COURSE READINGS

Biology 532 Winter 2022

DEVELOPMENTAL NEUROBIOLOGY SEMINAR

Wednesday and Friday, 10:00-11:30am
Remote via MyCourses/Zoom OR Stewart Biology Bldg. S3/4
(as per McGill's COVID-19 recommendations)

Instructors

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Jan 5

Introductory Lecture and Course Overview (Dr. van Meyel)

Jan 7

Unit 1 Lecture (Dr. van Meyel): Births, Migrations and Deaths

Background reading:

Pinson et al. Malformations of human neocortex in development - their progenitor cell basis and experimental model systems. Front Cell Neurosci. 13:305 (2019).

Kelava and Lancaster. Dishing out mini-brains: Current progress and future prospects in brain organoid research. Dev Biol. 420(2):199-209 (2016).

Tasic. Single cell transcriptomics in neuroscience: cell classification and beyond. Curr Opin Neurobiol. 50:242-249 (2018).

Jan 12

<u>Unit 1 Introductory Roundtable</u> (Dr. van Meyel):

Alçada-Morais et al. Adenosine A2A Receptors contribute to the radial migration of cortical projection neurons through the regulation of neuronal polarization and axon formation. Cereb Cortex. 31(12):5652-5663 (2021).

Jan 14

<u>Unit 1 Roundtable</u> (Dr. van Meyel):

Ohtsuka and Kageyama. Hes1 overexpression leads to expansion of embryonic neural stem cell pool and stem cell reservoir in the postnatal brain. Development 148(4):dev189191 (2021).

Jan 19

<u>Unit 2 Lecture</u> (Dr. Kania): Specification and Diversification of Neurons

Background reading:

Sagner and Briscoe. Establishing neuronal diversity in the spinal cord: a time and a place. Development 146, dev182154-13 (2019).

Lai et al. Making sense out of spinal cord somatosensory development. Development 143, 3434–3448 (2016).

Jan 21

<u>Unit 2 Roundtable</u> (Dr. Kania):

Osseward et al. Conserved genetic signatures parcellate cardinal spinal neuron classes into local and projection subsets. Science 372, 385–393 (2021).

Jan 26

<u>Unit 3 Lecture</u> (Dr. van Meyel): Neuronal Polarity, Neurite Outgrowth, and Dendrite Morphogenesis.

Background reading:

Takano et al. Neuronal polarization. Development. 142(12):2088-93 (2015).

Lefebvre et al. Development of dendritic form and function. Annu Rev Cell Dev Biol. 31:741-77 (2015).

Jan 28

<u>Unit 3 Roundtable</u> (Dr. van Meyel):

Lee et al. Inherited apicobasal polarity defines the key features of axon-dendrite polarity in a sensory neuron. Curr Biol 31(17):3768-3783 (2021).

Feb 2

Unit 4 Lecture (Dr. Cloutier): Axon Guidance.

Background reading:
Comer et al. Commissural axon guidance in the developing spinal cord: from Cajal to the present day. Neural Dev 14:9 (2019).

Feb 4

Unit 4 Roundtable (Dr. Cloutier):
Chaudhari et al. Robo recruitment of the Wave regulatory complex plays an essential and conserved role in midline repulsion. eLife 10: e64474 (2021).

Feb 9

Unit 1 - Student Seminar Presentation (Dr. van Meyel):
Morandell et al. Cul3 regulates cytoskeleton protein homeostasis and cell migration during a critical window of brain development. Nat Commun. 12(1):3058 (2021).

Feb 11

Unit 2 - Student Seminar Presentation (Dr. Kania):
Sagner et al. A shared transcriptional code orchestrates temporal patterning of the central nervous system. Plos Biol 19, e3001450 (2021).

Feb 16

Unit 3 - Student Seminar Presentation (Dr. van Meyel):
Takeo et al. GluD2- and Cbln1-mediated competitive interactions shape the dendritic arbors of cerebellar Purkinje cells. Neuron 109(4):629-644 (2021). (also see **Comment on Takeo**).

Feb 18

Unit 4 - Student Seminar Presentation (Dr. Cloutier):
Pederick et al. Reciprocal repulsions instructs the precise assembly of parallel hippocampal networks. Science 372: 1068-1073 (2021). (also see **Comment on Pederick**).

Feb 23

<u>Unit 5 Lecture</u> (Dr. Ruthazer): Topographic Map Formation: Interplay of Guidance Cues and Neuronal Activity

Background reading:
Kutsarova et al. Rules for shaping neural connections in the developing brain. Front Neural Circuits. 10:111 (2017).
Faust et al. Mechanisms governing activity-dependent synaptic pruning in the developing mammalian CNS. Nat Rev Neurosci 22: 657–673 (2021).

Feb 25

<u>Unit 5 Roundtable</u> (Dr. Ruthazer):
Ge et al. Retinal waves prime visual motion detection by simulating future optic flow. Science 373(6553):eabd0830 (2021).

Mar 2 and Mar 4 - No classes – Reading Break

Mar 9

<u>Unit 5 Student Seminar Presentation</u> (Dr. Ruthazer):
Lee et al. Astrocytes phagocytose adult hippocampal synapses for circuit homeostasis. Nature 590(7847):612-617 (2021).

Mar 11

<u>Unit 6 Lecture</u> (Dr. van Meyel): Formation of Synapses and Neural Circuits.

Background reading:
Sanes and Zipursky. Synaptic specificity, recognition molecules, and assembly of neural circuits. Cell 181(3):536-556 (2020).
Südhof. Towards an understanding of synapse formation. Neuron 100(2):276-293 (2018).
Allen and Eroglu. Cell biology of astrocyte-synapse interactions. Neuron 96(3):697-708 (2017).

Mar 16

<u>Unit 6 Roundtable</u> (Dr. van Meyel):
Oury et al. Mechanism of disease and therapeutic rescue of Dok7 congenital myasthenia. Nature 595(7867):404-408 (2021). (also see **Comment on Oury**).

Mar 18

Unit 6 Student Seminar Presentation (Dr. van Meyel):
Emperador-Melero et al. Intact synapse structure and function after combined knockout of PTPδ, PTPσ, and LAR. Elife 0:e66638 (2021).

Mar 23 (On-line course evaluation now open)

Unit 7 Lecture (Dr. van Meyel): Neural Stem Cells in Adults, and for Biomedical Research

Background reading:
Bond et al. Adult mammalian neural stem cells and neurogenesis: five decades later. Cell Stem Cell. 17(4):385-95. (2015).
Snyder et al. Recalibrating the relevance of adult neurogenesis. Trends Neurosci. 42(3):164-178 (2019).
Ardhanareeswaran et al. Human induced pluripotent stem cells for modelling neurodevelopmental disorders. Nat Rev Neurol 13, 265–278 (2017).

Mar 25

Unit 7 Roundtable (Dr. van Meyel): Dual Perspectives
Moreno-Jiménez et al. Evidences for adult hippocampal neurogenesis in humans. J Neurosci. 41(12):2541-2553 (2021).
Sorrells et al. Positive controls in adults and children support that very few, if any, new neurons are born in the adult human hippocampus. J Neurosci. 41(12):2554-2565 (2021).

Mar 30

Unit 7 Student Seminar Presentation (Dr. van Meyel):
Wegscheid et al. Patient-derived iPSC-cerebral organoid modeling of the 17q11.2 microdeletion syndrome establishes CRLF3 as a critical regulator of neurogenesis. Cell Rep. 36(1):109315 (2021).

April 1

Unit 8 Lecture (Dr. Fournier): Repair and Regeneration
Background reading:
Curcio and Bradke. Axon regeneration in the central nervous system: facing the challenges from the inside. Annu Rev Cell Dev Biol 34:495-521(2018).

April 6

<u>Unit 8 Roundtable</u> (Dr. Fournier):

Hilton et al. An active vesicle priming machinery suppresses axon regeneration upon adult CNS injury. Neuron S0896-6273(21)00775-3 (2021).

April 8

<u>Unit 8 Student Seminar Presentation</u> (Dr. Fournier):

Álvarez et al. Bioactive scaffolds with enhanced supramolecular motion promote recovery from spinal cord injury. Science 374(6569):848-856 (2021). (also see **Comment on Alvarez**).