FID Data Reconstruction

20161206 JaewoongLee

Ulsan National Institute of Science and Technology

jwlee230@unist.ac.kr

May 25, 2020

Overview

Brain Development

- Brain development is protract process that begins in the 3rd gestational week, and it continues for an extended period post-natally. (Stiles & Jernigan, 2010)
- MRI studies of structural and functional changes in the developing human brain. (Casey, Giedd, & Thomas, 2000)

Substantia Nigra (SN)

- SN is an anatomically heterogeneous nucleus with regional alternation in striatal projections and distribution of histo-chemical markers. (Fearnley & Lees, 1991)
- Dopamine contributes to the processing of signals in SN. (Geffen, Jessell, Cuello, & Iversen, 1976)
- Dopaminergic neurons have been developed in SN. (Freeman et al., 1991)

Corpus callosum (CC)

- CC is a wid and thick nerve tract, beneath the cerebra cortex in the brain.
- CC plays an major role in inter-hemispheric integration and communication. (Schlaug, Jäncke, Huang, Staiger, & Steinmetz, 1995)
- The size of CC differs upon disease, occupations, genders, and etc.
- Growth of CC was noticed from the 4th fetal month to maturity. (Rakic & Yakovlev, 1968; Pujol, Vendrell, Junqué, Martí-Vilalta, & Capdevila, 1993)

Development in Rats and Humans

- Some papers made approximate one-to-one correspond between development of rats and humans. (Andreollo, Santos, Araújo, & Lopes, 2012)
- The relation between rats and human aging:
  - 6 week in Rat = 4.5 years in Human
  - 4 month in Rat = 12 years in Human
  - 20 month in Rat = 50 years in Human

References I

Andreollo, N. A., Santos, E. F. d., Araújo, M. R., & Lopes, L. R. (2012). Rat's age versus human's age: what is the relationship? *ABCD. Arquivos Brasileiros de Cirurgia Digestiva (São Paulo)*, *25*(1), 49–51.

Casey, B., Giedd, J. N., & Thomas, K. M. (2000). Structural and functional brain development and its relation to cognitive development. *Biological psychology*, *54*(1-3), 241–257.

Fearnley, J. M., & Lees, A. J. (1991). Ageing and parkinson's disease: substantia nigra regional selectivity. *Brain*, *114*(5), 2283–2301.

Freeman, T. B., Spence, M. S., Boss, B. D., Spector, D. H., Strecker, R. E., Olanow, C. W., & Kordower, J. H. (1991). Development of dopaminergic neurons in the human substantia nigra. *Experimental neurology*, *113*(3), 344–353.

References II

Geffen, L., Jessell, T., Cuello, A., & Iversen, L. (1976). Release of dopamine from dendrites in rat substantia nigra. *Nature*, *260*(5548), 258–260.

Pujol, J., Vendrell, P., Junqué, C., Martí-Vilalta, J. L., & Capdevila, A. (1993). When does human brain development end? evidence of corpus callosum growth up to adulthood. *Annals of Neurology: Official Journal of the American Neurological Association and the Child Neurology Society*, *34*(1), 71–75.

Rakic, P., & Yakovlev, P. I. (1968). Development of the corpus callosum and cavum septi in man. *Journal of Comparative Neurology*, *132*(1), 45–72.

Schlaug, G., Jäncke, L., Huang, Y., Staiger, J. F., & Steinmetz, H. (1995). Increased corpus callosum size in musicians. *Neuropsychologia*, *33*(8), 1047–1055.

References III

Stiles, J., & Jernigan, T. L. (2010). The basics of brain development. *Neuropsychology review*, *20*(4), 327–348.