmetric cell division and fate. Pictures taken from “Have you seen” by Calegari F, EMBO J, 2012.

“Cyclin D2 in the basal process of neural progenitors is linked to non-equivalent cell fates”
Tsunekawa Y, Britto JM, Takahashi M, Polleux F, Tan SS, Osumi N.
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