DANDRITE Lecture
Thursday 16 November 2017
14:00-15:00
Building 1170, room 347 (Aud. 6) Aarhus University

Jens Christian Schwamborn

Prof. at Faculté des Sciences, de la Technologie et de la Communication - Université du Luxembourg

Research area: Parkinson's disease, Systems Biomedicine, Stem cells, Neurogenesis, Regeneration

Human brain organoids as in vitro model for Parkinson's disease

Research on human brain development and neurological diseases is limited by the lack of advanced experimental in vitro models that truly recapitulate the complexity of the human brain. Here, we describe a robust human brain organoid system that is highly specific to the midbrain derived from regionally patterned neuroepithelial stem cells. These human midbrain organoids contain spatially organized groups of dopaminergic neurons, which make them an attractive model for the study of Parkinson's disease. Midbrain organoids are characterized in detail for neuronal, astroglial, and oligodendrocyte differentiation. Furthermore, we show the presence of synaptic connections and electrophysiological activity. The complexity of this model is further highlighted by the myelination of neurites. The present midbrain organoid system has the potential to be used for advanced in vitro disease modeling and therapy development.

Host: Prof. Poul Henning Jensen, DANDRITE, Dept. of Biomedicine, Aarhus University

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5 recent publications

1. Spathis A.D., Asvos X., Ziavra D., Karambelas T., Topouzis S., Cournia Z., Qing X., Alexakos P., Smits L.M., Dalla C., Rideout H., Schwamborn J.C., Tamvakopoulos C., Fokas D., Vassilatis D.K. (2017) Nurr1:RXRα Heterodimer Activation as Monotherapy for Parkinson's Disease. *Proc Natl Acad Sci U S A.* **114**(15), 3999-4004
2. Monzel A.S., Smits L.M., Hemmer K., Hachi S., Moreno E.L., van Wuellen T., Jarazo J., Walter J., Werthschulte I., Boussaad I., Berger E., Fleming R.M.T. , Bolognin S., Schwamborn J.C. (2017). A novel approach to derive human midbrain-specific organoids from neuroepithelial stem cells. *Stem Cell Reports* **8**(5), 1144-1154
3. Gonzalez-Cano L., Menzl I., Tisserand J., Nicklas S. Sarah, Schwamborn J.C. (2017). Parkinson's Disease-Associated Mutant LRRK2-Mediated Inhibition of miRNA Activity is Antagonized by TRIM32. *Molecular Neurobiology* (in press)
4. Qing X., Walter J., Jarazo J., Arias-Fuenzalida J., Hillje A.L., Schwamborn J.C. (2017). CRISPR/Cas9 and piggyBac-mediated footprint-free LRRK2-G2019S knock-in reveals phenotypes in neurite complexity and α-Synuclein Serine 129 phosphorylation of dopaminergic neurons. *Stem Cell Research* (accepted)
5. Arias-Fuenzalida J., Jarazo J., Qing X., Walter J., Gomez-Giro G., Nickels S.L., Zaehres H., Schöler H.R., Schwamborn J.C. (2017). FACS assisted CRISPR-Cas9 genome editing facilitates Parkinson's disease modeling. *Stem Cell Reports* (accepted)