

Jim Imlay (217)-333-5812  
Department of Microbiology  
University of Illinois  
C226 CLSL, 601 S. Goodwin  
Urbana, IL 61801

Education:

Duke University, B.S., 1981, chemistry.  
University of California at Berkeley, Ph.D., 1987, biochemistry.

Positions held:

Professor, Department of Microbiology, University of Illinois 2003-  
Associate Professor, Department of Microbiology, University of Illinois 1998-2003.  
Assistant Professor, Department of Microbiology, University of Illinois, 1992-1998.  
Postdoctoral fellow, Department of Biochemistry, Duke University, 1987-1992.  
Chemist, UOP, Inc., Des Plaines, IL. 1981-1982.

Honors:

Fellow, Center for Advanced Studies, 2004-2005  
Helen Corley Petit Professorship, 1998-1999  
Fellow, Jane Coffin Childs Fund for Medical Research, 1988-1991.  
National Science Foundation Fellow, 1983-1987  
University Fellow, 1982-1983  
Summa cum laude, 1981.

Teaching:

Mcbio 331, Microbial Physiology, 1994-1999  
Mcbio 412, Special Topics: Research Proposals, 1996, 2001.  
Mcbio 290/292, 1992-  
Mcbio 490/499 1992-  
MCB 501, Graduate Biochemistry, 2000-  
MCB 501/502 Core course coordinator, 2000-.

Current funding:

National Institutes of Health, 2 R01 GM49640, July 2003-June 2007. "The physiology of oxidative stress in *Escherichia coli*." Total direct costs, \$1,237,412; current period, \$295,837 direct, \$427,631 total. Future years: \$440,402; \$453,552; \$467,099.

National Institutes of Health 1 RO1 AI051394-01A2, July 2004-June 2008 (Co-PI with James Slauch), "Resistance to external superoxide in *Salmonella*." Total direct costs: \$1,000,000; current period, \$250,000 direct.

Memberships:

American Society of Microbiology

Publications:

- Imlay, James A. and Stuart Linn. 1986. Bimodal pattern of killing of DNA-repair-defective or anoxically grown *Escherichia coli* by hydrogen peroxide. *J. Bacteriol.* 166: 519-527.
- Imlay, James A. and Stuart Linn. 1987. Mutagenesis and stress responses induced in *Escherichia coli* by hydrogen peroxide. *J. Bacteriol.* 169: 2967-2976.
- Linn, Stuart, and James A. Imlay. 1987. Toxicity, mutagenesis, and stress responses induced in *Escherichia coli* by hydrogen peroxide. *J. Cell Sci Suppl.* 6: 289-301.
- Imlay, James A. and Stuart Linn. 1988. Toxic DNA damage by hydrogen peroxide through the Fenton reaction *in vivo* and *in vitro*. *Science* 240: 640-642.
- Imlay, James A. and Stuart Linn. 1988. DNA damage and oxygen radical toxicity. *Science* 240: 1302-1309.
- Linn, Stuart, Sherman M. Chin, and James A. Imlay. 1988. Killing, stress responses, and mutagenesis induced in *E. coli* by hydrogen peroxide. In "DNA Damage and Repair," pp 373-376, A Castellani, ed., Plenum Press, N.Y.
- Linn, Stuart, Sherman M. Chin, and James A. Imlay. 1988. Toxic DNA damage by oxyradicals via the Fenton reaction *in vivo* and *in vitro*. In "Mechanisms of DNA Damage Processing," pp. 51-56, Alan R. Liss, Inc.
- Imlay, James A. and Irwin Fridovich. 1991. Assay of metabolic superoxide production in *Escherichia coli*. *J. Biol. Chem.* 266: 6957-6965.
- Imlay, James A. and Irwin Fridovich. 1991. Superoxide production by respiring membranes of *Escherichia coli*. *Free Radical Research Communications* 12: 59-68.
- Beyer, Wayne, James A. Imlay, and Irwin Fridovich. 1991. Superoxide dismutases. *Prog. Nucl. Acid Res. Mol. Biol.* 40: 221-291.
- Imlay, James A. and Irwin Fridovich. 1991. Isolation and genetic analysis of a mutation that suppresses the auxotrophies of superoxide dismutase-deficient *Escherichia coli*. *Molecular and General Genetics* 228: 410-416.
- Imlay, James A. and Irwin Fridovich. 1992. Endogenous superoxide generation threatens sensitive enzymes in *Escherichia coli*. In "Oxidative Damage and Repair: Chemical, Biological, and Medical Aspects," K.J.A. Davies, ed., Pergamon Press, N.Y.
- Imlay, James A. and Irwin Fridovich. 1992. Suppression of oxidative envelope damage by pseudoreversion of an SOD mutant of *Escherichia coli*. *J. Bacteriol.* 174: 953-961.

- Imlay, James A. and Irwin Fridovich. 1992. Exogenous quinones directly inhibit the respiratory NADH dehydrogenase in *Escherichia coli*. Arch. Biochem. Biophys. 296: 337-346.
- Kargalioglu, Yahya, and James A. Imlay. 1994. Importance of anaerobic superoxide dismutase synthesis in facilitating outgrowth of *Escherichia coli* upon entry into an aerobic habitat. J. Bacteriol. 176: 7653-7658.
- Imlay, James A. and Yahya Kargalioglu. 1995. A molecular etiology of superoxide stress in *Escherichia coli*. In, "The Oxygen Paradox," ed. K.J.A. Davies and F. Ursini. Cleup University Press, Padova, Italy.
- Imlay, James A. 1995. A metabolic enzyme that rapidly produces superoxide: fumarate reductase of *Escherichia coli*. J. Biol. Chem. 270: 19767-19777.
- Keyer, Kay, Amy S. Strohmeier, and James A. Imlay. 1995. Superoxide and the production of oxidative DNA damage. J. Bacteriol. 177: 6782-6790.
- Imlay, Karin R.C., and James A. Imlay. 1996. Cloning and analysis of *sodC*, encoding the copper-zinc superoxide dismutase of *Escherichia coli*. J. Bacteriol. 178: 2564-2571.
- Siegele, Deborah A., Karin R.C. Imlay, and James A. Imlay. 1996. The stationary phase-exit defect of *cydC* (*surB*) mutants is due to the lack of a functional terminal cytochrome oxidase. J. Bacteriol. 178: 6091-6096.
- Keyer, Kay, and James A. Imlay. 1996. Superoxide accelerates DNA damage by elevating free-iron levels. Proc. Natl. Acad. Sci. USA 93: 13635-13640.
- Keyer, Kay, and James A. Imlay. 1997. Inactivation of dehydratase [4Fe-4S] clusters and disruption of iron homeostasis upon cell exposure to peroxynitrite. J. Biol. Chem. 272: 27652-27659.
- Gort, Amy S., and James A. Imlay. 1998. The balance between endogenous superoxide stress and antioxidant defenses, J. Bacteriol. 180: 1402-1410.
- Gort, Amy S., Daniel M. Ferber, and James A. Imlay. 1999. The regulation and role of the periplasmic copper, zinc superoxide dismutase of *Escherichia coli*. Mol. Microbiol. 32: 179-192.
- Messner, Kevin R., and James A. Imlay. 1999. The identification of primary sites of superoxide and hydrogen peroxide formation in the aerobic respiratory chain and sulfite reductase complex of *Escherichia coli*. J. Biol. Chem. 274: 10119-10128.
- Storz, Gisela, and James A. Imlay. 1999. Oxidative stress. Curr. Opinion Microbiol. 2: 188-194.
- Maringanti, Sujatha, and James A. Imlay. 1999. An intracellular iron chelator pleiotropically suppresses the enzymic and growth defects of SOD-deficient *Escherichia coli*. J. Bacteriol. 181: 3792-3802.

- Schwartz, Christopher J., Djaman, Ouliana, Imlay, James A., and Patricia J. Kiley. 2000. The cysteine desulfurase, IscS, has a major role in in vivo Fe-S cluster formation in *Escherichia coli*. *Proc. Natl. Acad. Sci. USA* 97: 9009-9014.
- Srinivasan, Chandra, Liba, A., Imlay, James A., Valentine, Joan S., and Edith B. Gralla. 2000. Yeast lacking superoxide dismutase show elevated levels of "free iron" as measured by whole-cell EPR. *J. Biol. Chem.* 275: 29187-29192.
- Pan, Ning, and James A. Imlay. 2001. How does oxygen inhibit central metabolism in the obligate anaerobe *Bacteroides thetaiotaomicron*? *Mol. Microbiol.* 39: 1562-1571.
- Seaver, Lauren Costa, and James A. Imlay. 2001. Alkyl hydroperoxide reductase is the primary scavenger of endogenous hydrogen peroxide in *Escherichia coli*. *J. Bacteriol.* 183: 7173-7181.
- Seaver, Lauren Costa, and James A. Imlay. 2001. Hydrogen peroxide fluxes and compartmentalization inside growing *Escherichia coli*. *J. Bacteriol.* 183: 7182-7189.
- Korshunov, Sergei, and James A. Imlay. 2002. A potential role for periplasmic superoxide dismutase in blocking the penetration of external superoxide into the cytosol of gram-negative bacteria. *Mol. Microbiol.* 43: 95-106.
- Messner, Kevin R., and James A. Imlay. 2002. In vitro quantitation of biological superoxide and hydrogen peroxide generation. *Methods Enzymol.* 349: 354-361.
- Nguyen, Anh L., and James A. Imlay. 2002. Quantitation of intracellular free iron by electron paramagnetic resonance spectroscopy. *Methods Enzymol.* 349: 3-9.
- Imlay, James A. 2002. How oxygen damages microbes: oxygen tolerance and obligate anaerobiosis. *Adv. Microb. Physiol.* 46: 111-153.
- Imlay, James A. 2002. What biological purpose is served by superoxide reductase? *J. Biol. Inorg. Chem.* 7: 659-663.
- Elgrably-Weiss, Maya, Park, Sunny, Schlosser-Silverman, Eliana, Rosenshine, Ilan, Imlay, James, and Shoshy Altuvia. 2002. *Salmonella enterica* serovar Typhimurium *hemA* mutant is highly susceptible to oxidative DNA damage. *J. Bacteriol.* 184: 3774-3784.
- Imlay, James A. 2002. Free iron in bacteria. Electronic publication, the Oxygen Society.
- Woodmansee, Anh N., and James A. Imlay. 2002. Reduced flavins deliver electrons to intracellular free iron and promote oxidative DNA damage in *Escherichia coli*. *J. Biol. Chem.* 277: 34055-34066.
- Messner, Kevin R., and James A. Imlay. 2002. Mechanism of superoxide and hydrogen peroxide formation by fumarate reductase, succinate dehydrogenase, and aspartate oxidase. *J. Biol. Chem.* 277: 42563-42571.
- Varghese, S., Tang, Y., and James A. Imlay. 2003. Contrasting sensitivities of *Escherichia coli* aconitases A and B to oxidation and iron depletion. *J. Bacteriol.* 185: 221-230.

- Park, Sunny, and James A. Imlay. 2003. High levels of intracellular cysteine promote oxidative DNA damage by driving the Fenton reaction. *J. Bacteriol.* 185: 1942-1950.
- Woodmansee, Anh N., and James A. Imlay. 2003. A mechanism by which nitric oxide accelerates the rate of oxidative DNA damage in *Escherichia coli*. *Mol. Microbiol.*, 49: 11-22.
- Imlay, James A. 2003. Pathways of oxidative damage. *Ann. Rev. Microbiol.* 57: 395-418.
- Smith, Alexandra H., Imlay, James A., and Roderick I. Mackie. 2003. Increasing the oxidative stress response allows *Escherichia coli* to overcome inhibitory effects of condensed tannins. *Appl. Environ. Microbiol.* 69: 3406-3411.
- Pericone, Christopher D., Park, Sunny, Imlay, James A., and Jeffrey N. Weiser. 2003. Factors contributing to hydrogen peroxide resistance in *Streptococcus pneumoniae* include pyruvate oxidase (SpxB), also the major source of endogenous hydrogen peroxide production. *J. Bacteriol.* 185: 6815-6825.
- Krishnakumar, Radha., Craig, Maureen., Imlay, James A., and James M. Schlauch. 2004. Differences in enzymatic properties allow SodCI but not SodCII to contribute to virulence in *Salmonella enterica* serovar Typhimurium strain 14028. *J. Bacteriol.* 186: 5230-5238.
- Djaman, Ouliana, Outten, F. Wayne, and James A. Imlay. 2004. Repair of oxidized iron-sulfur clusters in *Escherichia coli*. *J. Biol. Chem.* 279: 44590-44599.
- Seaver, Lauren C., and James A. Imlay. 2004. Are respiratory enzymes the primary sources of intracellular hydrogen peroxide? *J. Biol. Chem.* 279: 48742-48750.
- Hassett, Daniel J., and James A. Imlay. 2005. Antioxidant systems in *Escherichia coli* and *Pseudomonas aeruginosa*. Molecular paradigm of infectious disease: a bacterial perspective. Eds., C. Nickerson and M.J. Schurr. Kluwer Academic-Plenum Publishers, N.Y.-Boston-Dordrecht-London-Moscow.
- Park, Sunny, and James A. Imlay. 2005. Substantial DNA damage from submicromolar intracellular hydrogen peroxide detected in Hpx<sup>-</sup> mutants of *Escherichia coli* Proc. Natl. Acad. Sci. USA, in press.
- Dunahee, Nathaniel K., Imlay, James A., and Benito J. Marinas. Mechanisms contributing to the increased resistance of *Escherichia coli* to inactivation with monochloramine. Manuscript submitted (*Environ. Science Technol.*).

Service:

- Editorial board, *Journal of Bacteriology*, 1999-.
- Editorial board, *CRC Critical Reviews of Biochemistry and Molecular Biology*, 2002-.
- Editorial board, *Faculty of 1000*, 2004-.
- Associate Director for Graduate Affairs, SMCB 2000-.
- MCB graduate program committee chair, 2000-.
- Microbiology graduate student recruiting, 1997-.

Microbiology faculty search committee (chair), 2003, 2004.  
Microbiology graduate student advisor, 1999-  
MCB school strategic planning committee, 1998-1999, 2000-2002.  
MCB graduate program committee, 1998-  
Courses and curriculum committee, School of Life Sciences, 1994-1998 (chair, 1997-1998).  
Courses and curriculum committee, College of Liberal Arts and Sciences, 1997-1998.  
Seminar organizer, department, 1994-1997.  
Hughes undergraduate research selection committee, 1996-2000.  
Capricious grading committee, 1994-1996.  
Graduate college executive committee, 2001-2003.  
Graduate college program subcommittee, 2002-2003.