

Strategic Collaborative Units

MOLECULAR MICROBIOLOGY

Director

Dr. Dennis Cvitkovitch

Coinvestigators/ Collaborators

Dr. Céline M. Lévesque
Dr. Paul Santerre
Dr. Lori Burrows
Dr. Joyce deAzavedo
Dr. Jeannine Brady
Dr. Gunnel Svensater
Dr. Bernard Guggenheim
Dr. Jason Tanzer
Dr. Gary Dunny
Dr. Steven Goodman
Dr. Grace Spatafora
Dr. Donald Morrison
Dr. Wenyuan Shi
Dr. Fengxia Qi
Dr. Justin Merrit
Dr. Scott Peterson
Dr. Robert Burne
Dr. Michael Mulvey
Dr. Richard Gregory
Dr. Erin Gaynor
Dr. Debora Foster
Dr. Michael Surette

Research Associates/ PDFs

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Research Assistants/ Technicians

Kirsten Krastel
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Richard Mair

Ph.D. Students

Julie Perry
Salim Kowthar
Julianna Kus
Prashanth Suntharalingam
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Shelly Bolotin

M.Sc. Students

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Rob Matsui
J.P. Singh
Jennifer Kim

Undergraduates

Anousheh Persadmehr

University of Toronto
Faculty of Dentistry



The goal of the Oral Microbiology Unit in the Faculty of Dentistry is to promote understanding of the way microbes compromise oral health and oral health-care delivery. Active research in the Section includes studies on oral biofilms, host/microbe interactions, endodontic microbiology and infection control. A major research foci is understanding the mechanisms that biofilms use to cause disease, with a focus on the oral cavity. The unit is typically well funded and has a research group encompassing 4 principal Investigators (Dr. Ellen, Dr. Fillery, Dr. Cvitkovitch, Dr. Lévesque) and a strong support staff for imaging, flow cytometry and sterilization. There are continuous training opportunities and several scholarships offered for Graduate Trainees.



▲ **Molecular Microbiology members** (left to right): K. Singh, R. Mair, R. Matsui, Dr. J. Kus, K. Krastel, Dr. D. Cvitkovitch, D. Del Re, Dr. D. Senadheera

Research Foci

Dr. Cvitkovitch's main research interests focus on cell-cell signalling and acid tolerance of *Streptococcus mutans* biofilms. The molecular microbiology group has discovered that *S. mutans* has at least two cell-cell signalling systems that allow the cell to become genetically competent, acid tolerant and allow it to form biofilms. They have deduced part of the molecular pathway of one of these quorum sensing systems and discovered it to be analogous to a peptide-pheromone cell-cell signalling system of *S. pneumoniae*. Research is currently examining other potential systems using a combination of in silico and in vitro techniques.

In the course of Dr. Cvitkovitch's graduate and post-doctoral training, his research focused on the

study of the genetics, physiology and metabolism of the oral pathogen *Streptococcus mutans*. Dr. Cvitkovitch is currently appointed as a tenured associate professor in the Dental Research Institute in the Faculty of Dentistry at the University of Toronto where he has established an active research program along with his teaching and academic responsibilities. He is continuing the study of the acid tolerance response of *S. mutans* (CIHR funded) and using DNA microarrays to help unravel the genes encompassing this system.

Dr. Cvitkovitch has also been recently awarded an R01 grant by the NIH to study genetic competence in *S. mutans* biofilms. This project began in September of 1999 and has continued to make

excellent progress at gaining insight into the mechanisms that oral bacteria use to communicate in biofilms. The molecular microbiology group has published numerous manuscripts and book chapters describing these processes.

The laboratory is actively involved in knowledge translation and has several interactions and ongoing projects with industrial partners that are developing both diagnostics and treatments for biofilm-mediated infections.

Statistics for 'Molecular Microbiology'

	2007	To date
Patents	0	1
Peer Reviewed Publications	7	46
Funding	\$520,000	~ \$3 million
PDFs	1	4
Ph.D. Students	6	8
MSc. Students	4	10
Undergraduate students	1	17
High school Students	4	18