“Corticogenesis from human pluripotent stem cells leads to the generation of pyramidal neurons with diverse and complex hodological properties”.

First Author: Espuny-Camacho, I
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Abstract

The cerebral cortex is the most complex structure of our brain. During evolution, the relative size of the cortex has increased considerably among higher mammals and new cortical areas involved in higher evolved functions have emerged. Here, we describe an intrinsic pathway of corticogenesis from human embryonic (ESC) and induced pluripotent (iPSC) stem cells leading to the sequential generation of first forebrain progenitors and later pyramidal neurons of all six layers identities in a time-dependent fashion, highly reminiscent of the *in vivo* situation. Moreover, the hESC-derived neurons followed a neuronal maturation program where late born neurons of about two months *in vitro* expressed a variety of genes involved in cortical neuronal function and where the majority of the neuronal population was characterized by the presence of synapses *in vitro*. Following transplantation into mouse neonatal brain, human ESC-derived cortical neurons integrated robustly into the host brain and established specific axonal projections and dendritic patterns corresponding to native cortical neurons. The differentiation and connectivity of the transplanted human cortical neurons complexified progressively over several months *in vivo*, culminating in the establishment of functional synapses with the host circuitry. Importantly, our data not only demonstrate *in vitro*, as well as *in vivo*, the cortical identity of the neurons differentiated from human ESC, but also provide a faithful model of human cortical development, from early neurogenesis to neuronal maturation and generation of neuronal circuits, with implications for the modelling and treatment of neuropsychiatric and neurological diseases and brain repair.

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Belgian Group
For Animal Cell Technology

XIVth BELACT Meeting
Advanced models of (stem) cells in toxicology, pharmacology, safety assessment, and cell therapy.

Friday December the 14th, 2012

ULB - Erasme campus - Musée de la Médecine

9:00 – 9.45 : Welcome & registration - Coffee

Morning session – Advanced (stem) cell models in cell

- 9:45–10:00 Martine Raes (BELACT Chairwoman) and Pierre Vanderhaeghen (ULB, Chairman of the morning session) – Introduction
- 10:00-10:40 Cedric Blanpain (ULB) "Multipotent and pluripotent cardiovascular progenitors during development stem cells differentiation "
- 10:40-11:20 Sabine Costagliola (ULB) "Functional thyroid tissue derived from pluripotent stem cells"

11:20-11:40 Short coffee break

- 11:40-12:00 Mustapha Najimi (UCL) "Adult human liver mesenchymal stem/progenitor cells participate to mouse liver regeneration after hepatectomy"
- 12:00-12:20 Ira Espuny Camacho (ULB) "Corticogenesis from human pluripotent stem cells leads to the generation of pyramidal neurons with diverse and complex hodological properties"
- 12:20-12:40 Laurence Borgs (ULG) "Novel strategy to differentiate human induced pluripotent stem cells into dopaminergic neurons"

12:40 -14:00 Poster Session & Exhibition - Sandwiches

Afternoon session – Advanced (stem) cell models in cell toxicology and safety assessment (chairman Stefanos Grammatikos)

- 14:00-14:35 Sonja Beken (FAGG-AFMPS) "Overview on the regulatory acceptance and use of in vitro models for non-clinical testing of human medicinal products".
- 14:35–14:55 Jean-Pascal Piret (Univ. Namur) "Use of in vitro models for the evaluation of potential toxic effects of engineered nanoparticles"
- 14:55-15:15 Christoph Giese (ProBiogen, Berlin) A human lymphoid organ model (HuALN) for predictive testing of immunogenicity, immunotoxicity and immune functions in vitro"
- *15:15-15:35 Short coffee break*
- 15:35-16:15 Franck Atienzar (UCB) "Evaluation of different cellular models and endpoints for the detection of Human Hepatotoxic Drugs"
- 16:15-16:30 Gisèle Deblandre (MaSThercell) "How to meet the challenges associated with the development of cell-based medicinal products"
- 16:30:16:40 Conclusion - Stefanos Grammatikos *(ESACT) Lille 2013*

- **16:45-16:50 John Wérenne (ULB) - Conclusion**

BELACT REPLY FORM
(KINDLY RETURN THIS FORM BY MAIL ASAP)

TO : I. Knott / N. Hantson
at GlaxoSmithKline Vaccines

EMAIL :isabelle.knott@gsk.com
cc Biocelan@ulb.ac.be

FROM :

NAME : .....

ADDRESS :.....

.....

TEL : .....

FAX : .....

E-MAIL : .....

- The BELACT Committee welcomes in particular graduate or post-graduate students and the program of the day can be included in 2nd or 3rd cycle courses.

  A certificate will be available to registered students for their participation to the meeting.

- I will participate to the XIVth BELACT meeting.
  (payment 10 EUROs student – 20 EUROs non-student at the registration desk sandwich & lunch included)

Please note also that prize(s) for the best poster(s) presented will be offered ; this year a special bursary (registration, hotel and travel expenses) is offered by ESACT to attend the Lille ESACT meeting (June 23-26).

Chairman	*Secretary*	Local organizer
• ***M. Raes***	• ***I.Knott***	• ***J. Wérenne***
(F.U.N.D.P.)	*(Glaxo SmithKline Biologicals)*	*(ULB)*
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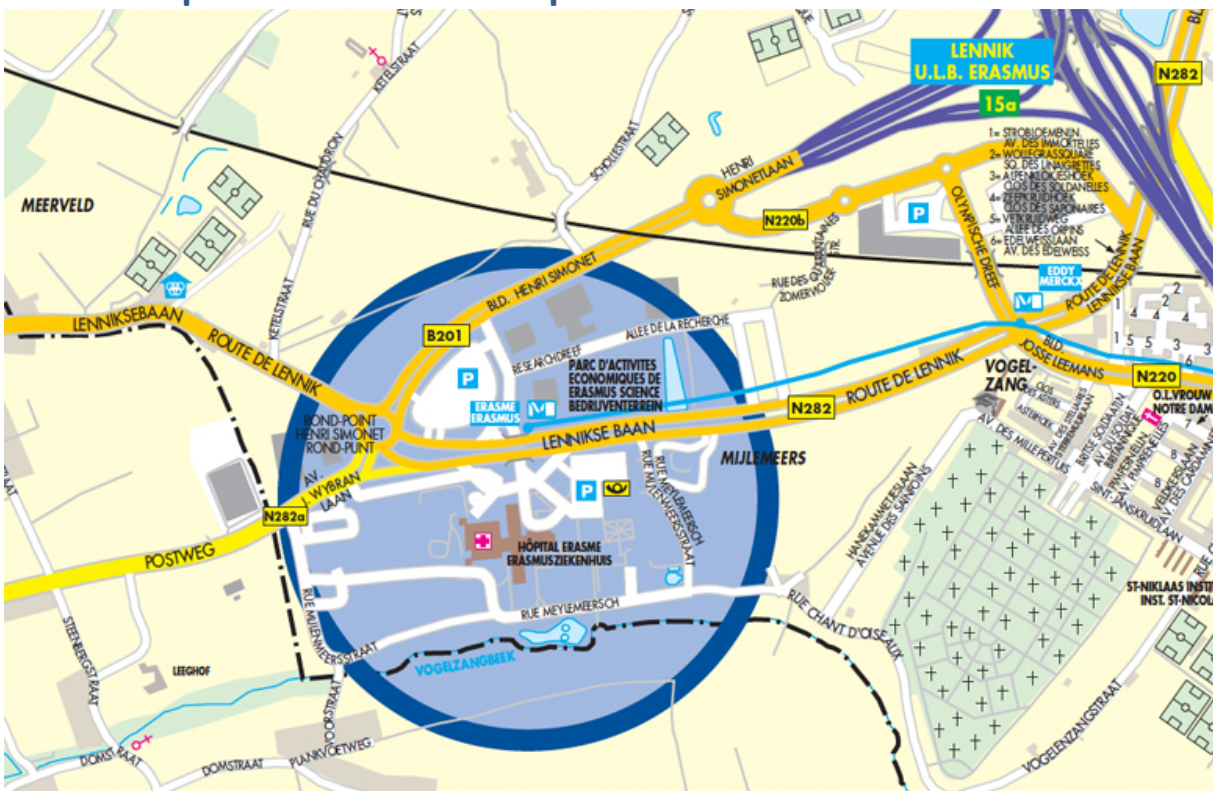
Fax. 081/72.41.35	*Fax. 02/656.9013*	*Fax. 02/*

Access map to the Erasme Campus



Access to ULB – Erasme Campus http://www.ulb.ac.be/campus/erasme/plan-en.htm

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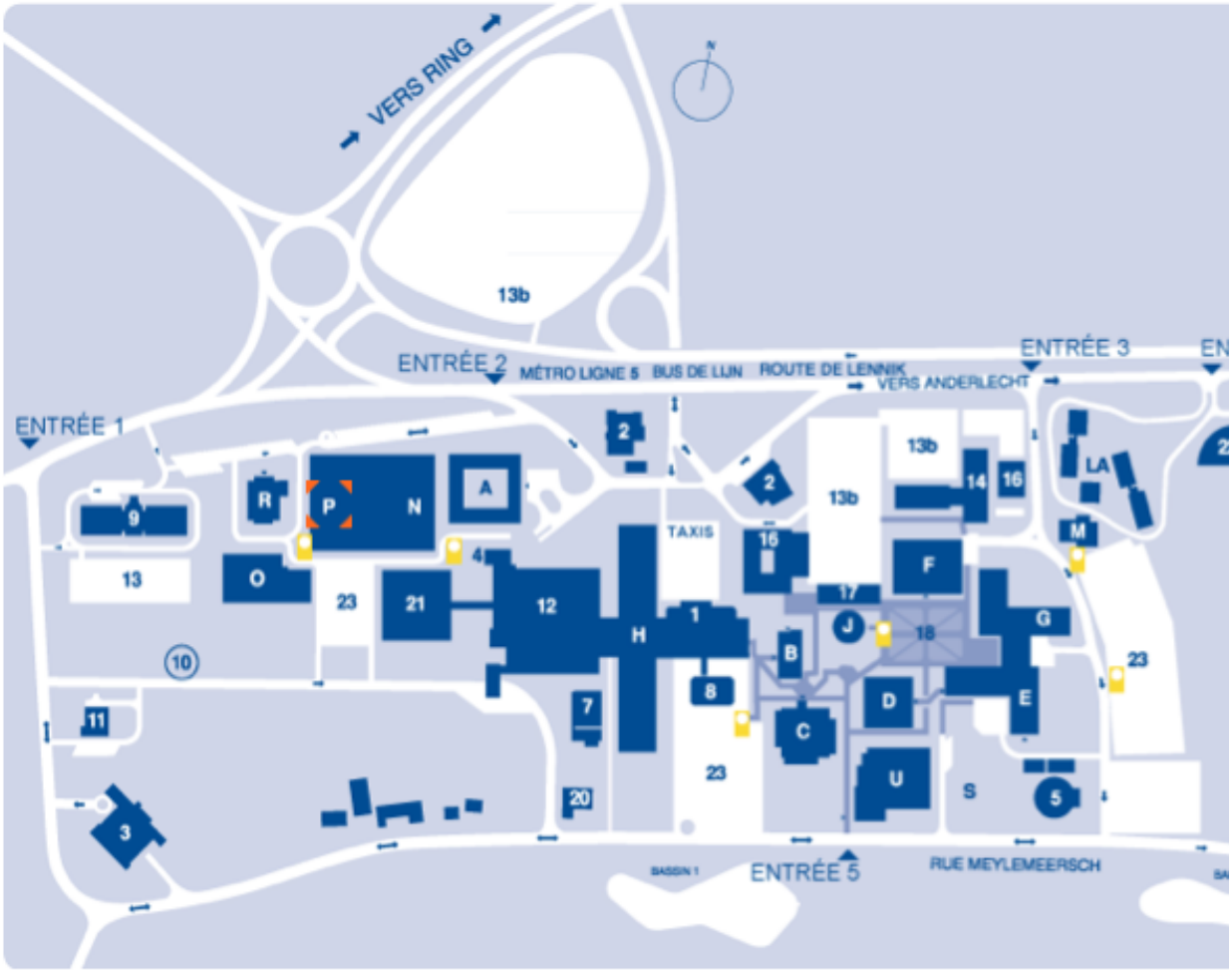
Musée de la Médecine = Building 17



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