



# Faculty Member Profile

## Lawrence K. Silbart

**Professor and Department Head, Department of Allied Health (2006)**

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LAWRENCE.SILBART@uconn.edu

### Background:

Dr. Silbart received his Ph.D. in toxicology from the University of Michigan in 1987. He joined the Department of Animal Science in 1991 as an Assistant Professor and Assistant Director of the Center for Environmental Health. He currently advises all undergraduate students enrolled in the Environmental Health Concentration.

### Courses Taught:

[ANSC 306](#) Vaccines: Mechanisms of Immune Protection (Only taught on alternating odd numbered years, spring semester)

### Awards Received:

- 2002 - Kinsman Award for Teaching Excellence

### Research Program:

Dr. Silbart conducts a variety of research programs in the area of mucosal immunology and vaccine development. His current research interests are focused in two major areas: (1) the development of mucosal vaccines capable of blocking the absorption of toxicants such as aflatoxin from the diet; and (2) the development of peptide-based vaccines for blocking the transmission of HIV across the vaginal mucosa. Dr. Silbart currently oversees the research efforts of four Ph.D. students, one master's student and one honors undergraduate student. All students in his research laboratories are broadly trained in molecular and cell biology, molecular genetics, immunology, and statistics. In addition, specialized training in toxicology or virology is sometimes required.

Blocking aflatoxin B1 absorption via active and passive vaccination of chickens: This research project uses a derivatized form of aflatoxin B1 coupled to a variety of carrier proteins to induce mucosal immunity in chickens. Aflatoxin B1 is a natural toxicant produced by common molds which grow on cornmeal and other grain products. Very little work has been done in the past on immune exclusion in

this species, thus, novel methods for inducing mucosal immunity are currently being investigated. A related project is currently examining the cellular basis of immune tolerance at the gastrointestinal mucosa.

Peptide-based vaccines for the induction vaginal immunity to HIV: This project uses synthetic peptides administered to rabbits in a variety of formulations designed to induce mucosal immunity. Recent studies have utilized genetic engineering approaches to design plasmid which when introduced into mammalian cells will result in their producing specific proteins and peptides present on the HIV glycoprotein envelope. These selected "epitopes" will hopefully elicit a specific type of immunity to HIV, without adverse effects. A similar project uses the bacterium *Salmonella typhimurium* as a vaccine delivery system. Recombinant plasmids introduced into the bacterium will result in the production of HIV peptides. When the bacterium invades the mucosa, it will die, and subsequently deliver the foreign HIV peptides to the inductive site of mucosal immune responses.

### **Recent Publications:**

Canpolat, E., Pedersen-Lane, J., Lawrence, D.A., Silbart, L.K., and Lynes, M.A. (2008) Metallothionein interactions at leukocyte plasma membranes. In preparation.

Barrette, R., Rood, D. and Silbart, L.K. (2008) Refocusing the immune response toward an immunodominant, hypervariable region within the FMDV VP1 G-H loop to a more highly conserved epitope via xenoepitope substitution. For submission 2/08

Nair, M.K.M, Venkitanarayanan, K., Silbart, L.K. and Kim, K.S., (2008) Outer membrane protein A (OmpA) of *Enterobacter sakazakii* binds fibronectin and contributes to invasion of human brain microvascular endothelial cells. (Submitted)

Gates A.E., S. Frasca, S. Jr, Nyaoke, A., Gorton, T.S., Silbart, L.K., Geary, S.J., (2008) Comparative Assessment of a Metabolically Attenuated *Mycoplasma gallisepticum* Mutant as a Live Vaccine for the Prevention of Avian Respiratory Mycoplasmosis. Vaccine (in press).

Yang H, Knapp J, Koirala P, Rajagopal D, Peer WA, Silbart LK, Murphy A, Gaxiola RA. (2007) Enhanced phosphorus nutrition in monocots and dicots over-expressing a phosphorus-responsive type I H<sup>+</sup>-pyrophosphatase. *Plant Biotechnol J*. Nov;5(6):735-45. Epub 2007 Aug 16. A.E. Gates,1,2 S. Frasca Jr,1,2 A. Nyaoke,2 T.S. Gorton,1,2 L.K. Silbart,1,3 S. J. Geary,1,2\*

Rezamand P, Hoagland TA, Moyes KM, Silbart LK, Andrew SM. (2007) Energy status, lipid-soluble vitamins, and acute phase proteins in periparturient Holstein and Jersey dairy cows with or without subclinical mastitis. *J Dairy Sci*. 2007 Nov;90(11):5097-107.

Siddiqui, S., Rood. D., Morris, J., Wyand S., Silbart, L.K., (2007) Allergen deposition in the lower respiratory tract correlates with eosinophilia in the airways of BALB/c mice. In revision.

Mohammed J, Frasca S Jr, Cecchini K, Rood D, Nyaoke AC, Geary SJ, Silbart LK. (2007) Chemokine and cytokine gene expression profiles in chickens inoculated with *Mycoplasma gallisepticum* strains Rlow or GT5. *Vaccine*. Dec 12;25(51):8611-21. Epub 2007 Oct 16.

Challa S., Barrette R., Rood .D, Zinckgraf J., French R., Silbart L. (2007) Non-toxic *Pseudomonas aeruginosa* exotoxin A expressing the FMDV VP1 G-H loop for mucosal vaccination of swine against

foot and mouth disease virus. *Vaccine*. 2007 Apr 30;25(17):3328-37. Epub 2007 Jan 12.

C. Srinivasan, J. Lee, F. Papadimitrakopoulos, L.K. Silbart, M. H. Zhao, and D.J. Burgess. Labeling and intracellular tracking of functionally active plasmid DNA with semiconductor quantum dots. *Mol Ther*. 2006 Aug;14(2):192-201. Epub 2006 May 12. Barrette, R.W., Urbonas, J., Silbart, L.K., (2006) Quantifying Specific Antibody Concentrations by ELISA using Slope Correction. *Clinical and Vaccine Immunology* 13(7): 802-805.

Silbart, L.K. (2006) Incorporating Problem-Based Learning Exercises into an Environmental Health Curriculum. Feature Article *J. Environ. Health* 68(9): 43-49.

Srinivasan, C., Lee, J., Papadimitrakopoulos, F., Silbart, L.K., Zhao, M. and Burgess, D.J. (2006) Labeling and Intracellular Tracking of Functionally Active Plasmid DNA with Semiconductor Quantum Dots. *Mol Ther*. 2006 Aug;14(2):192-201. Epub 2006 May 12.

Barrette, R., Urbonas, J.W., Silbart, L.K., (2006) Quantifying Specific Antibody Concentrations by ELISA using Slope Correction. *J. Clinical and Vaccine Immunology* 13(7): 802-805.

M. Javed, M. Gladd, K. Cecchini, S. Frasca Jr., D. Rood, P. Hudson, S.J. Geary, L.K. Silbart. Correlates of Immune Protection in GT5 Vaccinated Chickens Challenged with Pathogenic *Mycoplasma gallisepticum* Rlow (2005). *Infection and Immunity* 73:5410-5419

S. Challa, R. Barrette, D. Rood, J.W. Zinckgraf, R.A. French and L.K. Silbart. (2006) Non-toxic *Pseudomonas aeruginosa* exotoxin A expressing the FMDV GH-loop: A novel mucosal vaccine against Foot and Mouth Disease. (Accepted pending minor revisions, *Vaccine*.)

Yang, H., Knapp, J., Koirala, P., Silbart, L.K., Murphy, A., Gaxiola, R. (2007) Engineered Root Architecture Improves Pi Nutrition in Eudicot and Monocot Crop Plants. Submitted to PNAS.

Wilkinson, J., Rood, D., Minor, D., Guillard, K., Darre, M. and Silbart, L.K. (2003) Immune Response to a Mucosally Administered Aflatoxin B1 Vaccine. *Poultry Science* 82:1565-1572.

Fischer, D, Rood, D., Barrette, R., Zuwallack, A., Kramer, E., Brown, F., and L.K. Silbart. (2003) Intranasal immunization of guinea pigs with an immunodominant FMDV peptide conjugate induces mucosal and humoral antibodies and protection upon challenge. *J. Virology* 77:7486-7491.

Zinckgraf, J.W., Silbart, L.K. (2003). Modulating gene expression using DNA vaccines with different 3'-UTRs influences antibody titer, seroconversion rate and cytokine profiles. *Vaccine* 21:1640-1649.

Wilkinson, J., Minor, D., Darre, M., Silbart, L.K. (2003) Characterization of mucosal immune response of chickens following mucosal vaccination with an aflatoxin B1-carrier protein conjugate (accepted) *Poultry Science*.

Papazisi, L., Silbart, L.K., Frasca Jr., S., Rood, D., Liao, X., Gladd, M., Javed, M.A., Geary, S.J. (2002) A Modified Live *Mycoplasma gallisepticum* Vaccine to Protect Chickens From Respiratory Disease. *Vaccine* 20:3709-19.

Zinckgraf, J.W., Wohlfert, E.A., Rood, D. and L.K. Silbart (2002). Modulating gene expression using DNA vaccines with different 3'-UTRs influences antibody titer, seroconversion rate and cytokine profiles. *The FASEB Journal* 16: A312. New Orleans, LA 4/20 - 4/24/02.

Lynch, M.P., Faustman, C., Silbart, L.K., Rood, D. and Furr, H.C. (2001). Detection of lipid-derived aldehydes and aldehyde:protein adducts in vitro and in beef. *J. Food Sci.* 66:1093-1099.

Rasmusen, M.V. and Silbart, L.K. (2001) Modeling the abrogation of intestinal carcinogen absorption using high affinity binding sites *Toxicology Letters* 125:51-59.

Javed, M.A., Frasca, S. Jr., Cecchini, K., Rood, D., Nyaok, A.C., Geary, S.J., Silbart, L.K. (2007) Chemokine and Cytokine Gene Expression Profiles in Chickens Inoculated with *Mycoplasma Gallisepticum* Strains Rlow and GT5. In preparation.

Siddiqui, S., Rood, D., Morris, J., Wyand, S., Silbart, L.K. (2007) Allergen deposition in the lower respiratory tract correlates with eosinophilia in the airways of BALB/c mice. In preparation.

Javed, M., Frasca, S. Jr., Rood, D., Gates, A., Gorton, T.S., Geary, S.J., Silbart, L.K. (2007) Up Regulation of B- and T-cell Chemokines and Pro-apoptotic Gene Expression Profiles During *Mycoplasma gallisepticum* Infection in Chickens. In preparation.

Canpolat, E., Pedersen-Lane, J., Lawrence, D.A., Silbart, L.K., Lynes, M.A. (2007) Metallothionein interactions at leukocyte plasma membranes. In preparation.

Zinckgraf, J.W., Winchell, J.M., and Silbart, L.K. (2000) Fecal and vaginal immune response to a mucosally delivered HIV gp120-derived C4/V3 peptide *J. Repro. Immunol.* 45(2):99-112.