

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
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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	(Plenary lecture)
	Utrecht University <i>“Estimating the killing efficacy of cytotoxic T cells”</i>	
09:30 AM - 10:00 AM	Speaker: Stanca Ciupe	
	<i>“Mathematical models of T-cell development”</i> Duke University	
10:00 AM - 10:30 AM	Health Break	
10:30 AM - 11:00 AM	Speaker: Murray E Alexander	
	Institute for Biodiagnostics, National Research Council <i>“A unifying mechanism of clonal expansion leading to T cell memory”</i>	
11:00 AM - 11:30 AM	Speaker: Lindi Wahl	
	University of Western Ontario <i>“Tregs and autoimmunity: deterministic and stochastic approaches predict a role of bystander suppression”</i>	
11:30 AM - 12:00 PM	Speaker: Vahid Anvari	
	York University <i>“Relatively mature dendritic cells”</i>	
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	

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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**
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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)
Los 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?”

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- 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 Jaber-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**
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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 <i>“A stochastic model for viral mutation and control of infection”</i>	
08:30 AM - 09:00 AM	Speaker: Stephanie Portet University of Manitoba <i>“Impact of viral mutation on suppression of infection by cytotoxic T cells”</i>	
09:00 AM - 09:30 AM	Speaker: Elissa J Schwartz Washington State University <i>“HIV-1 escape from cytotoxic T lymphocyte response”</i>	
09:30 AM – 10:00 AM	Speaker: Dominik Wodarz University of California at Irvine <i>“Multiple infection of cells and the evolutionary dynamics of HIV in vivo”</i>	
10:00 AM – 10:30 AM	Health Break	
10:30 AM - 11:00 AM	Speaker: Daniel Coombs University of British Columbia <i>“Getting to grips with the emergence and transmission of drug resistant strains”</i>	
11:00 AM - 12:00 PM	Discussion on theme 4	Moderators: Lindi Wahl Murray Alexander
12:00 PM - 01:30 PM	Lunch Break <i>(A one-hour tour of the Banff Centre will start at 01:00 PM)</i>	
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 University of Warwick <i>“Immuno-epidemiology: bringing together within-host and between-host dynamics for measles”</i>	(Plenary lecture)

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- 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

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**Theme 8: Mathematical techniques and barriers to *in host* immune modeling
Chair: Robert Smith?**

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

05:30 PM - 07:30 PM Dinner

Friday, May 22 07:00 AM – 08:00 AM Breakfast

**Theme 5: Vaccine design: opportunities and challenges
Chair: Daniel Coombs**

- 08:15 AM - 08:30 AM Introduction to theme 5 and its presentation by Chair
- 08:30 AM - 09:30 AM Speaker: **Beni M Sahai**
Cadham Provincial Laboratory, Winnipeg, Canada
*“Immunological control of influenza infection and basis for
creation of a universal vaccine”*
- 09:30 AM - 10:15 AM Discussion on theme 5 **Moderators: Daniel Coombs
(with focus on HIV & flu vaccines) Elissa Schwartz**

10:15 AM – 10:35 AM Health Break

- 10:35 AM - 11:15 AM Discussion on theme 5 continues
- 11:15 AM - 11:45 AM Concluding Session **Moderators: Jane, Robert & Beni**
(A discussion recognizing achievements and future targets)
- 11:45 AM - 12:00 PM Workshop closes following vote of thanks **Jane Heffernan**

12:00 PM - 01:30 PM Lunch
