Molecular Genetics Graduate Topic Course

Course Title: Virus Replication
Course Location: to be determined
Course Time and Date: Fridays 2-4 PM, Oct 31 – Dec 5 (Take-home exam due Dec 19)
Course Instructor: Martha Brown
Instructor Contact Information (email): martha.brown@utoronto.ca
Additional Lecturers (list name, email, Department): none

Course Overview:

This course will consider recent developments in understanding the importance of extracellular vesicles in virus replication. The first class will comprise an interactive review of virus replication with particular attention to release of progeny virions and entry into the next host cell. Subsequent classes will consist of student presentations of selected papers from the literature, along with class discussion. Papers for presentation will be distributed a week in advance of the presentation. Assessment is based on presentation of one or more papers (depending on class size), participation in class discussion and a written assignment (Take-home exam).

This version of the course will focus on an aspect of virology that currently is attracting a lot of interest, specifically, the importance of extracellular vesicles for virus replication in cell culture and *in vivo*. Contrary to what the textbooks say, it's not just that viruses get out of infected cells when the cells disintegrate but it is now recognized that several viruses (both enveloped and non-enveloped) are released in vesicles before the cell disintegrates. Not only do vesicles deliver progeny viruses to new target cells but they also deliver molecules that can modulate conditions within the target cells, resulting in an intracellular environment that is more, or less, conducive to virus replication. Even commensal bacteria (part of the microbiome) *in vivo* produce vesicles that can protect against virus infection in animal models and presumably in us too. Recent papers will be studied to explore different ways by which vesicles mediate proviral and antiviral effects on virus replication, thereby facilitating localized virus spread and possibly disease, or limiting virus spread, thereby protecting the host from more serious widespread infection that could be fatal.

Course Objectives:

- To explore the recent literature that draws attention to vesicles for transport of newly-made virions between cells within one host and even between hosts
- To consider the role of vesicles for communication between infected cells and their uninfected neighbours
- To explore mechanisms by which vesicles from infected cells mediate proviral and antiviral effects on virus replication in neighbouring cells and in distal cells

Marking Scheme:

- Presentation 30 %
- Participation/discussion 20%
- Take-home exam 50%
  (questions distributed in last class; papers due two weeks later)

If you anticipate missing a class you must let the instructor know in advance. You will still be responsible for the material covered in that class.

The basic outline for what will be covered in the six weeks is below:

Week 1: Overview of virus replication and early studies in release of virus in vesicles (Oct 31)
Week 2: Release of rota- and noroviruses; transmission of virus between hosts (Nov 7)
Week 3: Proviral effects of extracellular vesicles (Nov 14)
Week 4: Antiviral effects of extracellular vesicles (Nov 21)
Week 5: Influence of infected cells on nearby and distal cells (Nov 28)
Week 6: Bacterial vesicles and their antiviral effect (Dec 5)