

Special Seminar

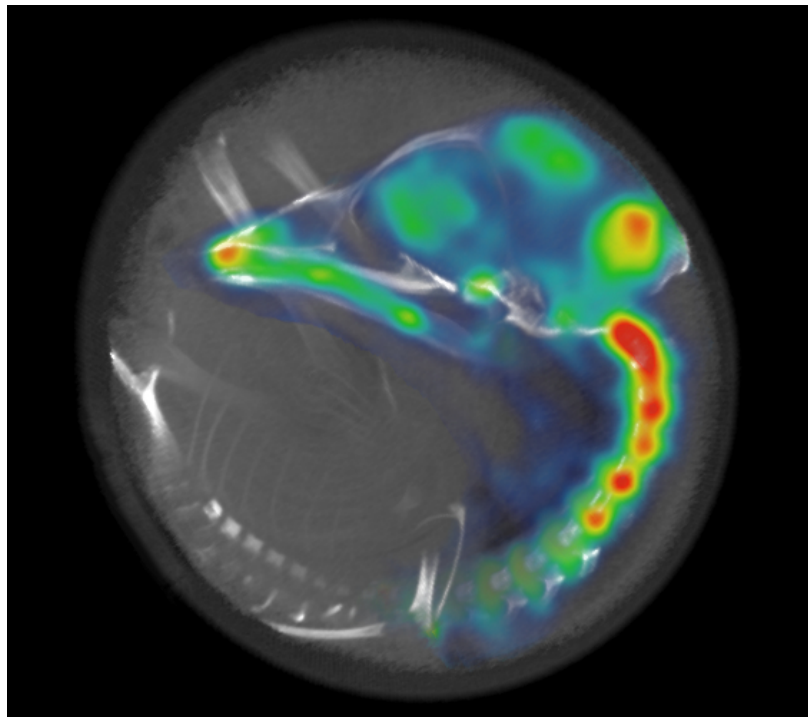
Neuroimaging at the dawn of integrative brain function

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Seminar room 1342/3, Domus Medica

(Lunch room, Dept of Physiology)

Sponsored by

Norwegian Consortium on Brain Development

Norwegian Center for Stem Cell Research

Overview of seminar content:

When in development do higher vertebrate embryo brains start functioning as integrative organs for the first time? To answer this question, chicken embryos were studied in the egg with a combination of sub-millimeter-resolution positron emission tomography (PET), structural x-ray computed tomography (CT) of the skeleton for fine-scale embryo staging, and non-invasive behavioral recording. PET imaging revealed unexpectedly wide variation in prenatal brain activity, inversely related to behavioral activity, which developed into different, sleep-like fetal brain states. Brief prenatal exposure to a salient chicken vocalization (eliciting strong postnatal behavioral responses) increased higher-brain activity significantly more than exposure to a spectrally-and-temporally-matching “non-vocal” noise analogue. Patterns of integrated activity between the brainstem and higher brain areas resembling awake, post-hatching animals were seen exclusively in chicken vocalization-stimulated embryos. Integrative, waking-like brain function first becomes present in a latent but inducible state during the final 20% of embryonic life (linked to the emergence of sleep-like states), and is selectively modulated by context-dependent monitoring circuitry.

REFERENCES

Balaban E., Desco M., Vaquero, J.J. (2012) Waking-like brain function in embryos. *Current Biology* 22(10): 852-861. (<http://dx.doi.org/10.1016/j.cub.2012.03.030>)

Rattenborg, N., Martinez-Gonzalez D. (2012) Developmental neurobiology: Awakening the brain for the first time. *Current Biology* 22(10): R398-R400. (<http://dx.doi.org/10.1016/j.cub.2012.03.030>)