Spring of 2004

Dandan Sun

Brain Tissue Culture Course 625

I. Syllabus

January 22: *Cell Cultures (Lecture-3hr)*

- type of nerve cell cultures
- general principles of cell cultures
- basic skills to characterize cell cultures (cell morphology, immunohistochemical staining, immunoblotting)

January 29: *Basic skills used in cell cultures (Laboratory-4hr)*

- sterilization technique
- preparation of cell culture medium
- quantification of cells in culture
- viable cell determination
- plating cells on coverslips

February 5: *Basic skills to characterize cell cultures (Laboratory-4hr)*

- immunofluorescence staining of neuronal and glial cells for a neuronal or glial marker protein
- coating cell culture plates with cellular matrix molecules

February 12: *Culturing cortical neurons (Laboratory-4hr)*

- sacrifice animal
- dissection of cortex
- cell suspension preparation
- determination of viable cells
- culturing cells

February 19: *Characterize cortical neuron cultures (Laboratory-4hr)*

- immunofluorescence staining for a neuronal marker protein

February 26: *Primary culture of astrocytes, and oligodendrocytes (Lecture)*

- primary culture of astrocytes and oligodendrocytes (Lecture)
- Plan of group presentations

March 4: *Culturing cortical astrocytes (Laboratory-4hr)*

- sacrifice animal
- dissection of cortex
- cell suspension preparation
- determination of viable cells
- culturing cells

March 11: *Discussion (Lecture/Laboratory)*

- discussion of recent studies using cultured cells (**Group 1**)
- maintenance of cortical astrocyte culture established on March 4 (Laboratory-1.5 hr)

March 18: *no class (Spring Recess)*

March 25: *Characterize cortical astrocyte cultures (Laboratory-4hr)*
- immunohistochemical staining for an astrocyte marker protein

April 1: *Culturing oligodendrocytes (Laboratory-4hr)*

April 8: *Neural stem cells: derivation, differentiation, and application (Su-Chun Zhang, < 2 hr)*
*Discussion of recent studies using cultured cells (**Group 2**, < 1.5 hr)*

April 15: *Functional study of membrane proteins in cultures (Lecture/Laboratory, Doug Kintner)*
Functional study of membrane proteins in cultures (Lecture, < 1.5 hr)
Probing intracellular changes in cultured cells (Laboratory, half of the class)

April 22: *Discussion of recent studies using cultured cells (**Group 3**, < 1.5 hr)*
Functional study of membrane proteins in cultures (Laboratory, half of the class)

April 29: *Organotypic slice cultures of neuronal tissue (Laboratory)*
- organotypic slice cultures of hippocampus

May 6: *Characterize organotypic slice cultures of hippocampus*

May 13 & 14: *Final Exam Presentation (3 hr)*

II. Reading list

- "Culturing nerve cells", 2nd edition, edited by Gary Banker and Kimberly Goslin, The MIT press, 1998.
- "The neuron in tissue culture", edited by L.W. Haynes, Wiley Ltd., 1999.
- "Neuronal Cell lines, a practical approach", edited by J. N. Wood, IRL press, 1992.
- Lab manual and hand-outs

III. Evaluation

Students will be evaluated in several ways:
- Laboratory experimental performance (70% of the total grade)
- In class discussion (10% of the total grade)
- Final Exam: students will write and present a research proposal using a culture model learned in this course (5-page long, double space, 15-20 min of presentation, 20% of the total grade).