MITACS Workshop, May 17 – 22, 2009
Mathematical Immunology of Infectious Diseases
(Program)

Sunday, May 17
04:00 PM    Registration opens
05:30 PM – 07:30 PM    Dinner

Monday, May 18
07:00 AM – 08:00 AM    Breakfast

08:00 AM – 08:10 AM    Welcome and Workshop Objectives by Jane Heffernan
08:10 AM - 08:20 AM    Welcome to BIRS and Banff Centre by Brenda Williams

Theme 1:    Organization and function of the immune system
Chair: Alan Perelson

08:20 AM - 08:30 AM    Introduction to theme 1 and its presentations by Chair

08:30 AM - 09:30 AM    Speaker: Rob J De Boer
Utrecht University
“Estimating the killing efficacy of cytotoxic T cells”

09:30 AM - 10:00 AM    Speaker: Stanca Ciupe
Duke University
“Mathematical models of T-cell development”

10:00 AM - 10:30 AM    Health Break

10:30 AM - 11:00 AM    Speaker: Murray E Alexander
Institute for Biodiagnostics, National Research Council
“A unifying mechanism of clonal expansion leading to T cell memory”

11:00 AM - 11:30 AM    Speaker: Lindi Wahl
University of Western Ontario
“Tregs and autoimmunity: deterministic and stochastic approaches predict a role of bystander suppression”

11:30 AM - 12:00 PM    Speaker: Vahid Anvari
York University
“Relatively mature dendritic cells”

12:00 PM - 01:30 PM    Lunch Break

02:00 PM - 03:00 PM    Discussion on theme 1    Moderators:    Alan Perelson
Beni Sahai

03:00 PM - 03:20 PM    Health Break
Theme 2a:  Mechanism of a disease process (In-host pathogen dynamics)  
Chair: Beni Sahai

03:20 PM - 03:30 PM  Introduction to theme 2a and its presentations by Chair

03:30 PM - 04:30 PM  Speaker: Peter A Bretscher  (Plenary lecture)  
University of Saskatchewan  
“Macroimmunology and Immunological Intervention”

04:30 PM - 05:00 PM  Speaker: Timothy Reluga  
Pennsylvania State University  
“Grokking in-host dynamics of infectious disease through modeling”

05:00 PM - 05:30 PM  Speaker: Ruy M Ribeiro  
Los Alamos National Laboratory  
“Hepatitis B virus kinetics under therapy sheds light on the balance between replication and immune clearance”

05:30 PM - 07:30 PM  Dinner

Tuesday, May 19  07:00 AM – 08:00 AM  Breakfast

Themes 2b & 3:  Mechanism of a disease process (HIV, HTLV-1, Malaria)  
Assessment of antiretroviral therapy  
Chairs: Rob De Boer and Ruy Ribeiro

08:15 AM - 08:30 AM  Introduction to themes 2b & 3 and its presentations by Chair

08:30 AM - 09:30 AM  Speaker: Alan Perelson  (Plenary lecture)  
Loa Alamos National Laboratory  
“Stochastic models of early HIV infection”

09:30 AM - 10:00 AM  Speaker: Michael Li  
University of Alberta  
“In-host models for HTLV-1 infection of CD4+ T cells and its immune responses”

10:00 AM - 10:30 AM  Health Break

10:30 AM - 11:00 AM  Speaker: Robert Smith?  
University of Ottawa  
“Can the viral reservoir of latently infected CD4+ T cells be eradicated with antiretroviral HIV drugs?”
11:00 AM - 11:30 PM Speaker: Rachelle Miron  
University of Ottawa  
“The effect of imperfect adherence on HIV induction therapy: how many drug holidays can you take and how long should they be”

11:30 AM - 12:00 PM Speaker: Yan Wang  
University of British Columbia  
“Oscillatory viral dynamics in a delayed HIV pathogenesis model”

12:00 PM - 01:30 PM Lunch Break

01:30 PM – 02:00 PM Group Photo

02:00 PM - 02:30 PM Speaker: Majid Jaberi-Douraki  
University of New Brunswick  
“Continuous and discrete dynamics of a deterministic model of HIV infection in vivo”

02:30 PM - 03:00 PM Speaker: Maite Severins  
Utrecht University  
“Evolution and dynamics of variant surface antigens in malaria”

03:00 PM - 03:20 PM Health Break

03:20 PM - 04:20 PM Discussion on themes 2 & 3  Moderators: Rob De Boer  
Ruy Ribeiro  
Jane Heffernan

Theme 4: Pathogen evolution: changing virulence, drug resistance or extinction  
Chairs: Lindi Wahl and Murray Alexander

04:20 PM - 04:30 PM Introduction to themes 4 and its presentations by Chair

04:30 PM - 05:00 PM Speaker: Michael Gilchrist  
University of Tennessee  
“Using simple, nested models to study the evolution of virulence”

05:00 PM - 05:30 PM Speaker: Catherine Beauchemin  
Ryerson University  
“Characterizing the fitness of drug-resistant influenza strains”

05:30 PM - 07:30 PM Dinner
Wednesday, May 20
07:00 AM – 08:00 AM Breakfast

Theme 4: Pathogen evolution: changing virulence, drug resistance or extinction
Chairs: Lindi Wahl and Murray Alexander

08:00 AM - 08:30 AM Speaker: Neal Madras
York University
“A stochastic model for viral mutation and control of infection”

08:30 AM - 09:00 AM Speaker: Stephanie Portet
University of Manitoba
“Impact of viral mutation on suppression of infection by cytotoxic T cells”

09:00 AM - 09:30 AM Speaker: Elissa J Schwartz
Washington State University
“HIV-1 escape from cytotoxic T lymphocyte response”

09:30 AM – 10:00 AM Speaker: Dominik Wodarz
University of California at Irvine
“Multiple infection of cells and the evolutionary dynamics of HIV in vivo”

10:00 AM – 10:30 AM Health Break

10:30 AM - 11:00 AM Speaker: Daniel Coombs
University of British Columbia
“Getting to grips with the emergence and transmission of drug resistant strains”

11:00 AM - 12:00 PM Discussion on theme 4 Moderators: Lindi Wahl Murray Alexander

FREE AFTERNOON (No session scheduled)

05:30 PM - 07:30 PM Dinner

Thursday, May 21
07:00 AM – 08:00 AM Breakfast

Theme 6: In-host processes affecting spread or control of infection in population
Chair: Michael Li

08:00 AM - 09:00 AM Speaker: Matthew Keeling (Plenary lecture)
University of Warwick
“Immuno-epidemiology: bringing together within-host and between-host dynamics for measles”
09:00 AM - 09:30 AM Speaker: David M Vickers
University of Saskatchewan
“Effect of immune responses on transmission of sexually-transmitted infections: Chlamydia as a case study”

09:30 AM - 10:00 AM Speaker: Nathaniel Osgood
University of Saskatchewan
“Impact of memory CTLs on dynamics of influenza virus in vivo and its spread in diverse populations”

10:00 AM - 10:30 AM Health Break

Theme 7: Vaccination/antimicrobial strategies for control of infection in population
Chair: Pauline van den Driessche

10:30 AM - 11:00 AM Speaker: Chris Bauch
University of Guelph
“Vaccination games on the network: the impact of population contact structure and in-host processes”

11:00 AM - 11:30 AM Speaker: Xiaohong Wang
Arizona State University
“Evaluating the efficacy of antimicrobial cycling programs and patient isolation on dual resistance in hospitals”

11:30 AM - 12:00 PM Speaker: Julien Arino
University of Manitoba
“Strategies for controlling an influenza pandemic using antivirals and vaccination”

12:00 PM - 01:30 PM Lunch Break

02:00 PM - 02:30 PM Speaker: Samit Bhattacharyya
University of Guelph
“Imitation dynamics, delaying strategies, and vaccination in an age-structured population”

02:30 PM - 03:00 PM Speaker: Jing Li
University of Ottawa
“Modeling diseases with latency in two locations”

03:00 PM - 03:20 PM Health Break

03:20 PM - 04:00 PM Discussion on themes 6 & 7 Moderators: Michael Li Pauline van den Driessche
### Theme 8: Mathematical techniques and barriers to *in host* immune modeling
**Chair:** Robert Smith?

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<tr>
<th>Time</th>
<th>Event</th>
<th>Speakers</th>
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<tbody>
<tr>
<td>04:00 PM - 04:30 PM</td>
<td>Speakers: Jane Heffernan and Catherine Beauchemin</td>
<td>York University and Ryerson University</td>
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<td>“Agent-based modeling”</td>
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<td>04:30 PM - 05:00 PM</td>
<td>Speaker: Murray E Alexander</td>
<td>Institute for Biodiagnostics, National Research Council</td>
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<td>“Large-scale population dynamics and collective behavior: a statistical physics perspective”</td>
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<td>05:00 PM - 05:30 PM</td>
<td>Discussion on theme 8</td>
<td>Moderators: Robert Smith?, Neal Madras</td>
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**05:30 PM - 07:30 PM** Dinner

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### Friday, May 22

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<tr>
<td>07:00 AM – 08:00 AM</td>
<td>Breakfast</td>
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### Theme 5: Vaccine design: opportunities and challenges
**Chair:** Daniel Coombs

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<tr>
<td>08:15 AM - 08:30 AM</td>
<td>Introduction to theme 5 and its presentation by Chair</td>
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<tr>
<td>08:30 AM - 09:30 AM</td>
<td>Speaker: Beni M Sahai</td>
<td>Cadham Provincial Laboratory, Winnipeg, Canada</td>
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<td>“Immunological control of influenza infection and basis for creation of a universal vaccine”</td>
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<td>09:30 AM - 10:15 AM</td>
<td>Discussion on theme 5</td>
<td>Moderators: Daniel Coombs</td>
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<td></td>
<td></td>
<td>(with focus on HIV &amp; flu vaccines)</td>
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<td>10:15 AM – 10:35 AM</td>
<td>Health Break</td>
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<td>10:35 AM - 11:15 AM</td>
<td>Discussion on theme 5 continues</td>
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<td>11:15 AM - 11:45 AM</td>
<td>Concluding Session</td>
<td>Moderators: Jane, Robert &amp; Beni</td>
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<td></td>
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<td>(A discussion recognizing achievements and future targets)</td>
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<td>11:45 AM - 12:00 PM</td>
<td>Workshop closes following vote of thanks</td>
<td>Jane Heffernan</td>
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<td>Lunch</td>
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