

Curriculum Vitae

ELEFThERIOS TERRY PAPOUTSAKIS

University of Delaware
Delaware Biotechnology Institute
Department of Chemical Engineering
15 Innovation Way
Newark, DE 19711

Office Phone: 302-831-8376
Office Fax: 302-831-4841
Email: epaps@udel.edu
Website: <http://www.papoutsakis.org>

EDUCATION

- 1980 Ph.D., Chemical Engineering, Purdue University
- 1977 M.S., Chemical Engineering, Purdue University
- 1974 Diploma in Chemical Engineering., National Tech. Univ. of Athens

POSITION

- 7/2007 - Present Eugene DuPont Chair of Chemical Engineering, & Delaware Biotechnology Institute Faculty Fellow
- 7/2007 - Present Professor, Chemical Engineering, University of Delaware
- 2001- 6/2007 Walter P. Murphy Professor of Chemical & Biological Engineering, Northwestern University
- 1996- 6/2007 Professor, Interdepartmental Biological Sciences Program Northwestern University
- 1994- 6/2007 Member, Lurie Comprehensive Cancer Center, Northwestern Univ. Medical School
- 1990- 6/2007 Professor, Dept. of Chemical & Biological Engineering, Northwestern University
- 1987-1989 Associate Professor, Dept. of Chemical Engineering, Northwestern University, Evanston, IL
- 1985-1987 Associate Professor, Dept. of Chemical Engineering, Rice University, Houston, TX
- 1980-1985 Assistant Professor, Dept. of Chemical Engineering, Rice University, Houston, TX

PROFESSIONAL SOCIETIES

- American Institute of Chemical Engineers (AIChE)
- American Chemical Society (ACS)
- American Association for the Advancement of Science (AAAS)
- American Society for Microbiology (ASM)
- American Institute of Medical & Biological Engineers (AIMBE)

HONORS AND AWARDS

- 2007 James M. Van Lanen Distinguished Service Award, American Chemical Society (BIOT Div.)
- 2005 Elected Fellow of The American Academy of Microbiology (AAM)
- 2005 Amgen Biochemical Engineering Award, Engineering Conferences International (ECI)
- 2004 Merck Cell Culture Engineering (CCE) Award, Engineering Conferences International (ECI)
- 2003 Alpha Chi Sigma Award of the American Institute of Chemical Engineers (AIChE)
- 1998 Marvin Johnson Award of the American Chemical Society, Biochemical Technology Division
- 1998 Elected Fellow of the American Association for the Advancement Of Science (AAAS)
- 1997 Bayer Lecturer in Biochemical Engineering, University of California at Berkeley
- 1997 Outstanding Chemical Engineer, Purdue University
- 1995 Food, Pharmaceutical & Bioengineering Award of the American Institute of Chemical Engineers (AIChE)
- 1993 Founding Fellow: American Institute of Medical and Biological Engineers (AIMBE)

1985-1990 Presidential Young Investigator Award, National Science Foundation (NSF)

EDITORIAL POSITIONS

1/1996-12/2002 Associate Editor, *Biotechnology & Bioengineering*
1/1990-12/1995 Editor in Chief, *Biotechnology & Bioengineering*

Editorial Boards:

2003-present *Biotechnology & Bioengineering* (Wiley)
2000-present *Journal of Biotechnology* (Elsevier)
1998-present *Metabolic Engineering* (Academic/Elsevier)
1994-present *Tissue Engineering* (M. A. Liebert Publishers, New York)
1986-1988 *Industrial and Engineering Chemistry Research* (ACS)

RECENT SIGNIFICANT PROFESSIONAL ACTIVITIES

2006-present Chair, Amgen Biochemical Engineering Award Committee (ECI Conferences).
2005- present Member, Institute Awards Committee, Amer. Institute of Chem. Engineers.
2006-2009 Member, Executive Board of the Program Committee (EBPC), American Institute of Chemical Engineers.
2002-04, 2008- Chair of Selection committee for the Division 15 (Food, Pharmaceutical & Bioengineering Division) Award of the American Institute of Chemical Engineers (AIChE).
2006 Chair and 2006 Conference Programming Chair for Division 15 (Food, Pharmaceutical & Bioengineering Division) of the American Institute of Chemical Engineers (AIChE).
2006, 2007 Member, Institutional Awards Committee, American Institute of Chemical Engineers (AIChE).
2005-present Chair, Merck Cell Culture Engineering Award committee (Engineering Conferences International)
1998-2005 Chair: Awards of the Amer. Chemical Society, Biochemical Technology (BIOT) Division.
2005- present Member, Awards committee of the Amer. Chemical Society, Biochemical Technology (BIOT) Division. Member of all BIOT Award committees.
2003 Chair, Biochemical Engineering XIII conference, Boulder CO, Engineering Conferences International (ECI).
2001 Invited participant and Group chair, NSF Workshop (chaired by D.I.C. Wang and D. Ryu) on the "Future of Biochemical Engineering", Arlington, VA, November 28-30.
2000 External member of the committee for Graduate Program Review of the Chemical Engineering Department at NC State University, Raleigh, NC, April 25-26.
1996-2004 Member, Awards committee for the Food, Pharmaceutical & Bioengineering Division Award of the AIChE.
1999-2003 Member of the Expert Panel Review of Networks of Centers of Excellence (NCERC/MRC/SSHRC Canada.): 3 Expert Panels.
1995- present 20 NSF proposal review panels and NIH study sections.
Organizing or on the scientific committee of 18 international conferences.

STUDENT TRAINING RECORD

53 Doctoral and 21 MS completed. 7 Doctoral in progress.
20 postdoctoral students trained or in training.

54 undergraduate student research supervision.
Details starting on page 31.

PATENTS

1. Sandstrom, C., Papoutsakis, E.T., Miller, W.M., and Bender, J.G. "Flow-through bioreactor with grooves for cell retention", US Patent No. 5,512,480, issued on April 30, 1996.
2. P.C. Collins, E.T. Papoutsakis, and W.M. Miller. "Method of Determining Progenitor Cell Content of A Hematopoietic Cell Culture," U.S. Patent 6,077,708, issued on June 20, 2000.
3. Papoutsakis, E. T, C. Tomas, M. Tesic, and J. Y. Santiago. "Increased cell resistance to toxic organic substances", US Patent No. 6,960,465, issued on Nov. 1, 2005.
4. E.T. Papoutsakis, S.Y. Lee, and J.H. Park, Method for preparing butanol through butyryl-CoA as an intermediate using bacteria, PCT/KR2007/006524 (Dec 14, 2007)
5. S.Y. Lee, J.H. Park, and E. T. Papoutsakis, Enhanced butanol producing microorganisms and method for preparing butanol using the same, PCT/KR2007/006525 (Dec 14, 2007).
6. S.Y. Lee, J.H. Park, E. T. Papoutsakis, and Y-S, Jang. Yu-Sin. Method for preparing butanol through butyryl-CoA as an intermediate using yeast. PCT/KR2008/000787 (Feb. 11, 2008).

BOOKS

"Foundations of Biochemical Engineering: Kinetics and Thermodynamics in Biological Systems." American Chemical Society Symposium Series No. 207 (with H.W. Blanch and G.N. Stephanopoulos), ACS, Washington, D.C., 1983, 522 pages.
Lee, S. Y. and Papoutsakis, E. T. (Editors); "Metabolic Engineering" Marcel Dekker, New York, 1999. 423 pp. +xxii.

211 REFEREED or EDITED PUBLICATIONS

Publications are grouped thematically but numbered chronologically
Underlined numbers indicate the most significant publications

I. QUANTITATIVE METABOLISM & PHYSIOLOGY, INTRACELLULAR FLUXES, MODELS & ENERGETICS

1. Papoutsakis, E., Lim, H.C. and Tsao, G.T., "Role of formaldehyde in the utilization of C1-compounds via the ribulose monophosphate cycle", *Biotechnol. Bioeng.* **20**: 421-442 (1978).
2. Papoutsakis, E., Lim, H.C. and Tsao, G.T., "SCP production on C1 compounds", *AIChE J.* **24**: 406-417 (1978).
3. Hirt, W., Papoutsakis, E., Krug, E., Lim, H.C. and Tsao, G.T., "Formaldehyde incorporation by a new methylotroph (L3)", *Appl. Environ. Microbiol.* **36**: 56-62 (1978).
6. Papoutsakis, E., Hirt, W. and Lim, H.C., "On the Bacterial utilization of pure and mixed C1 compounds for SCP production", *Biotechnol. Bioeng.*, **23**: 235-242 (1981).
11. Papoutsakis, E. and Lim, H.C., "SCP production on C1 compounds: the bioefficiency", *Ind. Eng. Chem. Fundam.* **20**: 307-314 (1981).
13. Diwan, A.R., Chu, I-M. and Papoutsakis E.T., "Substrate transport and its effect on the dynamics of methylotrophic growth", *Biotechnol. Lett.* **5**: 579-584 (1983).
19. Meyer, C.L., McLaughlin, J.K. and Papoutsakis, E.T., "The effect of CO on growth and product formation in batch cultures of *Clostridium acetobutylicum*", *Biotechnol. Lett.*, **7**: 37-42 (1985).
20. Roos, J.W., McLaughlin, J.K. and Papoutsakis, E.T., "The effect of pH on nitrogen supply, biomass lysis and solvent production in fermentations of *Clostridium acetobutylicum*", *Biotechnol. Bioeng.* **27**: 681-694 (1985).
21. McLaughlin, J.K., Meyer, C.L. and Papoutsakis, E.T., "Gas chromatography and gateway sensors for on-line

- state estimation of complex fermentations (Butanol/Acetone Fermentation)", *Biotechnol. Bioeng.* **27**: 1246-1257 (1985).
23. Huesemann, M., and Papoutsakis, E.T., "Effect of acetoacetate, butyrate, and uncoupling ionophores on growth and product formation of *Clostridium acetobutylicum*", *Biotechnol. Lett.* **8**: 37-42 (1986).
 24. Meyer, C.L., McLaughlin, J.K. and Papoutsakis, E.T., "On-line chromatographic analysis and fermentor state characterization of butanol/acetone fermentations", *Biochemical Engineering IV, Ann. N.Y. Acad. Sci.*, **469**: 350-363 (1986).
 26. Meyer, C.L., Roos, J.W. and Papoutsakis, E.T., "Carbon monoxide gasing leads to alcohol production and butyrate uptake without acetone formation in continuous cultures of *Clostridium acetobutylicum*", *Appl. Microbiol. Biotechnol.* **24**: 159-167 (1986).
 28. Chu, I-M. and Papoutsakis, E.T., "Growth dynamics of a methylotroph (*Methylomonas L3*) in continuous cultures. I. Fast transients induced by methanol pulses and methanol accumulation", *Biotechnol. Bioeng.* **29**: 55-64 (1987).
 29. Chu, I-M. and Papoutsakis, E.T., "Growth dynamics of a methylotroph (*Methylomonas L3*) in continuous cultures. II. Growth inhibition and comparison against an unstructured model", *Biotechnol. Bioeng.* **29**: 65-71 (1987).
 31. Chu, I-M., Keuer, T.A. and Papoutsakis, E.T., "Formate transport, growth inhibition and the membrane protonmotive force in two methylotrophs (T15 and L3)", *Appl. Microbiol. Biotechnol.* **26**: 70-77 (1987).
 32. Papoutsakis, E.T., Bussineau, C.M., Chu, I-M., Diwan, A.R. and Huesemann, M., "Transport of substrates and metabolites and their effect on cell metabolism [in butyric-acid and methylotrophic fermentations]", *Biochem. Engineering V, Ann. N.Y. Acad. Sci.* **506**: 24-50 (1987).
 33. Bussineau, C.M. and Papoutsakis, E.T., "Evidence suggesting energy-dependent formaldehyde transport in an RuMP-type methylotroph (T15)", *Arch. Microbiol.* **149**: 214-219 (1988).
 37. Huesemann, M.H.W. and Papoutsakis, E.T., "Solventogenesis in *Clostridium acetobutylicum* fermentations related to carboxylic acid and proton concentrations", *Biotechnol. Bioeng.* **32**: 843-852 (1988).
 40. Wiesenborn, D.P. Rudolph, F.B., and E.T. Papoutsakis, "Thiolase from *Clostridium acetobutylicum* ATCC 824 and its role in the synthesis of acids and solvents", *Appl. Environ. Microbiol.* **54**: 2717-2722 (1988).
 41. Wiesenborn, D.P., Rudolph, F.B. and Papoutsakis, E.T., "Phosphotransbutyrylase from *Clostridium acetobutylicum* ATCC 824 and its role in acidogenesis ", *Appl. Environ. Microbiol.* **55**: 317-322 (1989).
 42. Wiesenborn, D.P., Rudolph, F.B. and Papoutsakis, E.T., "Coenzyme A transferase from *Clostridium acetobutylicum* ATCC 824 and its role in the uptake of acids", *Appl. Environ. Microbiol.* **55**: 323-329 (1989).
 43. Papoutsakis, E.T. "Acetone-Butanol Fermentation", Chapter 2.1.3 in *Biomass Handbook* (C.W. Hall, O. Kitani, eds.), Gordon and Breach Publishers, pp. 271-286 (1989).
 45. Meyer, C.L. and Papoutsakis, E.T., "Continuous and biomass recycle fermentations of *Clostridium acetobutylicum*. Part 1. ATP supply and demand determines product selectivity", *Bioproc. Eng.* **4**: 1-10 (1989).
 46. Meyer, C.L. and Papoutsakis, E.T., "Continuous and biomass recycle fermentations of *Clostridium acetobutylicum*. Part 2. Novel patterns in energetics and product-formation kinetics", *Bioproc. Eng.* **4**: 49-55 (1989).
 48. Meyer, C.L. and Papoutsakis, E.T., "Increased levels of ATP and NADH are associated with increased solvent production in continuous cultures of *Clostridium acetobutylicum*", *Appl. Microbiol. Biotechnol.* **30**: 450-459 (1989).
 49. Huesemann, M.H.W. and Papoutsakis, E.T., "Comparison between *in vivo* and *in vitro* enzyme activities in continuous and batch fermentations of *Clostridium acetobutylicum*", *Appl. Microbiol. Biotechnol.* **30**: 585-595 (1989).
 52. Huesemann, M.H.W., and Papoutsakis, E.T., "Enzymes limiting butanol and acetone formation in continuous and batch cultures of *Clostridium acetobutylicum*", *Appl. Microbiol. Biotechnol.* **31**: 435-444 (1989).
 53. Welch, R.W., Rudolph, F.B. and Papoutsakis, E.T., "Purification and characterization of the NADH dependent

butanol dehydrogenase from *Clostridium acetobutylicum* (ATCC 824)", *Arch. Biochem. Biophys.* **273**: 309-318 (1989).

61. Huesemann, M.H.W. and Papoutsakis, E.T., "Effects of propionate and acetate additions on solvent production in batch cultures of *Clostridium acetobutylicum*", *Appl. Environ. Microbiol.* **56**:1497-1500 (1990).

II. METABOLIC ENGINEERING, GENETICS & GENOMICS OF CLOSTRIDIA

39. Cary, J.W., Petersen, D.J., Papoutsakis, E.T., and G.N. Bennett, "Cloning and expression of *Clostridium acetobutylicum* phosphotransbutyrylase and butyrate kinase genes in *Escherichia coli*", *J. Bacteriol.* **170**: 4613-4618 (1988).
51. Cary, J.W., Petersen, D.J., Bennett, G.N. and Papoutsakis, E.T. "Methods for cloning key primary metabolic enzymes and ancillary proteins associated with the acetone-butanol fermentation of *Clostridium acetobutylicum*" *Ann. N.Y. Acad. Sci.*, **589** (*Biochem. Engineering VI*) (St. Barbara, CA, Oct. 3-7, 1988): 67-81 (1990).
60. Cary, J.W., Petersen, D.J., Papoutsakis, E.T., and G.N. Bennett, "Cloning and expression of *Clostridium acetobutylicum* ATCC 824 coenzyme A: acetate/butyrate: coenzyme A-transferase in *Escherichia coli*", *Appl. Environ. Microbiol.* **56**, 1576-1583 (1990).
68. Petersen, D.J., Welch, R.W., Walter, K.A., Mermelstein, L.D., Papoutsakis, E.T., Rudolph, F.B., and Bennett, G.N., "Cloning of an NADH-dependent Butanol Dehydrogenase Gene from *Clostridium acetobutylicum*", *Ann. N.Y. Acad. Sci.* **646**, 94-98 (1991).
70. Mermelstein, L.D., Welker, N.E., Bennett, G.N. and Papoutsakis, E.T., "Expression of Cloned Homologous Fermentative Genes in *Clostridium acetobutylicum* ATCC 824", *Bio/Technol.* **10**: 190-195 (1992).
75. Lee, S.Y., Bennett, G.N. and Papoutsakis, E.T., "Construction of *E. coli*-*Clostridium acetobutylicum* shuttle vectors and transformation of *C. acetobutylicum* strains", *Biotechnol. Lett.* **14**: 427-432 (1992).
76. Lee, S.Y., Mermelstein, L.D., Bennett, G.N. and Papoutsakis, E.T., "Vector construction, transformation and gene amplification in *Clostridium acetobutylicum* ATCC 824", *Ann. N.Y. Acad. Sci.* **665**: 39-51 (1992).
79. Walter, K.A., Bennett, G.N. and Papoutsakis, E.T., "Molecular characterization of two *Clostridium acetobutylicum* ATCC 824 butanol dehydrogenase isozyme genes" *J. Bacteriol.* **174**: 7149-7158 (1992).
81. Mermelstein, L.D. and Papoutsakis, E.T., "*In vivo* methylation in *Escherichia coli* by the *Bacillus subtilis* phage ϕ 3T I Methyltransferase to protect plasmids from restriction upon transformation of *Clostridium acetobutylicum* ATCC 824", *Appl. Environ. Microbiol.* **59**: 1077-1081 (1993).
84. Lee, S.Y., Mermelstein, L.D., Bennett, G.N., and Papoutsakis, E.T. "Determination of plasmid copy number and stability in *Clostridium acetobutylicum* ATCC 824", *FEMS Microbiol. Lett.* **108**: 319-324 (1993).
86. Papoutsakis, E.T. and Bennett, G.N., "Cloning, structure, and expression of acid and solvent pathway genes of *Clostridium acetobutylicum*", Chapter 8 in: *Clostridia and Biotechnology* (Woods, D. R., ed.), pp. 157-199, Butterworth-Heinemann, Stoneham, MA (1993).
90. Mermelstein, L.D., Bennett, G.N. and Papoutsakis, E.T., "Amplification of homologous fermentative genes in *Clostridium acetobutylicum* ATCC 824", In: *Bioproducts and Bioprocesses: Third Conference to Promote Japan/US Joint Projects and Cooperation in Biotechnology* (Tanner, R.D., ed.), pp. 317-343, Springer Verlag, New York (1993).
91. Mermelstein, L.D., Papoutsakis, E.T., Petersen, D.J. and Bennett, G.N., "Metabolic engineering of *Clostridium acetobutylicum* for increased solvent production by enhancement of acetone formation enzyme activities using a synthetic acetone operon" *Biotechnol. Bioeng.* **42**: 1053-1060 (1993).
92. Walter, K.A., Nair, R.V., Cary, J.W., Bennett, G.N., and Papoutsakis, E.T., "Sequence and arrangement of two genes encoding enzymes of the butyrate formation pathway of *Clostridium acetobutylicum* ATCC 824", *Gene* **134**: 107-111 (1993).
93. Mermelstein, L.D., and Papoutsakis, E.T., "Evaluation of macrolide and lincosamide antibiotics for plasmid maintenance in low pH *Clostridium acetobutylicum* ATCC 824 fermentations", *FEMS Microbiol. Lett.* **113**: 71-75

- (1993).
94. Walter, K.A., Mermelstein, L.D., and Papoutsakis, E.T., "Fermentations of recombinant *Clostridium acetobutylicum* with increased dosages of butyrate formation genes" *Ann. N.Y. Acad. Sci.* **721**: 69-72 (1994).
 95. Mermelstein, L.D., Welker, N.E., Petersen, D.J., Bennett, G.N., and Papoutsakis, E.T., "Genetic and metabolic engineering of *Clostridium acetobutylicum* ATCC 824", *Ann. N.Y. Acad. Sci.* **721**: 54-68 (1994).
 96. Nair, R.V., Bennett, G.N., and Papoutsakis, E.T., "Molecular characterization of an aldehyde/alcohol dehydrogenase gene from *Clostridium acetobutylicum* ATCC 824", *J. Bacteriol.* **176**: 871-885 (1994).
 103. Nair, R.V. and Papoutsakis, E.T., "Expression of plasmid encoded *aad* in *Clostridium acetobutylicum* M5 restores vigorous butanol production", *J. Bacteriol.* **176**: 5843-5846 (1994).
 104. Walter, K.A., Mermelstein, L.D. and Papoutsakis, E.T., "Host-plasmid interactions in recombinant strains of *Clostridium acetobutylicum* ATCC 824", *FEMS Microbiol. Lett.*, **123**: 335-342 (1994).
 111. Stim-Herndon, K.P., Nair, R., Papoutsakis, E.T., and Bennett, G. N., "Analysis of degenerate variants of *Clostridium acetobutylicum* ATCC 824", *Anaerobe*, **2**: 11-18 (1996).
 115. Green, E.M., Boynton, Z.L., Harris, L.M., Rudolph, F.B., Papoutsakis, E. T. and Bennett, G.N., "Genetic manipulation of acid formation pathways by gene inactivation in *Clostridium acetobutylicum* ATCC 824", *Microbiology*, **142**: 2079-2986 (1996).
 122. Cornillot, E., Nair, R., Papoutsakis, E.T., & Soucaille, P. "The genes for butanol and acetone formation in *Clostridium acetobutylicum* ATCC 824 reside on a large plasmid whose loss leads to strain degeneration", *J. Bacteriol.* **179**: 5442-5447 (1997).
 123. Bermejo, L.L., Welker, N.E and Papoutsakis, E.T. "Heterologous expression of *Clostridium acetobutylicum* ATCC824 genes in *Escherichia coli* for acetone production and acetate detoxification", *Appl. Environ. Microbiol.*, **64**: 1079-1085 (1998).
 135. Nair, R., Green E., Bennett, G. N. and Papoutsakis, E T. "Regulation of the *sol* locus genes for butanol and acetone production in *Clostridium acetobutylicum* ATCC 824 by a putative transcriptional repressor", *J. Bacteriol.* **181**: 319-330 (1999).
 136. Desai, R. P. and Papoutsakis E. T., "Antisense RNA strategies for the metabolic engineering of *Clostridium acetobutylicum*", *Appl. Environ. Microbiol.* **65**: 936-945 (1999).
 138. Desai, R., Nielsen, L. K., and Papoutsakis, E. T. "Stoichiometric modeling of *Clostridium acetobutylicum* fermentations with nonlinear constraints", *J. Biotechnol.* **71**: 191-205 (1999).
 142. Papoutsakis, E. T., and Bennett, G. N. "Metabolic Engineering of *Clostridium acetobutylicum*", pp. 253-279, Chapter 11 in "Metabolic Engineering" (S.Y. Lee and E. T. Papoutsakis, Eds), Marcel Dekker, 1999.
 143. Lee, S. Y. and Papoutsakis, E. T. "The challenges and promise of metabolic engineering", pp.1-12, Chapter 1 in "Metabolic Engineering" (S.Y. Lee and E. T. Papoutsakis, Eds), Marcel Dekker, 1999.
 145. Tummala, S. B., Welker, N. E., and Papoutsakis, E. T., "Development and characterization of a gene-expression reporter system for *Clostridium acetobutylicum* ATCC 824", *Appl. Environ. Microbiol.* **65**: 3793-3799 (1999).
 146. Desai, R. P., Harris, L. M., Welker, N. E., Papoutsakis, E. T. "Metabolic flux analysis elucidates the importance of the acid-formation pathway in regulating solvent production by *Clostridium acetobutylicum*", *Metabolic Eng.* **1**: 206-213 (1999).
 147. Harris, L. M., Desai, R. P., Welker, N. E., Papoutsakis, E. T. "Characterization of recombinant strains of the *Clostridium acetobutylicum* butyrate kinase inactivation mutant: need for new phenomenological models for solventogenesis and butanol inhibition?", *Biotechnol. Bioeng.* **67**: 1-11 (2000).
 159. L. M. Harris, L. Blank, R. P. Desai, N. E. Welker, and E. T. Papoutsakis "Analysis of recombinant strains of *Clostridium acetobutylicum* with an inactivated *solR* gene", *J. Ind. Microbiol. Biotechnol.* **27**: 322-328 (2001).
 166. Tummala, S.B., Tomas, C., Harris, L.M., Welker, N.E., Rudolph, F.B., Bennett, G.N., Papoutsakis, E.T. "Genetic tools for solventogenic clostridia," in *Clostridia: Biotechnology and Medical Applications* (Bahl, H., Durre, P., Eds). New York, NY. John Wiley & Sons, Inc., 2001, pp 105-123.

168. L. M. Harris, N. E. Welker, and E. T. Papoutsakis "Northern, morphological and fermentation analysis of *spo0A* inactivation and overexpression in *Clostridium acetobutylicum* ATCC 824", *J. Bacteriol.* **184**: 3586-3597 (2002).
169. Yang, H., H. Haddad, C. Tomas, K. Alsaker, and E. T. Papoutsakis. "A segmental nearest neighbor normalization and gene identification method gives superior results for DNA-array analysis", *Proc. Nat. Acad. Sci. (USA)*. **100**: 1122-1127 (2003).
170. Tummala, S. B., Welker, N. E., and Papoutsakis, E. T., "Design of antisense RNA constructs for the downregulation of the acetone formation pathway of *Clostridium acetobutylicum*," *J. Bacteriol.*, **185**: 1923-1934 (2003).
171. Tomas, C., H. Bonarius, K. Alsaker, H. Yang, W. Hendriksen, J. Beamish, C. Paredes and E. T. Papoutsakis "DNA-array based transcriptional analysis of *Clostridium acetobutylicum* sporulation (SK01) and degenerate (M5) mutants", *J. Bacteriol.* **185**: 4539-4547 (2003).
172. Tummala, S. B., S. G. Junne, and E. T. Papoutsakis. "Antisense RNA downregulation of CoA Transferase combined with alcohol/aldehyde dehydrogenase (AAD) overexpression leads to predominantly alcohologenic *Clostridium acetobutylicum* fermentations", *J. Bacteriol.* **185**: 3644-3653 (2003).
173. Tummala, S.B., Junne, S.G., Paredes, C.J., Papoutsakis, E.T. "Transcriptional analysis of product concentration-driven changes in cellular programs of recombinant *Clostridium acetobutylicum* strains", *Biotechnol Bioeng.* **84**: 842-854, 2003.
174. Tomas, C., Welker, N. E., and Papoutsakis, E. T. "Overexpression of *groESL* in *Clostridium acetobutylicum* results in increased solvent production and tolerance, prolonged metabolism, and changes in the cell's transcriptional program", *Appl. Environ. Microbiol.* **69**: 4951-4965 (2003).
175. Tomas, C., Beamish, J, and Papoutsakis, E. T. "Transcriptional analysis of butanol stress and tolerance in *Clostridium acetobutylicum*", *J. Bacteriol.* **186**: 2006-2018 (2004).
176. Alsaker, K.V., Spitzer T. R. and E. T. Papoutsakis "Transcriptional analysis of *spo0A* overexpression in *Clostridium acetobutylicum* sporulation and its effects on the cell's response to butanol stress", *J. Bacteriol.* **186**: 1959-1971 (2004).
178. Tomas, C.A., S.B. Tummala, E.T. Papoutsakis. "Metabolic engineering of solventogenic Clostridia", in *Handbook on Clostridia* (H. Bahl and P. Durre, Eds). CRC Press, New York. 2005.
179. Tummala, S.B., C.A. Tomas, E.T. Papoutsakis. "Gene analysis of clostridia", in *Handbook on Clostridia* (H. Bahl and P. Durre, Eds). CRC Press, New York. 2005.
182. Paredes, C., I. Rigoutsos, and E. T. Papoutsakis. "Transcriptional organization of the *Clostridium acetobutylicum* genome", *Nucleic Acid Res.* **32**: 1973-1981 (2004).
183. Zhao, Y., C. A. Tomas, Rudolph, F.B., E. T. Papoutsakis and G. N. Bennett. "Intracellular acetyl phosphate and butyryl phosphate concentrations in *Clostridium acetobutylicum* and implications for solvent formation", *Appl. Environ. Microbiol.* **71**: 530-537 (2005).
187. Borden, J.R., Paredes, C.J., Papoutsakis, E.T., "Diffusion, Mixing, and Associated Dye Effects in DNA-Microarray Hybridizations", *Biophys. J.* **89**: 3277-3284 (2005).
188. Alsaker, K., Paredes, C. and Papoutsakis, E.T., "Design, optimization and validation of genomic DNA microarrays for examining the *Clostridium acetobutylicum* transcriptome", *Biotech. Bioproc. Eng.* **10**: 432-443 (2005).
189. Alsaker, K., and Papoutsakis, E.T., "The transcriptional program of early sporulation and stationary phase events in *Clostridium acetobutylicum*", *J. Bacteriol.* **187**: 7103-7118 (2005).
190. Hatzimanikatis, V. and Papoutsakis, E.T., "Extracting networks from expression data", *Encyclopedia of Genetics, Genomics, Proteomics and Bioinformatics*, Part 4, Sect. 5, <http://www.wiley.com/legacy/wileychi/ggpb/index.html> (2005).
191. Paredes, C. J., Alsaker, K.V., and Papoutsakis, E.T., "A comparative genomic view of clostridial differentiation and physiology", *Nature Reviews Microbiology.* **3**: 969-978 (2005).
197. Borden J.R. and Papoutsakis, E. T. "Dynamics of genomic-library enrichment and identification of solvent-

- tolerance genes in *Clostridium acetobutylicum*", *Appl. Environ. Microbiol.* **73**: 3061-3068 (2007).
199. Paredes, C. J., Senger, R.S., Borden, J.R., Sillers, R. and Papoutsakis, E.T., "A general framework for designing and validating oligomer-based DNA-microarrays and its application to *Clostridium acetobutylicum*", *Appl. Environ. Microbiol.* **73**: 4631-4638 (2007).
204. Paredes, C.J., Jones, S.W., Senger, R.S., Borden, J.R., Sillers, R., E.T. Papoutsakis. "Molecular aspects of butanol fermentation", in *Microbial Energy Conversion* (Wall, J., Harwoo, C., Demain, A. (Eds). American Society of Microbiology Press, In press.
206. Sullivan, L., Paredes, C. J., Papoutsakis, E. T. & Bennett. G. N. Analysis of the clostridial hydrophobic with a conserved tryptophan family (ChW) of proteins in *Clostridium acetobutylicum* with emphasis on ChW14 and ChW16/17. *Enz. Microb. Technol.* **42**: 29-43 (2007).
208. Senger, R. S. and E. T. Papoutsakis: Genome-Scale Model for *Clostridium acetobutylicum*. Part 1. Reverse engineering to resolve network gaps, pathway discovery, and extrapolation to other clostridia. *Biotechnol. Bioeng.* in revision (2008).
209. Senger, R. S. and E. T. Papoutsakis: Genome-Scale Model for *Clostridium acetobutylicum*. Part 2: Development of Specific Proton Flux States and Numerically-Determined Sub-Spaces. *Biotechnol. Bioeng.* in revision (2008).
211. Jones, S.W., Paredes, C.J., Tracy, B., Cheng, N., Sillers, R., Senger, R. and E.T. Papoutsakis. "The transcriptional program underlying the physiology of clostridial sporulation." Submitted: 2008.

III. METABOLIC FLUX ANALYSIS: THEORY & EXPERIMENTS

12. Papoutsakis, E.T., "A Useful equation for fermentations of butyric-acid bacteria", *Biotechnol. Lett.* **5**: 253-258 (1983).
14. Papoutsakis, E.T., "A useful equation for fermentations of butyric-acid bacteria. Scenarios for controls of solvent production", in *The Acetone-Butanol Fermentation and Related Topics*, J.D. Bu'Lock and A.J. Bu'Lock, Eds. (Science and Technology Letters, London, 1983), Fermentation Research I, pp. 121-128.
15. Papoutsakis, E.T., "Equations and calculations for fermentations of butyric acid bacteria", *Biotechnol. Bioeng.* **26**: 174-187 (1984).
16. Papoutsakis, E.T. and Meyer, C.L., "Equations and calculations of product yields and preferred pathways for butanediol and mixed-acid fermentations", *Biotechnol. Bioeng.* **27**: 50-66 (1985).
17. Papoutsakis, E.T. and Meyer, C.L., "Fermentation equations for propionic- acid bacteria and for production of assorted oxychemicals from various sugars", *Biotechnol. Bioeng.* **27**: 67-80 (1985).
18. Chu, I-M. and Papoutsakis, E.T., "Carbon oxidation and incorporation patterns in batch cultures of *Methylomonas L3*" *Biotechnol. Lett.* **7**, 15-20 (1985).
22. Chu, I-M., Bussineau, C.M. and Papoutsakis, E.T., "Direct measurement of carbon-substrate oxidation and incorporation patterns in RuMP-Type methylotrophs. Chemostatic cultures of *Methylomonas L3*", *Biotechnol. Bioeng.* **27**: 1623-1633 (1985).
27. Bussineau, C.M. and Papoutsakis, E. T., "Intracellular reaction rates, enzyme activities and biomass yields in *Methylomonas L3*: Growth rate and substrate-composition effects", *Appl. Microbiol. Biotechnol.* **24**: 435-442 (1986).
30. Bussineau, C.M., Keuer, T.A., Chu, I-M. and Papoutsakis, E.T., "Effect of growth conditions on enzyme activities, intracellular kinetics and biomass yields of a new RuMP-Type methylotroph (T15)", *Appl. Microbiol. Biotechnol.* **26**: 61-69 (1987).
34. Meyer, C.L. and Papoutsakis, E.T., "Detailed stoichiometry and process analysis" In: *Handbook on Anaerobic Fermentations* (L.E. Erickson, D.Y.C. Fung, eds.) Chp. 4, pp. 83-118, Marcel Dekker, N.Y. (1988).
35. San, K-Y., Papoutsakis, E.T. and Stephanopoulos, G.N., "Measurement, data analysis, and control", pp. 441-462, Chp. 14 in *Handbook on Anaerobic Fermentations* (L.E. Erickson, D.Y.C. Fung, eds) Marcel Dekker, N.Y.

(1988).

138. Desai, R., Nielsen, L. K., and Papoutsakis, E. T. "Stoichiometric modeling of *Clostridium acetobutylicum* fermentations with nonlinear constraints", *J. Biotechnol.* **71**: 191-205 (1999).
142. Papoutsakis, E. T., and Bennett, G. N. "Metabolic Engineering of *Clostridium acetobutylicum*", pp. 253-279, Chapter 11 in *Metabolic Engineering* (S.Y. Lee and E. T. Papoutsakis, Eds), Marcel Dekker, N.Y. (1999).
146. Desai, R. P., Harris, L. M., Welker, N. E., Papoutsakis, E. T. "Metabolic flux analysis elucidates the importance of the acid-formation pathway in regulating solvent production by *Clostridium acetobutylicum*", *Metabolic Eng.* **1**: 206-213 (1999).
147. Harris, L. M., Desai, R. P., Welker, N. E., Papoutsakis, E. T. "Characterization of recombinant strains of the *Clostridium acetobutylicum* butyrate kinase inactivation mutant: need for new phenomenological models for solventogenesis and butanol inhibition?", *Biotechnol. Bioeng.* **67**: 1-11 (2000).
159. L. M. Harris, L. Blank, R. P. Desai, N. E. Welker, and E. T. Papoutsakis "Analysis of recombinant strains of *Clostridium acetobutylicum* with an inactivated *solR* gene" *J. Ind. Microbiol. Biotechnol.* **27**: 322-328 (2001).
208. Senger, R. S. and E. T. Papoutsakis: Genome-Scale Model for *Clostridium acetobutylicum*. Part 1. Reverse engineering to resolve network gaps, pathway discovery, and extrapolation to other clostridia. *Biotechnol. Bioeng.* in revision (2008).
209. Senger, R. S. and E. T. Papoutsakis: Genome-Scale Model for *Clostridium acetobutylicum*. Part 2: Development of Specific Proton Flux States and Numerically-Determined Sub-Spaces. *Biotechnol. Bioeng.* in revision (2008).

IV. CELL-CULTURE ENGINEERING

25. Cherry, R.S. and Papoutsakis, E.T., "Hydrodynamic effects on cells in agitated tissue culture reactors", *Bioproc. Eng.* **1**: 29-41 (1986).
36. Cherry, R.S. and Papoutsakis, E.T., "Physical mechanisms of cell damage in microcarrier cell culture bioreactors", *Biotechnol. Bioeng.* **32**: 1001-1014 (1988).
38. Petersen, J.F., McIntire, L.V. and Papoutsakis, E.T., "Shear sensitivity of cultured hybridoma cells (CRL-8018) depends on mode of growth, culture age and metabolite concentration", *J. Biotechnol.* **7**: 229-246 (1988).
44. Cherry, R.S. and Papoutsakis, E.T., "Modeling of contact-inhibited animal cell growth on flat surfaces and spheres", *Biotechnol. Bioeng.* **33**: 300-305 (1989).
47. Cherry, R.S. and Papoutsakis, E.T., "Growth and death rates of bovine embryonic kidney cells in turbulent microcarrier bioreactors", *Bioproc. Eng.* **4**: 81-89 (1989).
50. Papoutsakis, E.T. and Kunas, K.T. "Hydrodynamic effects on cultured hybridoma cells CRL 8018 in an agitated bioreactor", in *Adv. in Animal Cell Biology and Technology for Bioprocesses.* (R. E. Spier et al., eds.). Butterworths. pp. 203-208 (1989).
54. Kunas, K.T., and Papoutsakis, E.T., "The protective effect of serum against hydrodynamic damage of hybridoma cells in agitated and surface aerated bioreactors", *J. Biotechnol.* **15**: 57-70 (1990).
55. Kunas, K.T., and Papoutsakis, E.T., "Increasing serum concentrations decrease cells death and allow growth of hybridoma cells at higher agitation rates", *Biotechnol. Lett.* **11**: 525-530 (1989).
56. Cherry, R.S. and Papoutsakis, E.T., "Understanding and controlling injury of animal cells in bioreactors", in *Animal Cell Biotechnology* (R.E. Spier and J.B. Griffiths, eds.), Vol. 4. Academic Press. Chp. 3: pp. 72-121 (1990).
57. Kunas, K.T., and Papoutsakis E.T., "Damage mechanisms of suspended animal cells in agitated bioreactors with and without bubble entrainment", *Biotechnol. Bioeng.* **36**: 476-483 (1990).
59. Petersen, J.F., McIntire, L.V. and Papoutsakis, E.T., "Shear sensitivity of freely suspended animal cells in batch, fedbatch, and continuous cultures", *Biotechnol. Progr.* **6**: 114-120 (1990).
62. Papoutsakis, E.T., Petersen, J.F. and McIntire, L.V., "Cytoskeletal microfilament network and energy

- metabolism affect ability of animal cells to resist shear injury", in *Production of Biologicals From Animal Cells In Culture* (Proc. of the 10th ESACT Meeting, Avignon, France, May 1990) (Spier, R.E., Griffiths J. B., and Meigner, B., eds.). Butterworths, England. pp. 229-234 (1991).
63. Michaels, J. D., Petersen, J.F., McIntire, L.V. and Papoutsakis, E.T., "Protection mechanisms of freely suspended animal cells (CRL 8018) from fluid-mechanical injury. Viscometric and bioreactor studies using serum, Pluronic F68 and polyethylene glycol", *Biotechnol. Bioeng.* **38**: 169-180 (1991).
 64. Michaels, J. D. and Papoutsakis, E.T., "Polyvinyl alcohol and polyethylene glycol as protectants against fluid-mechanical injury of freely suspended animal cells (CRL 8018)", *J. Biotechnol.* **19**: 241-258 (1991).
 65. Lakhotia, S. and Papoutsakis, E.T., "Agitation induced cell injury in microcarrier cultures. The protective effect of viscosity is agitation-intensity dependent: Experiments and theory", *Biotechnol. Bioeng.* **39**: 95-107 (1992).
 66. Papoutsakis, E.T., "Fluid-mechanical damage of animal cells in bioreactors (A review)", *Trends in Biotechnol.* **9**: 427-437 (1991).
 67. Papoutsakis, E.T., "Media additives for protecting animal cells against agitation and aeration damage in bioreactors (A review)", *Trends in Biotechnol.* **9**: 316-324 (1991).
 71. O'Connor, K.C. and Papoutsakis, E.T., "Agitation effects on microcarrier and suspension CHO cells", *Biotechnol. Techn.* **6**: 323-328 (1992).
 73. Lakhotia, S., Bauer, K.D. and Papoutsakis, E.T., "Damaging agitation intensities increase DNA synthesis rate and alter cell cycle phase distributions of CHO cells", *Biotechnol. Bioeng.* **40**: 978-990 (1992).
 74. Michaels, J.D., Kunas K.T. and Papoutsakis, E.T., "Fluid-mechanical Damage of freely-suspended cells in agitated bioreactors: Effects of dextran, derivatized celluloses and polyvinyl alcohol", *Chem. Eng. Communic.* **118**: 341-360 (1992).
 78. Borys, M.C. and Papoutsakis, E.T., "Formation of bridges, and large cellular clumps in CHO-cell microcarrier cultures: Effects of agitation, dimethyl sulfoxide and calf serum", *Cytotechnol.* **8**: 237-248 (1992).
 82. Lakhotia, S., Bauer, K.D. and Papoutsakis, E.T., "Fluid-mechanical forces in agitated bioreactors reduce the CD13 and CD33 surface content of HL60 cells", *Biotechnol. Bioeng.* **41**: 868-877 (1993).
 83. Borys, M.C., Linzer, D.I.H., and Papoutsakis, E.T., "Culture pH affects expression rates and glycosylation of recombinant mouse placental lactogen proteins by Chinese Hamster Ovary (CHO) cells", *Bio/Technol.* **11**: 720-724 (1993).
 85. Papoutsakis, E.T. and Michaels, J.D., "Physical forces in mammalian cell bioreactors", in *Physical Forces and the Mammalian Cells* (J. Frangos, ed.). Academic Press, New York. Chp. 10: pp. 291-345 (1993).
 87. Borys, M.C. and Papoutsakis, E.T., "'Oxygenation', Module 8.D:1 of Part 8D: Biochemistry of Cells in Culture. Environmental Factors", in *Protocols in Cell and Tissue Culture* (J. B. Griffiths, Doyle, A., and Newell, D. G., eds.). Wiley, Chichester, UK. pp. 8D1.1-8D.1.13 (1993).
 88. Borys, M.C. and Papoutsakis, E.T., "'Mixing', Module 8.D:2 of Part 8D: Biochemistry of Cells in Culture. Environmental Factors", in *Protocols in Cell and Tissue Culture* (J. B. Griffiths, Doyle, A., and Newell, D.G., eds.), Wiley, Chichester, UK. pp. 8D:2.1-8D.2.8 (1993).
 89. Papoutsakis, E.T., "'Mechanical Protection, Module 8.D:3 of Part 8D: Biochemistry of Cells in Culture. Environmental Factors", in *Protocols in Cell and Tissue Culture* (J. B. Griffiths, Doyle, A., and Newell, D.G., eds.), Wiley, Chichester, UK. pp. 8D:3.1-8D.3.8 (1993).
 97. Michaels, J.D., Wasan, D. and Papoutsakis, E.T., "Dynamic interfacial tension and rheological properties of cell culture media with shear protectants", in *Animal Cell Technology: Products of Today, Prospects for Tomorrow* (R. E. Spier, J. B. Griffiths, W. Berthold, eds.), Butterworth-Heinemann. pp. 389-391 (1994).
 98. Borys, M.C., Linzer, D.I.H. and Papoutsakis, E.T., "Culture pH and ammonia affect expression rates and glycosylation of recombinant mouse placental lactogen proteins by CHO cells", in *Animal Cell Technology: Products of Today, Prospects for Tomorrow* (R. E. Spier, J. B. Griffiths, W. Berthold, eds.), Butterworth-Heinemann. pp. 658-660 (1994).
 99. Borys, M.C., Linzer, D.I.H. and Papoutsakis, E.T., "Ammonia affects the glycosylation patterns of recombinant

- mouse placental lactogen-1 (mPL-I) by Chinese Hamster Ovary (CHO) Cells", *Biotechnol. Bioeng.* **43**: 505-514 (1994).
101. Borys, M.C., Linzer, D.I.H. and Papoutsakis, E.T., "Cell aggregation in a CHO microcarrier culture affects expression rates and N-linked glycosylation of recombinant mouse placenta lactogen-1 (mPL-1)", *Ann. N. Y. Acad. Sci.* **745**: 360-371 (1994).
 105. Michaels, J.D., Nowak, J.E., Mallik, A.K., Koczo, K., Wasan, D.T., and Papoutsakis, E. T., "Analysis of cell-to-bubble attachment in sparged bioreactors in the presence of cell protecting additives against shear", *Biotechnol. Bioeng.* **47**: 407-419 (1995).
 106. Michaels, J. D., Nowak, J.E., Mallik, A.K., Koczo, K., Wasan, D.T., and Papoutsakis, E.T., "Interfacial properties of cell culture media with cell protecting additives against shear", *Biotechnol. Bioeng.* **47**: 420-430 (1995).
 112. Michaels, J.D., Mallik, A.K., and Papoutsakis, E.T., "Sparging and agitation induced injury of cultured animal cells: Do bubble coalescence and breakup in the bulk liquid injure cells?", *Biotechnol. Bioeng.* **51**: 399-409 (1996).
 128. McDowell, C. L., and Papoutsakis, E. T. "Decreasing extracellular pH increases CD13 receptor surface content and alters the metabolism of HL60 cells cultured in stirred tank reactors", *Biotechnol. Progr.*, **14**: 567-572 (1998).
 129. McDowell, C. L., and Papoutsakis, E. T. "Increased agitation intensity increases CD13 receptor surface content and mRNA levels, and alters the metabolism of HL60 cells cultured in a stirred tank bioreactor", *Biotechnol. Bioeng.* **60**: 239-250 (1998).
 130. McDowell, C. L., Carver R., T., and Papoutsakis, E. T. "Effects of Methocel A15LV, polyethylene glycol, and polivinyl alcohol on CD13 and CD33 receptor surface content and metabolism of HL60 cells cultured in stirred tank bioreactors", *Biotechnol. Bioeng.* **60**: 251-258 (1998).
 131. McDowell, C. L., and Papoutsakis, E. T. "Serum increases the CD13 receptor expression, reduces the transduction of fluid-mechanical forces, and alters the metabolism of HL60 cells cultured in agitated bioreactors", *Biotechnol. Bioeng.* **60**: 259-268 (1998).
 149. McDowell, C. L., Borys, M.C. and Papoutsakis, E. T. "Animal cell culture: Physicochemical effects of pH", *The Encyclopedia of Cell Technology* (R. E. Spier, Ed.). Wiley, New York. pp. 63-70 (2000).
 150. Carswell, K. S., and Papoutsakis, E. T. "Culture of human T-cells in stirred bioreactors for cellular immunotherapy applications: shear, proliferation, and the IL-2 receptor", *Biotechnol. Bioeng.* **68**: 328-338 (2000).
 151. Carswell, K. S., Weiss, J. W. and Papoutsakis, E. T. "Low oxygen tension enhances the stimulation and proliferation of human T lymphocytes", *Cytotherapy* **2**: 25-37 (2000).
 157. Carswell, K. S., and Papoutsakis, E. T. "Extracellular pH Affects the Proliferation of Cultured Human T-cells and Their Expression of the Interleukin 2 Receptor", *J. Immunotherapy.* **23**: 669-674 (2000).
 161. Haddad, H, Carswell, K. S., and Papoutsakis, E. T. "Ex vivo expansion of Human T lymphocytes", in *Methods in Tissue Engineering* (A. Atala & R. Lanza, Eds.), Academic Press, San Diego. Chapter 41: pp. 487-502 (2002).
 162. Haddad, H, and Papoutsakis, E. T. "Low oxygen tension and autologous plasma increase T-cell proliferation in serum-free media", *Cytotherapy.* **3**: 435-447 (2001).
 177. Haddad-Adams, H., Windgassen, D., Ramsborg C. G., Paredes, C., and Papoutsakis, E. T. "Molecular understanding of oxygen-tension and patient-variability effects on Ex vivo expanded T-cells", *Biotechnol. Bioeng.* **87**: 437-450 (2004).
 180. Ramsborg CG, D. Windgassen, C. J. Paredes and E. T. Papoutsakis, "Molecular insights into the pleiotropic effects of plasma on Ex vivo expanded T-cells using DNA-microarray analysis", *Exp. Hematol.* **32**: 970-990 (2004).
 203. Pascoe, D.E., Arnott, D., Papoutsakis, E.T., Miller, W.M., Andersen, D.C., "Proteome analysis of antibody-

producing CHO cell lines with different metabolic profiles", *Biotechnol Bioeng.* **92**(2):391-410 (2007).

V. STEM-CELL & HEMATOPOIETIC-CELL BIOENGINEERING

69. Koller, M.R., Bender, J.G., Miller, W.M. and Papoutsakis, E.T., "Reduced oxygen tension increases hematopoiesis in long-term culture of human and progenitor cells from cord blood and bone marrow", *Exper. Hematol.* **20**: 264-270 (1992).
72. Koller, M.R., Bender, J.G., Miller, W.M. and Papoutsakis, E.T., "Effects of synergistic cytokine combinations, low oxygen, and irradiated stroma on the expansion of human cord blood progenitors", *Blood.* **80**: 403-411 (1992).
77. Koller, M.R., Bender, J.G., Papoutsakis, E.T. and Miller, W.M., "Beneficial effects of reduced oxygen tension and perfusion in long-term hematopoietic cultures", *Ann. N.Y. Acad. Sci.* **665**: 105-116 (1992).
80. Koller, M.R., Bender, J.G., Miller, W.M. and Papoutsakis, E.T., "Expansion of primitive human hematopoietic progenitors in a perfusion bioreactor system with IL-3, IL-6 and stem-cell factor", *Bio/Technol.* **11**: 358-363 (1993).
100. Sandstrom, C.E., Miller, W.M. and Papoutsakis, E.T., "Review: serum-free media for cultures of primitive and mature hematopoietic cells", *Biotechnol. Bioeng.* **43**: 706-733 (1994).
102. Koller, M.R. and Papoutsakis, E.T., "Cell adhesion in animal cell culture: physiological and fluid-mechanical implications", Chapter in "Cell Adhesion: Fundamentals and Biotechnological Applications" (M. Hjortso, J. Roos, eds), *Bioprocess Technology Series*, No. 20. Marcel Dekker, New York. **20**: pp. 61-110 (1995).
107. Sandstrom, C.E., Bender, J.G., Papoutsakis, E.T., and Miller, W.M., "Effects of CD34+ cell selection and perfusion on Ex vivo expansion of peripheral blood mononuclear cells", *Blood.* **86**: 958-970 (1995).
108. Papoutsakis, E.T., McAdams, T.A., Sandstrom, C.E., Miller, W.M., and Bender, J.G. "Ex vivo Expansion of Primitive Hematopoietic Cells for Cellular Therapies: An Overview", *Cytotechnology.* **18**: 133-146 (1995).
109. Sandstrom, C.E., Bender, J.G., Miller, W.M., and Papoutsakis, E.T. "Development of novel perfusion chamber to retain nonadherent T-cells and its use for comparison of human "mobilized" peripheral-blood cell cultures with and without irradiated bone marrow stroma", *Biotechnol. Bioeng.* **50**: 493-504 (1996).
110. Collins, P.C., Papoutsakis, E. T., & Miller, W.M. "Ex-vivo systems for hematopoietic cell therapies", *Current Opinion in Biotechnology.* **7**: 223-230 (1996).
113. McAdams, T.A., Miller, W.M., and Papoutsakis, E.T., "Hematopoietic cell culture therapies: I. Cell culture considerations", *Trends in Biotechnol.* **14**: 341-349 (September 1996).
114. McAdams, T.A., Winter, J. A., Miller, W.M., and Papoutsakis, E.T., "Hematopoietic cell culture therapies: II. Clinical aspects", *Trends in Biotechnol.* **14**: 388-396 (October 1996).
116. Sandstrom, C.E., Collins, P.C., McAdams, T.A., Bender, J.G., Papoutsakis, E.T., and Miller, W.M., "Comparison of serum-deprived media for the Ex vivo expansion of hematopoietic progenitor cells from cord blood and peripheral blood mononuclear cells", *J. Hematotherapy.* **5**: 461-473 (1996).
117. Lalauppa, J.A., Papoutsakis, E.T., and Miller, W.M. "Evaluation of cytokines for the expansion of megakaryocyte and granulocyte lineages", *Stem Cells.* **15**: 198-206 (1997).
118. Laluppa, J.A., Papoutsakis, E.T., and Miller, W.M., "Ex vivo expansion of hematopoietic stem and progenitor cells for transplantation", in *Blood Stem Cell Transplantation* (J. Winter, Editor), Kluwer, New York. Chp. 8: pp.159-186 (1997).
119. McAdams, T.A., Miller, W.M., and Papoutsakis, E.T. "Effects of culture pH on the expansion and differentiation of hematopoietic progenitors from peripheral and cord blood", *Br. J. Haematol.* **97**: 889-895 (1997).
120. Collins, P. C., Wong, C-K., Papoutsakis, E. T., and Miller, W. M., "Real time method for determining the colony-forming cell content of human hematopoietic cell cultures", *Biotechnol. Bioeng.* **55**: 693-700 (1997).
121. Lalauppa, J.A., McAdams, T.A., Papoutsakis, E.T., and Miller, W.M. "Culture materials affect Ex vivo expansion of hematopoietic progenitor cells", *J. Biomed. Mat. Res.* **36**: 347-359 (1997).

124. Collins, P. C., Miller, W. M., and Papoutsakis, E. T., "Stirred culture of peripheral and cord-blood hematopoietic cells offers advantages over traditional static systems for clinically relevant applications", *Biotechnol. Bioeng.* **59**: 534-543 (1998).
125. Collins, P. C., Nielsen, L. K., Patel, S. D., Papoutsakis, E. T., and Miller, W. M., "Characterization of hematopoietic cell expansion, oxygen uptake and glycolysis in a controlled, stirred-tank bioreactor system", *Biotechnol. Progr.* **14**: 466-472 (1998).
126. Lalauppa, J.A., Papoutsakis, E.T., and Miller, W.M. "Oxygen tension alters the effects of cytokines on the megakaryocyte, erythrocyte and granulocyte lineages", *Exp. Hematol.* **26**: 835-843 (1998).
127. Nielsen, L. K., Papoutsakis, E. T., and Miller, W. M., "Modeling Ex vivo hematopoiesis using chemical engineering metaphors", *Chem. Eng. Sci.* **53**: 1913-1925 (1998).
132. Collins, P.C., Patel, S.D., Miller, W. M., and Papoutsakis, E. T. "Initiation, maintenance, and quantification of human hematopoietic cell cultures", in *Methods in Molecular Medicine, Vol.18: Tissue Engineering Methods* (J. R. Morgan, M. L. Yarmush, Eds), Human Press, Totowa, NJ. Chp. 22: pp. 271-292 (1999).
133. Horner, M, Miller, W.M., Ottino, J.M., and Papoutsakis, E.T., "Transport in a grooved perfusion flat-bed bioreactor for cell therapy applications", *Biotechnol. Progr.* **14**: 689-699 (1998).
134. McAdams, T.A., Miller, W.M., and Papoutsakis, E.T., "pH is a potent modulator of erythroid differentiation", *Br. J. Haematol.* **103**: 317-325 (1998).
137. Nielsen, L. K., Bender, J. G., Miller, W.M., and Papoutsakis, E. T., "Population balance model of in vivo neutrophil formation following bone marrow rescue therapy", *Cytotechnology.* **28** (1/3): 157-162 (1998).
139. Mostafa, S. S, Hevehan, D. L., McAdams, T.A., Papoutsakis, E. T. and Miller, W. M., "Hematopoietic cells for cellular and gene therapy: I. Basic assay techniques", in *Animal Cell Biotechnology: Methods and Protocols* (N. Jenkins, Ed.), Humana Press. Chapter 17: pp. 211-227 (1999).
140. McAdams, T.A., Papoutsakis, E. T. and Miller, W. M., "Hematopoietic cells for cellular and gene therapy: II. Expansion Protocols", in *Animal Cell Biotechnology: Methods and Protocols* (N. Jenkins, Ed.), Human Press. Chapter 18: pp. 229-238 (1999).
141. Collins, P. C., Papoutsakis, E. T., Patel, S. and Miller, W. M., "Nuclei size distribution as a predictor of hematopoietic cell proliferation", *Cytotherapy.* **1**: 99-110 (1999).
144. Guo, M. H., Miller, W. M., Papoutsakis, E. T., Patel, S., James, C., Goolsby, C., and Winter J. N., "Ex vivo expansion of CFU-GM and BFU-E in unselected peripheral blood mononuclear cell cultures with Flt3L in enhanced by autologous plasma", *Cytotherapy.* **1**: 183-194 (1999).
148. Hevehan, D. L., Papoutsakis, E. T. & Miller W. M., "Physiologically significant effects of pH and oxygen tension on granulopoiesis", *Exp. Hematol.* **28**: 267-275 (2000).
152. Patel, S.D, Guo, R., Miller, W.M., Papoutsakis, E.T., Minster, N.I., Baum, C.M., and Winter, J.N., "Clinical-scale expansion of progenitor and post-progenitor cells using daniplestim, leridistim, progenipoietin, promegapoietin and autologous plasma", *Cytotherapy.* **2**: 85-94 (2000).
153. Patel, S.D., Miller, W.M., Winter, J.N., and Papoutsakis E.T., "Cell density-dependent proliferation in frequently fed peripheral blood mononuclear cell cultures", *Cytotherapy.* **2**: 267-280 (2000).
154. Hevehan, D., Miller, W.M., and Papoutsakis, E.T., "A dynamic model of Ex vivo granulocytic kinetics to examine the effects of pO₂, pH and IL-3", *Exp. Hematol.* **28**:1016-1028 (2000).
155. Patel, S.D., Papoutsakis, E.T., Winter, J.N., and Miller, W.M., "The lactic acid issue revisited: novel feeding protocols to examine inhibition of cell proliferation and glucose metabolism in hematopoietic cell cultures," *Biotechnol. Progr.* **16**: 885-892 (2000).
156. Mostafa, S.S., Miller, W.M., and Papoutsakis, E.T., "Oxygen tension influences the differentiation, maturation and apoptosis of human megakaryocytes", *Br. J. Haematol.* **111**: 879-889 (2000).
158. Yang, H., Papoutsakis, E.T., and Miller, W.M., "Model-based estimation of myeloid hematopoietic progenitor cells using metabolic activities", *Biotechnol. Bioeng.* **72**: 144-155 (2001).
160. Mostafa, S.S., Papoutsakis, E.T., and Miller, W.M., "Oxygen tension modulates the expression of cytokine

receptors, transcription factors and lineage-specific markers in cultured human megakaryocytes", *Exper. Hematol.* **29**: 873-883 (2001).

163. Chow, D., Miller, W.M., and Papoutsakis, E.T., "Estimation of Oxygen Tension Distributions of the Bone Marrow Hematopoietic Compartment. I. Krogh's model", *Biophysical J.* **81**: 675-684 (2001).
164. Chow, D., Miller, W.M., and Papoutsakis, E.T., "Estimation of oxygen tension distributions of the bone marrow hematopoietic compartment. II. Modified Kroghian models", *Biophysical J.* **81**: 685-696 (2001).
165. Hevehan, D. L., Miller, W.M., and Papoutsakis, E.T., "Differential expression and phosphorylation of distinct STAT3 proteins during granulocytic differentiation", *Blood.* **99**: 1627-1637 (2002).
167. Yang, H., Miller, W.M., and Papoutsakis, E. T., "Higher pH promotes megakaryocytic maturation and apoptosis", *Stem Cells.* **20**: 320-328 (2002).
192. Lisa M. Giammona, L. M., P. G. Fuhrken, E. T. Papoutsakis, and W. M. Miller, "Nicotinamide (vitamin B3) increases the polyploidisation and proplatelet formation of cultured primary human megakaryocytes" *Brit. J. of Haematol.* **135**, 554-566 (2006).
193. Fuhrken, P.G., C. Chen; W. M. Miller, & E. T. Papoutsakis. Comparative, genome-scale transcriptional analysis of CHRF-288-11 and primary human megakaryocytic cell cultures provides novel insights into lineage-specific differentiation. *Exp. Hematology*, **35**: 476-489 (2007).
194. Dipankar R, Y. Terao, P. G. Fuhrken, Z-Q. Ma, F. J. DeMayo, K. Christov, N. A. Heerema, R. Franks, S. Y. Tsai, E. T. Papoutsakis and H. Kiyokawa. "Deregulated CDC25A expression promotes mammary tumorigenesis with genomic instability", *Cancer Res.*, **67**: 984-991 (2007).
200. Chen, C, Fuhrken, P.G., Huang L.T, Paredes, C. J., Miller, W. M. & E. T. Papoutsakis. A systems-biology analysis of isogenic megakaryocytic and granulocytic cultures identifies new molecular components of megakaryocytic apoptosis. *BMC Genomics* **8**: 384 (doi:10.1186/1471-2164-8-384) (2007).
201. Huang, L.T., Paredes, C.J., Papoutsakis, E.T., Miller W.M., Gene-expression analysis illuminates the transcriptional programs underlying the functional activity of ex-vivo expanded granulocytes. *Physiol Genomics.* **31**: 114-125 (2007).
202. Wang, H., Lu, Y., Huang, W., Papoutsakis, E.T., Fuhrken, P., Eklund, E.A., HoxA10 activates transcription of the gene encoding mitogen-activated protein kinase phosphatase 2 (Mkp2) in myeloid cells. *J Biol. Chem.* **282**: 16164-76. (2007).
205. Fuhrken, P. G., C. Chen, P. A. Apostolidis, M. Wang, W. M. Miller, E. T. Papoutsakis. Gene-Ontology driven transcriptional analysis of CD34⁺-cell initiated megakaryocytic cultures identifies new transcriptional regulators of megakaryopoiesis. *Physiol. Genomics.* (2008) doi:10.1152/physiolgenomics.00127.2007.
206. Sepúlveda D.E., B. A. Andrews, J. A. Asenjo, & E. T. Papoutsakis. Comparative transcriptional analysis of embryoid body versus two-dimensional differentiation of murine embryonic stem cells. *Tissue Eng.* Accepted (2008).
210. Peter G. Fuhrken, Pani A. Apostolidis, Stephan Lindsey, William M. Miller, and Eleftherios T. **Papoutsakis** **Tumor suppressor protein p53 regulates megakaryocytic polyploidization and apoptosis** *J. Biol. Chem.*, Apr 2008; doi:10.1074/jbc.M801923200.

VI. T-CELL BIOENGINEERING & GENOMICS FOR CELLULAR IMMUNOTHERAPY

150. Carswell, K. S., and Papoutsakis, E. T., "Culture of human T-cells in stirred bioreactors for cellular immunotherapy applications: shear, proliferation, and the IL-2 receptor", *Biotechnol. Bioeng.* **68**: 328-338 (2000).
151. Carswell, K. S., Weiss, J. W. and Papoutsakis, E. T., "Low oxygen tension enhances the stimulation and proliferation of human T lymphocytes", *Cytotherapy.* **2**: 25-37 (2000).
157. Carswell, K. S., and Papoutsakis, E. T., "Extracellular pH affects the proliferation of cultured human T-cells and their expression of the interleukin 2 receptor", *J. Immunotherapy.* **23**: 669-674 (2000).
161. Haddad, H, Carswell, K. S., and Papoutsakis, E. T., "Ex vivo expansion of Human T lymphocytes", in

Methods in Tissue Engineering (A. Atala & R. Lanza, Eds.), Academic Press, San Diego. Chapter 41: pp. 487-502 (2002).

162. Haddad, H, and Papoutsakis, E. T., "Low oxygen tension and autologous plasma increase T-cell proliferation in serum-free media", *Cytotherapy*. **3**: 435-447 (2001).
169. Yang, H., Haddad, H., Tomas, C., Alsaker, K., and Papoutsakis E. T., "A segmental nearest neighbor normalization and gene identification method gives superior results for DNA-array analysis", *Proc. Nat. Acad. Sci. (USA)*. **100**: 1122-1127 (2003).
177. Haddad-Adams, H, Windgassenc D., Ramsborg, C. G., Paredes, C., and Papoutsakis, E. T., "Molecular understanding of oxygen-tension and patient-variability effects on Ex vivo expanded T-cells", *Biotechnol. Bioeng.* **87**: 437-450 (2004).
180. Ramsborg CG, D. Windgassen, C. J. Paredes and E. T. Papoutsakis, "Molecular insights into the pleiotropic effects of plasma on Ex vivo expanded T-cells using DNA-microarray analysis", *Exp. Hematol.* **32**: 970-990 (2004).
195. Ramsborg CG and E. T. Papoutsakis, "Global transcriptional analysis delineates the differential inflammatory response interleukin-15 elicits from cultured human T cells", *Exp. Hematol.* **35**: 454-464 (2007).

VIII. COMPUTATIONAL BIOLOGY

181. Thomas, R., Mehrotra, S., Papoutsakis, E.T., Hatzimanikatis, V., "A model-based optimization framework for the inference of gene regulatory networks from DNA array data", *Bioinformatics*. **20**: 3221-3235 (2004).
198. Thomas, R., Paredes, CJ, Mehrotra, S., Papoutsakis, E.T., Hatzimanikatis, V., "A model-based optimization framework for the inference of regulatory interactions using time-course DNA microarray expression data", *BMC Bioinformatics* **8**: 228 (2007).
208. Senger, R. S. and E. T. Papoutsakis, Genome-Scale Model for *Clostridium acetobutylicum*. Part 1. Reverse engineering to resolve network gaps, pathway discovery, and extrapolation to other clostridia. *Biotechnol. Bioeng.* in revision (2008).
209. Senger, R. S. and E. T. Papoutsakis, Genome-Scale Model for *Clostridium acetobutylicum*. Part 2: Development of Specific Proton Flux States and Numerically-Determined Sub-Spaces. *Biotechnol. Bioeng.* in revision (2008).

VIII. TRANSPORT MODELS, APPLIED MATHEMATICS & OTHER

4. Papoutsakis, E., Ramkrishna, D. and Lim, H.C., "The extended Graetz problem with Dirichlet wall boundary conditions", *Appl. Sci. Res.* **36**: 13-34 (1980).
5. Papoutsakis, E., Ramkrishna, D. and Lim, H.C., "The extended Graetz problem with prescribed wall flux", *AIChE J.* **26**: 779-787 (1980).
7. Papoutsakis, E. and Ramkrishna, D., "Conjugated Graetz problems. I. General formalism and a class of solid-fluid problems", *Chem. Eng. Sci.* **36**: 1381-1391 (1981).
8. Papoutsakis, E. and Ramkrishna, D., "Conjugated Graetz problems. II. Fluid-fluid problems", *Chem. Eng. Sci.* **36**: 1393-1399 (1981).
9. Papoutsakis, E. and Ramkrishna, D., "Heat transfer in a capillary flow emerging from a reservoir", *Trans. ASME, J. Heat Transf.* **103**: 429-435 (1981).
10. Papoutsakis, E., "Nusselt numbers near the entrance of the heat-exchange section in flow systems", *AIChE J.* **27**: 687-689 (1981).
25. Cherry, R.S. and Papoutsakis, E.T., "Hydrodynamic effects on cells in agitated tissue culture reactors", *Bioproc. Eng.* **1**: 29-41 (1986).
58. Papoutsakis, E.T., "Developments in product recovery and purification", Chapter 13 in "Recombinant DNA Technology and Applications", A. Prokop, R. Bajpai, C. S. Ho, eds, pp. 357-412; McGraw-Hill, (1991).

133. Horner, M, W. M. Miller, J. M. Ottino, and E. T. Papoutsakis, "Transport in a grooved perfusion flat-bed bioreactor for cell therapy applications", *Biotechnol. Progr.* **14**: 689-699 (1998).
163. Chow, D., W. M. Miller and E. T. Papoutsakis, "Estimation of oxygen tension distributions of the bone marrow hematopoietic compartment. I. Krogh's model", *Biophysical J.* **81**: 675-684 (2001).
164. Chow, D, W. M. Miller and E. T. Papoutsakis, "Estimation of oxygen tension distributions of the bone marrow hematopoietic compartment. II. Modified Kroghian models", *Biophysical J.* **81**: 685-696 (2001).

IX. DNA COMPUTING

184. Tsiftaris S.A., Katsaggelos A.K., Pappas T.N., and Papoutsakis E.T., "DNA Based Matching of Digital Signals", *Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing*, **5**: 581-584 (2004).
185. Tsiftaris S.A., Katsaggelos A.K., Pappas T.N., and Papoutsakis E.T., "DNA computing from a signal processing viewpoint", *IEEE Signal Processing Magazine.* **21** (5): 100-106 (Sep. 2004).
186. Tsiftaris S.A., Katsaggelos A.K., Pappas T.N., and Papoutsakis E.T., "How can DNA computing be applied to digital signal processing?", *IEEE Signal Processing Magazine.* **21** (6): 57-61 (Nov. 2004).

CONTINUING EDUCATION COURSES

Organized and offered (1996-2000) short course "Cell culture and separations for cell and gene therapies." Short course was later offered (with W.M. Miller) for the American Society of Mechanical Engineers Bioprocess Technology Seminars (October 2001 in Atlanta, GA; and October 2002 in San Diego, CA).

INVITED SEMINARS/PAPERS

- "Single-cell-protein production from one-carbon compounds: a window into biochemical engineering",
 - University of Texas, Austin, Texas, Dept. of Chem. Engineering, December 2, 1980.
 - National Technical University, Athens, Greece, School of Chemical Engineering, December 17, 1981.
- "Equations, Calculations and Control Scenarios for Fermentations of Butyric Acid Bacteria", - Technical University, Delft, The Netherlands, Departments of Chemical Engineering and Technical Biology, July 20, 1982.
 - Cornell University, School of Chem. Engineering, Ithaca, NY, November 3, 1982.
- "A Fermentation Equation for Butanol/Acetone Production by Butyric - Acid Bacteria",
 - University of Minnesota, Dept. Of Chem. Engineering, Minneapolis, MN, April 21, 1983.
 - University of Houston, Dept. of Chem. Engineering, Houston, TX, September 30, 1983.
 - University of Notre Dame, Dept. of Chem. Engineering, Notre Dame, IN, October 11, 1983.
- "Fermentation Equations for Production of Oxychemicals from Sugars",
 - Indian Institute of Technology, Bombay, India, March 2, 1984.
 - (Indian) National Chemical Laboratory, Dept. of Chem. Engineering, Pune, India, March 5, 1984.
- "Regulation Mechanisms of Product Formation in the Butanol-Acetone Fermentation"
 - Louisiana State University, Dept. of Chem. Engineering, Baton Rouge, LA, Nov. 9, 1984.
 - University of Pennsylvania, Dept. Of Chem. Engineering, Philadelphia, PA, March 11, 1985.
- "On-Line Chromatographic Analysis and Fermentor State Characterization of Butanol/Acetone Fermentations",
 - Washington University, Dept. of Chem. Engineering, St. Louis, MO, April 15, 1985.
 - Pfizer, Inc., Fermentation and Recovery R&D, Groton, CT, October 4, 1985.
- "Shear Requirements, Mixing, and Cell Damage in Suspension Tissue Culture Bioreactors: Shear, Wear, and Tear",
 - E.I. du Pont de Nemours and Co. Inc., Wilmington, DE, January 24, 1986.
 - Cetus Corporation, Emeryville, CA, August 18, 1986.
 - Texas A&M University, Dept. of Chem. Engineering, College Station, TX, November 14, 1986.
- "Mechanisms of Cell Damage in Agitated Microcarrier Tissue Culture Reactors: Shear, Wear, and Tear",

- Purdue Univ., School of Chem. Engineering, W. Lafayette, IN, January 30, 1986.
- "On-Line Chromatographic Monitoring and Gateway Sensors for Complex Fermentations",
 - Eastman Kodak Company, Rochester, NY, April 11, 1986.
- "Transport of Substrates and Metabolites, The Membrane Protonmotive Force and Their Effect on Cell Metabolism",
 - Nagoya University, Dept. of Chem. Engineering, Nagoya, JAPAN, September 30, 1986.
 - Tokyo Institute of Technology, Lab. of Resources Utilization, Yokohama, JAPAN, October 3, 1986.
- "Regulation of Product Yields and Selectivities in Anaerobic Fermentations of Butyric-Acid Bacteria",
 - Calif. Institute of Technology, Dept. of Chem. Engineering, Pasadena, CA, January 8, 1987.
 - Univ. of Colorado, Dept. of Chem. Engng., Boulder, CO, March 5, 1987.
 - Univ. of Florida, Dept. of Chem. Engineering, Gainesville, FL, April 3, 1987.
- "Shear and Other Hydrodynamic Effects in Microcarrier Cell Culture",
 - Technische Universitaet Hamburg-Harburg, (Arbeitsbereich Biotechnologie I: Prof. Dr. H. Maerkl), May 21, 1987.
 - Eidgenoessische Technische Hochschule (Technisch-Chemisches Laboratorium), Zuerich, Switzerland, June 5, 1987.
 - Technische Universitaet Hannover, FRG (Institut fuer Technische Chemie: Prof. Dr. K. Schuegerl), June 9, 1987.
 - Gesellschaft fuer Biotechnologische Forschung (Braunschweig, FRG), June 23, 1987.
- "Shear Effects on Cultured Hybridoma Cells",
 - Gesellschaft fuer Biotechnologische Forschung (Braunschweig, FRG), June 11, 1987.
- "Liquid Shear Effects in Animal Cell Culture",
 - Abbott Laboratories (Chem. Agric. Products Division), N. Chicago, IL, March 25, 1987.
 - Codon, Brisbane, CA, April 17, 1987.
- "Metabolic Regulation of Product Formation in Anaerobic Fermentations of Butyric-Acid Bacteria",
 - Amoco (Biotechnol. Division), Naperville, IL, July 16, 1987
- "Membrane Oxygenation and Perfusion in Animal-Cell Bioreactors",
 - Questar, Charlotte NC, Aug. 8, 1987.
- "Shear and Other Hydrodynamic Effects in Animal Cell Bioreactors",
 - Eastman Kodak Company, Rochester, NY, Oct. 23, 1987.
 - Carnegie-Mellon Univ. Dept. of Chem. Engineering, April 5, 1988.
 - Michigan State Univ., Dept. of Chem. Engineering, East Lansing, MI, April 28, 1988.
 - Univ. of California, Dept. of Chem. Eng., Davis, CA, June 21, 1988.
 - Univ. of California, Dept. of Chem. Eng., Berkeley, CA, Nov. 7, 1988.
 - Monsanto Corp., St. Louis, MO, Nov. 11, 1988.
 - Univ. of Illinois, Dept. of Chem. Eng., Chicago, IL, March 3, 1989.
 - Massachusetts Institute of Technology, Dept. of Chem. Eng., Cambridge, MA, March 24, 1989.
 - The UpJohn Company, Kalamazoo, MI, May 25, 1989
- "Regulation of Product Formation in the *C. Acetobutylicum* Fermentation: ATP and NADH Levels, Enzyme Regulation and Cloning Studies",
 - Michigan State Univ., Biotechnol. Institute, East Lansing, MI, April 29, 1988.
- "Fluid-Mechanical Effects on Animal Cells in Bioreactors",
 - The Pennsylvania State University, Dept. of Chem. Engineering, University Park, PA, March 5, 1990.
 - Illinois Institute of Technology, Dept. of Chem. Engineering, Chicago, IL, February 13, 1991.
 - State Univ. of New York at Buffalo, Dept. of Chem. Engineering, Buffalo, NY, February 27, 1991.
 - Washington State University, Dept. of Chem. Engineering, Pullman, WA, March 11, 1991.
 - University of British Columbia, Biotechnology Lab., Vancouver, BC, Canada, March 13, 1991.

- Univ. of Maryland, Dept. of Chem. Engineering, College Park, MD, March 19, 1991.
- "Analysis and Redirection of Cellular Metabolism in Anaerobic Butyric-acid Bacteria",
 - Dartmouth College, Thayer School of Engineering, Hanover, NH, April, 5, 1990.
- "Fluid-Mechanical Effects on Animal Cells",
 - Gordon Conference: Effects of Gravity on Biosystems, Colby-Sawyer College, New London, CT, July 9-13, 1990.
- "Vectors, Transformation, and Metabolic Engineering Studies of *Clostridium acetobutylicum* ATCC 824",
 - International Workshop on The Regulation of Metabolism, Genetics, and Development of the Solvent-Forming Clostridia, Salisbury, England, August 9-11, 1990.
- "Beneficial effects of reduced oxygen tension and perfusion in long-term hematopoietic (bone-marrow) cultures",
 - Medical School of Dimocriton University, Dept. of Internal Medicine, Alexandroupolis, Greece, April 15, 1991.
 - Eidgenoessische Technische Hochschule (Technisch-Chemisches Laborat.), Zuerich, Switzerland, April, 23, 1991.
- " Long-term Hematopoietic Cell Culture: Improvements from Better Defined and Controlled Hormonal and Nutritional Conditions",
 - Shriners Hospital/Burns Institute/Harvard Med. School, Boston, MA, December 4, 1991.
- "Cell Injury in Agitated and Aerated Bioreactors and How to Minimize It",
 - 2nd US/KOREA Joint Seminar in Bioprocess Technology, Seoul, Korea, December 12-17, 1991.
- "Physical and Physiological Aspects of Fluid-mechanical Injury of Freely-suspended Animal Cells in Bioreactors",
 - Yale University, Chem. Eng. Dept., New Haven, CT, October 24, 1991.
 - Genzyme, Inc., Framingham, MA, October 25, 1991.
 - University of Patras, Greece, Chem. Eng. Dept., March 23, 1992.
 - University of Wisconsin, Chem. Eng. Dept., Madison, WI, February 12, 1992.
 - University of Rochester, Chem. Eng. Dept., Rochester, NY, February 19, 1992.
 - Texas A&M University, Chem. Eng. Dept., College Station, TX, February 28, 1992.
 - Merck Sharp & Dohme Research Laboratories, Rahway, NJ, May 8, 1992.
 - University of Texas, Chem. Eng. Dept., Austin, TX, Nov. 17, 1992.
- "Efficient Transformation of and Expression of Autologous Primary Metabolic Genes in *Clostridium acetobutylicum* ATCC 824",
 - Clostridium II Symposium, Blacksburg, VA, Aug. 13, 14, 1992.
- "Animal-cell Culture Biotechnology",
 - 6th International Pharmaceutical Technology Symposium, Ankara, Turkey, Sept. 7-10. 1992.
- "Genetic & Metabolic Engineering of *Clostridium acetobutylicum*",
 - NIH Conference: Research opportunities in biomolecular engineering, Washington, DC, December 7, 8, 1992.
- "Metabolic Engineering of *Clostridium acetobutylicum*",
 - Univ. of Michigan, Chem. Eng. Dept., Ann Arbor, MI, March 18, 1993.
 - Univ. of Iowa, Chem. Eng. Dept., Iowa City, IA, April 8, 1993.
 - Institutes Nationale des Sciences Appliquees, Dep. de Genie Biochimique et Alimentaire, Toulouse, France, June 11, 1993.
 - Argonne National Laboratory, Argonne, IL, May 3, 1994.
- "Ex Vivo Expansion Under Perfusion Conditions of Primitive Hematopoietic Cells for Transplantation Therapies",
 - John Hopkins University, Chem. Eng. Dept., Baltimore, MD, November 18, 1993.
 - Univ. of California, Chem. Eng. Dept., Berkeley, CA, February 7, 1994.
- "Ex Vivo Expansion of Primitive Human Hematopoietic Cells Under Perfusion Conditions",
 - Keystone Symposium Tissue Engineering, Taos, NM, February 20-26, 1994.

- "Ex Vivo Expansion of Bone-marrow and Other Primitive Hematopoietic Cells for Transplantation and Other Cell Therapies",
 - Amer. Soc. Artif. Internal Organs, 40th Anniversary Mtng., San Francisco, CA, April 14-16, 1994.
 - Abbott Laboratories, North Chicago, IL, July 14, 1994.
- "Genetic Pathway Engineering of the Complex Primary Metabolism of *Clostridium acetobutylicum*",
 - 7th International Symposium on the Genetics of Industrial Microorganisms, Montreal, Canada, June 26-July 1, 1994.
- "Ex Vivo Expansion of Primitive Hematopoietic Cells Under Perfusion Conditions for Cellular Therapies",
 - ESACT/JAACT Meeting 1994, Veldhoven, The Netherlands, September 12-16, 1994.
- "Ex Vivo Expansion of Primitive Hematopoietic Cells under Perfusion Conditions for Transplantation Therapies",
 - 44th Canadian Chemical Engineering Conference, Calgary, Canada, October 2-5, 1994 (**Keynote Lecture**)
 - University of Tulsa, Chem. Eng. Dept., Tulsa, OK, March 24, 1995
- "Agitation, Aeration and Cell Injury in Free-suspension Animal-cell Bioreactors",
 - 8th annual meeting of the Japanese Association for Animal Cell Technology (JAACT'95), Iizuka, Japan, November 6-10, 1995.
 - Bayer (USA) Biotechnology Corp., Berkeley, CA, March 20, 1996.
- "Ex Vivo Expansion of Primitive Hematopoietic (blood-making) cells for somatic cell therapies",
 - Ohio State University, Chem. Eng. Dept., Columbus, OH, April 17, 1996
- "Cell Culture Technologies to Produce Cells for Transfusion Therapies",
 - 5th World Congress of Chemical Engineering, San Diego, CA, July 14-18, 1996
- "Cell Culture for Tissue Engineering and Somatic Cell Therapies",
 - 10th International Biotechnology Symposium, Sydney, Australia, August 25-30, 1996
- "Agitation, Aeration and Cell Injury in Free-suspension Animal-cell Bioreactors",
 - Dept. of Chem. Engineering, Univ. of Queensland, Brisbane, Australia, September 6, 1996
- "The Genetics of Strain Degeneration and Solvent Formation in *Clostridium acetobutylicum*",
 - **The FPBD Award Symposium**, 1996 AIChE Meeting, November 10-15, 1996, Chicago, IL.
- "Cell Culture for Cell and Gene Therapies: New Opportunities for Bioengineering",
 - Chemical Engineering Dept., Iowa State University, Ames, IA, October 2, 1997.
- "Cell Culture for Cell and Gene Therapies: New Opportunities in Biochemical Engineering",
 - The 1997 Bayer Biochemical Engineering Lecture, Univ. of California at Berkeley, Chemical Engineering Dept., October 8, 1997.
- "Stoichiometric Modeling of *Clostridium acetobutylicum* Fermentations with Nonlinear Constraints: An important Metabolic Engineering Tool",
 - 3rd (Federal) Interagency Workshop on Metabolic Engineering, Gaithersburg, MD, April 20, 1998.
- "Cell Culture is Crucial for the Success of Cell and Gene Therapies",
 - The 1998 Marvin Johnson Award Lecture, 1998 National Meeting of the American Chemical Society, Boston, MA, August 26, 1998.
- "O₂ and Its Transport in Hematopoietic Life and Death",
 - Chemical Engineering Dept., Univ. of Illinois, Urbana, IL, November 10, 1998.
- "Master Switches, Antisense RNA, and *Clostridium acetobutylicum* Fermentations",
 - Metabolic Engineering II (Engineering Foundation Conference), Elmau, Germany, October 25-30, 1998.
- "Cell Culture is Crucial for the Success of Cell and Gene Therapies",
 - Lederle-Praxis Biologicals, Sanford, NC, December 1, 1998.
- "Cell Culture is Crucial for the Success of Cell and Gene Therapies",
 - Osiris, Inc., Baltimore, MD, December 10, 1998.
- "Oxygen and its Transport in Hematopoietic Life and Death",
 - Engineering Foundation Conference: Biochemical Engineering XI, Salt Lake City, UT, July 25-30, 1999.

"Metabolic Engineering of *Clostridium acetobutylicum*",
 - 50th Anniversary Meeting of SIM (Society for Industrial Microbiology" Arlington, VA, August 1-5, 1999.

"The Genetics, Physiology, Metabolic Engineering and Biotransformation Potential of the Anaerobic Solventogenic Clostridia",
 - Merck Research Laboratories, Rahway, NJ, October 14, 1999.

"O₂ and Its Transport in Hematopoietic Life and Death",
 - Merck Research Laboratories, West Point, PA, October 15, 1999.

"A Brief (and Biased) History of Fluid-mechanical "Injury" of Animal Cells in Bioreactors",
 - School of Chemical Engineering, Cornell University, Ithaca, NY, October 25, 1999.

"O₂ and Its Transport in Hematopoietic Life and Death",
 - Dept. of Chemical Engineering, University of Cincinnati, Cincinnati, OH, June 1, 2000.

"Metabolic Engineering of Solvent Production", **Keynote Lecture**
 - 15th Australasia Biotechnology Conference (ABA 2000), Brisbane, Australia, July 2-6, 2000.

"Haematopoietic Tissue Engineering", **Keynote Lecture**
 - 15th Australasia Biotechnology Conference (ABA 2000), Brisbane, Australia, July 2-6, 2000.

"Haematopoietic and T-cell Therapies", **Keynote Lecture**
 - BioFutures Conference, University of Queensland, Brisbane, Australia, July 5, 2000.

"Ex Vivo Expansion of Hematopoietic Cells for Cellular and Gene Therapies" **Keynote Lecture**
 - The World Congress on Biotechnology (Biotechnology 2000), Berlin, Germany, September 3-8, 2000.

"O₂ and Its Transport in Hematopoietic Life and Death",
 - Dept. of Chemical Engineering, University of Wisconsin, Madison, WI, October 10, 2000.

"Master Switches, Antisense RNA and Metabolic Engineering of *Clostridium acetobutylicum*",
 - Colloquia of Microbiology, University of Chile and Catholic University, Santiago, Chile, November 2, 2000.

"Cell Culture for Cellular Therapies Based on Hematopoietic Stem, Progenitor and T-cells",
 - Millenium Institute Lecture- 2000, University of Chile, Santiago, Chile, November 3, 2000.

"O₂ and Its Transport in Hematopoietic Life and Death",
 - NIDDK/NIH, Bethesda, MD, March 1, 2001.
 - Dept. of Chemical Engineering, Tufts University, Medford, MA, April 30, 2001.
 - Dept. of Chemical Engineering, UCLA, Los Angeles, CA, May 25, 2001.

"Metabolic Engineering of Solvent Tolerance in Anaerobic Bacteria",
 - Interagency Workshop on Metabolic Engineering, Arlington, VA, June 28, 2001.

"DNA Microarrays and a Systems Approach to Biology: T-cells and Immunotherapy",
 - Dept. of Chemical Engineering, Texas A&M University, College Station, TX, October 19, 2001.

"DNA Arrays, Transcriptome and Pathways",
 - Bioinformatics and Genomics Plenary Session, II. Annual AIChE meeting, Reno, NV, Nov. 4-9, 2001

"DNA Microarrays and a Systems Approach to Biology: T-cells and Immunotherapy",
 - Dept. of Chemical & Biochemical Engineering, University of Maryland Baltimore County, Baltimore, February 5, 2002.
 - Dept. of Chemical Engineering, Johns Hopkins University, Baltimore, April 25, 2002.

"Stem Cells & Bioengineering",
 - Annual Meeting of the Amer. Instit. Medical & Biological Engineering (AIMBE), Washington DC, March 1, 2002.

"DNA Microarrays and a Systems Approach to Biology & Biotechnology",
 - National Center for Food Safety and Technology/IIT, Summit-Argo, IL, March 22, 2002.
 - University of Chicago, Biomedical Seminars, May 21, 2002.
 - Korean Advanced Institute for Science & Technology (KAIST), Taejeon. Korea, July 8, 2002.

"*Clostridium acetobutylicum*: the Old is New",

- 9th International Symposium on the genetics of Industrial microorganisms (GIM), Gyeongju, Korea, July 1-5, 2002.
- "Biochemical Engineering in the Era of Genomics, High Throughput Technologies, and Systems Biology",
 - National meeting of the American Chemical Society, Boston, MA, August 18-22, 2002.
- "High Throughput Analysis of Stem-cell Differentiation and T-cell Expansion" (with H. Haddad, L. T. Huang, H. Yang, and W. M. Miller),
 - Metabolic Engineering IV (Eng. Foundation Conferences), Barga, Italy, October 6-11, 2002.
- "Large Scale Transcriptional Analysis of *Clostridium acetobutylicum* Differentiation and Degeneration",
 - Univ. of Iowa: 11th Annual CBB Conference "Biocatalysis, Evolution and Metabolic Engineering", Iowa City, IA, October 21-23, 2002.
- "A Systems Biology Approach to Hematopoietic Stem-Cell Differentiation" (with L. T. Huang, H. Yang, and W. M. Miller),
 - EMBS/BMES 2002 (IEEE Engineering in Medicine & Biology Society, Biomedical Engineering Society Annual Meeting), Houston, TX, October 23-26, 2002.
- "A Systems Biology Approach to Hematopoietic Differentiation and Proliferation Using DNA Arrays" (with H. Haddad, L. T. Huang, H. Yang, and W. M. Miller),
 - Wilhelm Award Symposium, Annual AIChE Meeting, Indianapolis, IN, November 3-8, 2002.
- "Biochemical Engineering in the Era of Genomics and Systems Biology",
 - University of Colorado, Dept. of Chemical Engineering, Boulder, CO, April 22, 2003
- "DNA Microarrays and a Systems Approach to Biology",
 - Imperial College (University of London), Dept. of Chemical Engineering and Chemical technology & Centre for Process Systems Engineering, London, UK, May 16, 2003.
- "Biochemical Engineering in the Era of Genomics, Systems Biology & Genetic Medicine",
 - University of California, Riverside, Dept. of Chemical & Environmental Engineering, Riverside, CA, June 6, 2003.
- "A Brief History of Fluid-mechanical "Injury" of Animal Cells in Bioreactors (and What Have We Learned from History...)",
 - Cell Genesys Inc., South S. Franscisco, CA, October 7, 2003.
- "DNA Microarrays and a Systems Approach to Biology",
 - Clemson University, Dept. of Chemical Engineering, Clemson, SC, October 16, 2003.
 - Rice University, Dept. of Chemical Engineering, Houston, TX, October 30, 2003.
 - University Of Illinois U-C, Dept. of Bioengineering, Urbana-Champaign, IL, November 6, 2003.
 - Integrated Genomics, Inc. Chicago, IL, January 20, 2004.
- "Genomic-scale Transcriptional Analysis for Deconvoluting Complex Effects in Cultured Primary T Lymphocytes",
 - Biotechnology Research Institute, National Research Council Canada, Montreal, Quebec, Canada, September 9, 2004.
- "Stem Cell Biotechnology. The Hematopoietic Paradigm: Lineage Commitment and Plasticity," **Keynote Lecture**
 - 12th International Biotechnology Symposium, Santiago, Chile, October 17-22, 2004.
- "Experimental and Computational Innovation and Quality Control in DNA-Microarray Analysis", Papoutsakis, E.T., Alsaker, K.V., Paredes, C.J., Fuhrken, P.G., Borden, J.R., AIChE 2004 Annual Meeting, Austin, TX, November 7-12, 2004.
- "Stem Cell Biotechnology: Lineage Commitment and Plasticity",
 - The Pennsylvania State University, Department of Chemical Engineering, University Park, PA, March 23, 2005.
 - National Tsing Hua University, Biological Sciences Division, Hsinchu, Taiwan, April 18, 2005.
- "Genomic-scale Transcriptional Analysis is Essential for Understanding and Improving Ex Vivo Expansion of human T Cells for Immunotherapy",

- National Tsing Hua University, Biological Sciences Division, Hsinchu, Taiwan, April 18, 2005.
- "Biochemical Engineering in the Era of Postgenomics, Genetic Medicine, and Systems Biology",
 - National Tsing Hua University, Department of Chemical Engineering, Hsinchu, Taiwan, April 20, 2005.
- "Stem Cell Biotechnology: Lineage Commitment and Plasticity", **Keynote Lecture**
 - Asia Pacific Biochemical Engineering Conference, Jeju Island, Korea, May 16, 2005.
- "Understanding Butanol and Butyrate Toxicity and Tolerance in Clostridia at the Genomic Scale", Papoutsakis, E.T.,
 - The National Hellenic Research Foundation (E.I.E.), Institute for Bioinformatics, Athens, Greece, July 4, 2005.
- "Complex Phenotypes: A *Partial* Genomic View", **Amgen Award Lecture**,
 - 2005 Biochemical Engineering Conference XIV, Harrison Hot Springs, BC, Canada, July 13, 2005.
- "The transcriptional program of early sporulation and stationary phase events in *Clostridium acetobutylicum*", (with Alsaker, K.V.),
 - AICHE Annual Meeting, Cincinnati, OH, Oct. 30-Nov. 4, 2005.
- "The Global Transcriptional Program of Early Sporulation and Stationary Phase Events in *Clostridium acetobutylicum*",
 - Dupont Company, Wilmington, DE, Dec. 6, 2005.
- "Complex phenotypes in the era of genomics"
 - University of Delaware, Dept. of Chemical Engineering, Febr. 13, 2006.
- "A genomic view of lineage commitment & plasticity of human hematopoietic stem cells"
 - Rutgers University, Dept. of Chemical & Biochemical Engineering, March 8, 2006.
- "Experimental and Computational Innovation and Quality Control in DNA-Microarray Analysis"
 - Princeton University, Dept. of Chemical Engineering, March 15, 2006.
- "At crossroads", **Merck Cell-Culture Engineering Award Lecture**
 - 2006 Cell-Culture Engineering X Conference, Whistler BC, Canada, April 24, 2006.
- "Experimental and Computational Innovation and Quality Control in DNA-Microarray Analysis"
 - Univ. of Massachusetts, Amherst, MA, Dept. of Chemical Engineering, May 11, 2006.
- "Genomic tools in cell-culture and cell-therapy R&D".
 - DECHEMA/VBU Symposium on Animal Cells: Profiling and metabolic Engineering. Tutzing, June 13-15, 2006.
- "Beyond discovery: genomic-scale analyses in bioprocess development & validation and in clinical assessments".
 - Behringer-Ingelheim Pharam GmbH, Biberach, Germany, June 12, 2006.
- "Experimental and Computational Innovation and Quality Control in DNA-Microarray Analysis"
 - Texas Tech University, Lubbock, TX, Dept. of Chemical Engineering, October 20, 2006.
- "A Gene-Ontology driven analysis of complex phenotypes". E. T. Papoutsakis, C. Paredes, K. Alsaker, C. Chen, P. Fuhrken and W. M. Miller.H.
 - Blanch Fest Symposium, Annual Meeting of the AIChE, November 12-17, 2006, S. Francisco, CA.
- "Biochemical Engineering for the 21st Century", **Plenary Presentation**.
 - Fourth UK Biochemical Research Showcase (BERN), January 5, 2007. Birmingham, UK.
- "The growth, differentiation and death of the megakaryocyte."
 - Center for the Study of Systems Biology of Georgia Tech, May 10, 2007, Atlanta, Georgia.
- "Hematopoietic stem cell differentiation in the megakaryocytic compartment: p53 & NF B, stress, apoptosis and platelets," **Plenary Presentation**.
 - Asia Pacific Biochemical Engineering Conference, November 6, 2007. Taipei, Taiwan.
- "The transcriptional programs of clostridial sporulation and metabolite stress response."
 - Department of Chemical & Biomolecular Engineering, Korea Advanced Institute of Science and

- Technology (KAIST). November 9, 2007. Daejeon, Korea.
- "Clostridia and biofuels: potential and limitations,"
- Department of Chemical & Biomolecular Engineering, Korea Advanced Institute of Science and Technology (KAIST). November 9, 2007. Daejeon, Korea.
- "Of Megakaryocytes and Platelets," **R. B. Trull Lectureship.**
- Dept. of Chemical Engineering. February 5, 2008. University of Texas at Austin.
- "Clostridia, biofuels and biorefining: potential and problems." **Plenary Presentation.**
- Marie Curie Conference on Non-Pathogenic Clostridia, February 24 to 27, 2008, Toulouse, France.

CONFERENCE PRESENTATIONS (since 1998)

101. "Ex Vivo Production of Hematopoietic Progenitor and Post-Progenitor Cells for Transplantation Therapies", W.M. Miller (speaker), J.A. Laluppa, T.A. McAdams, P.C. Collins, and E.T. Papoutsakis, Keystone Symposia Conference on Tissue Engineering in Keystone, CO, January 1998.
102. "Real-time Method for Determining the Colony-Forming Cell Content of Human Hematopoietic Cell Cultures", P.C. Collins, C.K. Wong, E.T. Papoutsakis, and W.M. Miller, AIChE National Meeting in Los Angeles, November 1997.
103. "Effects of Dissolved Oxygen on the Ex Vivo Expansion of T-cells", Carswell, K.S. and Papoutsakis, E.T., Engineering Foundation Conference on Cell Culture Engineering VI in San Diego, February 1998.
104. "The Interplay of Agitation Intensity and Media Additives on Receptor Expression", Christi L. McDowell and Papoutsakis, E.T., Engineering Foundation Conference on Cell Culture Engineering VI in San Diego, February 1998.
105. "Ex Vivo Expansion of Peripheral Blood Progenitor Cells Using Daniplestim, Myelopoietin, Progenipoietin, and Promegapoietin", R. Guo, S. Patel, N.I. Minster, C.M. Baum, J.P. McKearn, E.T. Papoutsakis, W.M. Miller, J.N. Winter, International Society for Hematotherapy and Graft Engineering Annual Meeting in Baltimore, June 1998.
106. "Regulation of the *SoI* locus Genes", R. Nair, L. Harris. G. Bennett, E. Green. E. T. Papoutsakis, CLOSTRIDIUM V, Toulouse France, June 25-27, 1998
107. "Stoichiometric Modeling of *Clostridium acetobutylicum* Fermentations with Nonlinear Constraints", Desai, R., Nielsen, L. K., and Papoutsakis, E. T., CLOSTRIDIUM V, Toulouse France, June 25-27, 1998.
108. "Clinical-Scale Expansion of Unselected Peripheral Blood Mononuclear Cells Using a Combination of Synthetic Cytokines and Autologous Plasma", S.D. Patel, R. Guo, E.T. Papoutsakis, J.N. Winter, N.I. Minster, C.M. Baum, J.P. McKearn, and W.M. Miller, abstract 504, American Society of Hematology Annual Meeting in Miami Beach, December 1998.
109. "Culture pO₂ Alters Megakaryocyte Ploidy, Apoptosis, Cell Expansion, and Differentiation in a Physiologically Relevant Way", S.S. Mostafa, E.T. Papoutsakis, and W.M. Miller, abstract 1814, American Society of Hematology Annual Meeting in Miami Beach, December 1998.
110. "Culture pO₂ and pH Modulate Cytokine Receptor Expression, Cell Proliferation, and Differentiation During Ex Vivo Granulocyte-Specific Expansion", D.L. Hevehan, E.T. Papoutsakis, and W.M. Miller, abstract 1815, American Society of Hematology Annual Meeting in Miami Beach, December 1998.
111. "Increased Megakaryocyte Expansion with Promegapoietin-Progenipoietin Combination and High Seeding Density", P. Lefebvre, Y.R Meng, W.M. Miller, A. Rademaker, T. Papoutsakis, N. Minster, C.M. Baum, J.P. McKearn, J.N. Winter, and I. Cohen, abstract 2671, American Society of Hematology Annual Meeting in Miami Beach, December 1998.
112. "Oxygen Effects on the Culture of T Lymphocytes for Cellular Immunotherapy", K. S. Carswell, E. T. Papoutsakis, 217th ACS National Meeting, Anaheim, CA, March 21-25, 1999.
113. "Metabolic Engineering and Gene Regulation in *Clostridium acetobutylicum*", L. M. Harris, R. V. Nair, E. Green, R. Desai, G. N. Bennett & E. T. Papoutsakis, 217th ACS National Meeting, Anaheim, CA, March 21-

- 25, 1999.
114. "Molecular Analysis of the *spo0A* Gene in *Clostridium acetobutylicum*", Progress Towards Decoupling Stationary Phase Phenomena in Solventogenic Bacteria", L. M. Harris, E. T. Papoutsakis, and N. Welker, Engineering Foundation Conference: Biochemical Engineering XI, Salt Lake City, UT, July 25-30, 1999.
 115. "Bone Marrow Architecture Affects Oxygen-Tension Levels and Gradients Experienced by Hematopoietic Cells", D. C. Chow, L. A. Wenning, W. M. Miller and E. T. Papoutsakis", Engineering Foundation Conference: Biochemical Engineering XI, Salt Lake City, UT, July 25-30, 1999.
 116. "Is the Success of T-cell Based Immunotherapies Compromised by the Cell Culture Protocols Being Used?", E. T. Papoutsakis & K. S. Carswell, Cell Culture Engineering VII, Santa Fe, NM, February 5-10, 2000.
 117. "Culture pH and pO_2 are potent determinants of granulocyte proliferation and differentiation: experimental evidence and model verification", D. L. Hevehan, L. A. Wenning, E. T. Papoutsakis and W. M. Miller. Cell Culture Engineering VII, Santa Fe, NM, February 5-10, 2000.
 118. "Lactic Acid Inhibition Revisited Through Hematopoietic Cell Cultures", S. D. Patel, E. T. Papoutsakis and W. M. Miller. Cell Culture Engineering VII, Santa Fe, NM, February 5-10, 2000.
 119. "Topologically Significant Effects of Oxygen Tension on Megakaryocytic Differentiation and Maturation", S. S. Mostafa, W. M. Miller and E. T. Papoutsakis. Cell Culture Engineering VII, Santa Fe, NM, February 5-10, 2000.
 120. "Metabolic Engineering of *Clostridium acetobutylicum* ATCC 824", L. M. Harris, N. E. Welker and E. T. Papoutsakis, American Institute of Chemical Engineers Annual Meeting, Los Angeles, CA, November 12-17, 2000.
 121. "The Regulatory Role of *spo0A* in *Clostridium acetobutylicum* ATCC 824 Solvent Production", L. M. Harris, N. E. Welker and E. T. Papoutsakis, United Engineering Foundation - Metabolic Engineering III., Colorado Springs, CO, October 22-27, 2000.
 122. "Molecular Analysis of *spo0A* in *Clostridium acetobutylicum* ATCC 824", L. M. Harris, N. E. Welker and E. T. Papoutsakis, Clostridium 2000 - Sixth International Workshop on Regulation of Metabolism, Genetics and Development of the Solvent- and Acid-Forming Clostridia. Urbana, IL, May 25-27, 2000.
 123. "Fermentation Characterization and Flux Analysis of *Clostridium acetobutylicum* Recombinant Strains with an Inactivated *solR* Gene", L. M. Harris, R. Desai, L. Blank, N. E. Welker and E. T. Papoutsakis, Clostridium 2000 - Sixth International Workshop on Regulation of Metabolism, Genetics and Development of the Solvent- and Acid-Forming Clostridia. Urbana, IL, May 25-27, 2000.
 124. "Metabolic Patterns of Different Myeloid Cell Lineages", Kuang Y., Yang H., Pascoe DE, Liaw G, Wenning L. A, Hevehan DL, Mostafa M, Patel S, Miller WM, Papoutsakis ET. 2000 Spring National Meeting of the Amer. Chemical Society, S. Francisco, CA, March 26-30, 2000.
 125. "Model-Based Estimation of Progenitor Cells with the Aid of Metabolic Activities", H. Yang, E. T. Papoutsakis, and W. M. Miller, 2000 Spring National Meeting of the Amer. Chemical Society, S. Francisco, CA, March 26-30, 2000.
 126. "Clinical Scale Production of Granulocyte Progenitors and Post-progenitors Using Nunc Cell Factories", R. Guo, S. Patel, E.T. Papoutsakis, C. Ghoolsby, M. Paniagua, W.M. Miller, and J.N. Winter, ISHAGE 6th International Meeting, S. Diego, CA, June 15-18, 2000.
 127. "T-cell Expansion for Cellular Immunotherapies: Effects of Oxygen Tension and Autologous Plasma", H. Haddad and E. T. Papoutsakis, Annual Meeting of the Biomedical Engineering Society, Seattle, WA, October 12-14, 2000.
 128. "Advanced Strategies for Metabolic Engineering of Solvent Production", E.T. Papoutsakis, R. Desai, L. Harris, N. E. Welker, Pacifichem 2000 (International Chemical Congress of the Pacific Basin Societies), Honolulu, HI, December 14-19, 2000.
 129. "The Large-scale Transcriptional Program of Ex Vivo Expanded Primary Human T-cells using DNA Microarrays", H. Haddad, H. Yang and E. T. Papoutsakis, Biochemical Engineering XII, Sonoma, CA, June

- 11-15, 2001.
130. "pO₂ Modulates the Expression of Cytokine Receptors, Transcription Factors and Lineage-specific Markers in Cultured Human mMegakaryocytes", Mostafa, S.S., Papoutsakis, E.T., and Miller, W.M., 2001 Spring National Meeting of the Amer. Chemical Society, S. Diego, CA, April 1-5, 2001.
 131. "Effects of Oxygen Tension on the Large-scale Transcriptional Program of Ex Vivo Expanded Human T-cells", H. Haddad and E. T. Papoutsakis, Annual Meeting of the International Society for Hematotherapy and Graft Engineering (ISHAGE), Quebec City, Canada, June 15-18, 2001.
 132. "Large-scale Gene Expression Analysis of Ex Vivo Expanded Human T-cells Using DNA Arrays", 5th Gene Delivery & Cellular Protein Expression Conference, Semmering, Austria, Sept. 9-13, 2001.
 133. "Design of Antisense RNA Constructs for the Metabolic Engineering of *Clostridium acetobutylicum*", S. Tummala, N. E. Welker, and E. T. Papoutsakis, Annual AIChE meeting, Reno, NV, Nov. 4-9, 2001.
 134. "Ex Vivo T-cell Expansion for Cellular Immunotherapies: Impact of Reduced Oxygen Tension on Transcription Using DNA Microarrays", H. Haddad, H. Yang and E. T. Papoutsakis, Annual AIChE meeting, Reno, NV, Nov. 4-9, 2001.
 135. "Effects of Oxygen Tension on Gene Expression Kinetics of Ex Vivo Expanded Human T-cells Using DNA Arrays", H. Haddad, H. Yang, and E.T. Papoutsakis, 43rd Annual Meeting of the American Society of Hematology, Orlando, FL, December 7-11, 2001.
 136. "Surface Modification for Hematopoietic Stem Cell Cultures Mimicking the Stem Cell Niche," D.C. Chow, J.B. Tooredman, E.T. Papoutsakis, and W.M. Miller BMES Annual Conference, Durham, NC, October 2001.
 137. "Gene Cluster Analysis and Regulatory Network Development for Ex Vivo Expanded Human T-cells Using DNA Arrays", H. Yang, H. Haddad, and E. T. Papoutsakis. Pacific Symposium for Biocomputing (PSB), Lihue, Kauaii (HI), January 3-7, 2002.
 138. "Kinetics of Gene Expression in Human T-cells: Effect of Oxygen Tension", H. Haddad, H. Yang, and E. T. Papoutsakis, Cell Culture Engineering VIII (Eng. Foundation Conferences), Snowmass, CO, April 1-6, 2002.
 139. "Metabolic Engineering of the Acetone Formation Pathway of *Clostridium acetobutylicum* using Antisense RNA" S. Tummala, N. Welker and E. T. Papoutsakis National Meeting of the American Chemical Society, Boston, MA, August 18-22, 2002.
 140. "Transcriptional Profile of Solvent Formation and Sporulation in *Clostridium acetobutylicum*", H. P. J. Bonarius, K. Alsaker, W. Hendriksen, L. M. Harris, C. Tomas, H. Yang, and E. T. Papoutsakis, Clostridium VII, Seventh International Workshop on the Regulation of Metabolism, Genetics, and Development of the Solvent- and Acid-forming Clostridia, Rostock-Warnemünde, Germany, September 19 - 22, 2002.
 141. "Proteomic Analysis of Metabolic Changes In Fed-Batch CHO Cell Cultures", D. E. Pascoe, D. Arnott, W. M. Miller, E. T. Papoutsakis, and D. C. Andersen. Metabolic Engineering IV (Eng. Foundation Conferences), Barga, Italy, October 6-11, 2002.
 142. "DNA-array and Western Analysis of GroESL Overexpression to Enhance Solvent Tolerance in *Clostridium acetobutylicum*", C. Tomas, and E. T. Papoutsakis. Metabolic Engineering IV (Eng. Foundation Conferences), Barga, Italy, October 6-11, 2002.
 143. "A Novel Noise Filtering and Normalization Method for Microarray Data Processing", H. Yang, H. Haddad, C. Tomas, K. Alsaker, E.T. Papoutsakis, Annual AIChE Meeting, Indianapolis, IN, November 3-8, 2002.
 144. "Immobilized Stem Cell Factor Prolongs Activation of MAP Kinase Pathway and Enhances Ex Vivo Expansion of Peripheral Blood CD34+ Cells", Chow, D.C., King, J.A., Chenoweth, T.L., Harbers, G.M., Healy, K.E., Papoutsakis, E.T., Miller, W.M. American Society of Hematology Annual Meeting in Philadelphia, December 2002.
 145. "A piecewise subtractive quasi-global normalization and gene identification method gives superior results for DNA-array analysis", He Yang, Hadar Haddad, Christopher Tomas, Keith Alsaker, and E. Terry Papoutsakis.

- Pacific Symposium for Biocomputing (PSB), Lihue, Kauaii (HI), January 3-7, 2003.
146. "DNA-Array-Based Transcriptional Analysis of the *Clostridium acetobutylicum* differentiation and degeneration programs", E.T. Papoutsakis, C.A. Tomas, K.V. Alsaker, H.P.J. Bonarius, W.T. Hendriksen, H. Yang, J.A. Beamish, and C.J. Paredes, 225th ACS National Meeting, New Orleans, LA, March 23-27, 2003.
 147. "DNA-Array and Western Analysis of Stress-Response Protein Overexpression to Enhance Solvent Tolerance in *Clostridium acetobutylicum*" C.A. Tomas and E.T. Papoutsakis, Emerging Technologies, EPA Science Forum, Washington, D.C, May 5-7, 2003.
 148. "DNA-microarray Analysis of Butanol-stressed *Clostridium acetobutylicum* Strains", K. Alsaker and E.T. Papoutsakis, Biochemical Engineering XIII (Eng. Foundation Conferences), Boulder, CO, July 17-23, 2003.
 149. "The Transcriptional Organization of *Clostridium acetobutylicum*", C.J. Paredes, K.V. Alsaker, C.A. Tomas, S.B. Tummala and E.T. Papoutsakis, Biochemical Engineering XIII (Eng. Foundation Conferences), Boulder, CO, July 19-23, 2003.
 150. "Expansion and Transcriptional Analysis of T-lymphocytes for Immunotherapy Protocols", C. Ramsborg, D. Windgassen, J. Fallon, C. Paredes and E.T. Papoutsakis, Biochemical Engineering XIII, Boulder, CO, July 19-23, 2003.
 151. "DNA-Microarray Analysis of the Role of spo0A on Cellular Transcription in *Clostridium acetobutylicum* ATCC 824", K. Alsaker, T. Spitzer, and E.T. Papoutsakis, Annual AIChE Meeting, San Francisco, CA, November 16-21, 2003.
 152. "Transcriptional Unit Annotation And Use Of Prokaryotic Genomes", C.J. Paredes, K.V. Alsaker, C.A. Tomas, S.B. Tummala and E.T. Papoutsakis, AIChE 2003 Annual Meeting, San Francisco, CA, November 16-21, 2003
 153. "Optimization and Transcriptional Analysis of T-lymphocyte Expansion", D. Windgassen, C.G. Ramsborg, J. Fallon, C.J. Paredes, and E.T. Papoutsakis, AIChE 2003 Annual Meeting, San Francisco, CA, November 16-21, 2003.
 154. "DNA-Array Based Transcriptional Analysis of Cell Culture Parameters on Ex Vivo Expanded T-cells", C. Ramsborg, D. Windgassen, J. Fallon, C. Paredes and E.T. Papoutsakis, American Society of Hematology, San Diego, CA, December 6-9, 2003.
 155. "Microarray-based Analysis of the Stress Response in *Clostridium acetobutylicum* Cultures", K. Alsaker and E.T. Papoutsakis, Spring National 2004 American Chemical Society Meeting (Biochemical Technology Division), Anaheim, CA, March 28- April 1, 2004.
 156. "Common transcriptional motifs between *Bacillus subtilis* and *Clostridium acetobutylicum*", Paredes, C.J., E.T. Papoutsakis. Metabolic Engineering V, Lake Tahoe, CA, September 19-23, 2004.
 157. "Recombinant *Clostridium acetobutylicum* strains with complex phenotype characteristics", R. Sillers, E.T. Papoutsakis. Metabolic Engineering V, Lake Tahoe, CA, September 19-23, 2004.
 158. "Experimental and Computational Innovation and Quality Control in DNA-Microarray Analysis", Papoutsakis, E.T., Alsaker, K.V., Paredes, C.J., Fuhrken, P.G., Borden, J.R., AIChE 2004 Annual Meeting, Austin, TX, November 7-12, 2004.
 159. "Maturation and Death in Terminal Megakaryocytic Differentiation: Phenotypic and DNA Microarray Characterization", Fuhrken, P.G., Chen, C., Giammona, L., Miller, W.M., and Papoutsakis, E.T., AIChE 2004 Annual Meeting, Austin, TX, November 7-12, 2004.
 160. "Understanding Butanol and Butyrate Toxicity and Tolerance in Clostridia at the Genomic Scale", Papoutsakis, E.T., Alsaker, K.V., Borden, J.R. 229th ACS National Meeting, San Diego, CA, March 13-17, 2005.
 161. "Common transcriptional motifs between *Bacillus subtilis* and *Clostridium acetobutylicum*", Paredes, C.J.,

- E.T. Papoutsakis. Metabolic Engineering V, Lake Tahoe, CA, September 19-23, 2004.
162. "Recombinant *Clostridium acetobutylicum* strains with complex phenotypic characteristics", R. Sillers, E.T. Papoutsakis. Metabolic Engineering V, Lake Tahoe, CA, September 19-23, 2004.
 163. "Genomic View of Differentiation and Lineage Plasticity of Human Hematopoietic Stem Cells", Papoutsakis, E.T., Metabolic Engineering V, Lake Tahoe, CA, September 19-23, 2004.
 164. "Maturation and Death in Terminal Megakaryocytic Differentiation: Phenotypic and DNA Microarray Characterization", Fuhrken, P.G., Chen, C., Giammona, L., Miller, W.M., and Papoutsakis, E.T., AIChE 2004 Annual Meeting, Austin, TX, November 7-12, 2004.
 165. "Multilevel Metabolic Engineering Strategies to Improve the Yield and Selectivity of Butanol Production from *Clostridium acetobutylicum*", Sillers, R. and Papoutsakis, E.T., AIChE 2004 Annual Meeting, Austin, TX, November 7-12, 2004.
 166. "Lineage Plasticity and Determinism in Ex Vivo Differentiation of Hematopoietic Stem Cells Examined by Large-scale Transcriptional Analysis", Huang, L.T., Chen, C., Miller, W.M., and Papoutsakis, E.T., AIChE 2004 Annual Meeting, Austin, TX, November 7-12, 2004.
 167. "DNA-array Based Transcriptional Analysis Elucidates Granulocytic Differentiation of Human Stem Cells", Huang, L.T., Miller, W.M., Papoutsakis, E.T., AIChE 2004 Annual Meeting, Austin, TX, November 7-12, 2004.
 168. "Optimization and Use of DNA-Array Analysis to Elucidate Cellular Stress Response from Toxic Primary Metabolites in *Clostridium acetobutylicum*", Alsaker, K.V., Paredes, C.J., and Papoutsakis, E.T., AIChE 2004 Annual Meeting, Austin, TX, November 7-12, 2004.
 169. "Understanding Butanol and Butyrate Toxicity and Tolerance in Clostridia at the Genomic Scale", Papoutsakis, E.T., Alsaker, K.V., Borden, J.R. 229th ACS National Meeting, San Diego, CA, March 13-17, 2005.
 170. "The large-scale transcriptional program in human megakaryocytic differentiation", Fuhrken, P.G., Chen, C., Miller, W.M., and Papoutsakis, E.T., 2005 Biochemical Engineering Conference XIV, Harrison Hot Springs, BC, Canada, July 10-14, 2005.
 171. "Diffusion, Mixing, and Associated Dye Effects in DNA-Microarray Hybridizations", Borden, J.R., Paredes, C.J., Papoutsakis, E.T., 2005 Biochemical Engineering Conference XIV, Harrison Hot Springs, BC, Canada, July 10-14, 2005.
 172. "Genome-wide screening for solvent tolerance genes in *Clostridium acetobutylicum*", Borden, J.R., Papoutsakis, E.T., AIChE Annual Meeting, Cincinnati, OH, Oct. 30-Nov. 4, 2005.
 173. "Apoptotic signaling pathways in megakaryocytes", Giammona, L.M., Miller, W.M., Papoutsakis, E.T., AIChE Annual Meeting, Cincinnati, OH, Oct. 30-Nov. 4, 2005.
 174. "Leveraging large-scale transcriptional analysis in cell culture engineering", Fuhrken, P.G., Miller, W.M., Papoutsakis, E.T., AIChE Annual Meeting, Cincinnati, OH, Oct. 30-Nov. 4, 2005.
 175. "Megakaryocyte development illuminated by transcriptional analysis", Fuhrken, P.G., Chen, C., Miller, W.M., Papoutsakis, E.T., AIChE Annual Meeting, Cincinnati, OH, Oct. 30-Nov. 4, 2005.
 176. "Regulon prediction and coregulation patterns in *Clostridium acetobutylicum*", Paredes, C.J., Alsaker, K.V., Papoutsakis, E.T., AIChE Annual Meeting, Cincinnati, OH, Oct. 30-Nov. 4, 2005.
 177. "Lineage Switching of Hematopoietic Cells In Response to Changes in Culture Conditions", Huang, L.T., Chen, C., Miller, W.M., Papoutsakis, E.T., AIChE Annual Meeting, Cincinnati, OH, Oct. 30-Nov. 4, 2005.
 178. "Sporulation regulons and their prediction in clostridia", Paredes, C.J., Alsaker, K.V., Papoutsakis, E.T., AIChE Annual Meeting, Cincinnati, OH, Oct. 30-Nov. 4, 2005.
 179. "Coregulation patterns in *Clostridium acetobutylicum*", Paredes, C.J., Alsaker, K.V., Papoutsakis, E.T., AIChE Annual Meeting, Cincinnati, OH, Oct. 30-Nov. 4, 2005.
 180. "Development of a Mathematical Model for a 3-D Perfused Bone Marrow Culture System", Collins, P.C., Miller, W.M., Papoutsakis, E.T., AIChE Annual Meeting, Cincinnati, OH, Oct. 30-Nov. 4, 2005.
 181. Regulation of Human Hematopoietic Progenitor Cell Differentiation in Culture. William M. Miller, Li Ting

- Huang, Peter G. Fuhrken, Lisa M. Giammona, Chi Chen, and E. Terry Papoutsakis. Cell Culture Engineering X. Whistler, BC, Canada. April 27, 2006.
182. Nicotinamide Increases the Productivity of Ex Vivo Megakaryocytic Cultures. Lisa M. Giammona, E. Terry Papoutsakis, William M. Miller. (poster number 137). Cell Culture Engineering X. Whistler, BC, Canada. April 23-28, 2006.
 184. Exploring Global Transcriptional Responses to Ex Vivo Megakaryocyte Culture Conditions. Peter G. Fuhrken, Lisa Giammona, William M. Miller, and E. Terry Papoutsakis. (poster number 144). Cell Culture Engineering X. Whistler, BC, Canada. April 23-28, 2006.
 185. Signaling pathways affecting sporulation and stationary phase phenomena in *Clostridium acetobutylicum*. Ryan Sillers, Mohab Al-Hinai, Carlos J. Paredes, and E. Terry Papoutsakis. The Ninth International Workshop on the Regulation of Metabolism, Genetics, and Development of the solvent- and acid- forming Clostridia. Rice University's Clostridium IX meeting. Houston, Texas, USA. May 18-21, 2006.
 186. Detecting the Genetic Basis of / *Clostridium acetobutylicum*. Jacob R. Borden and E. Terry Papoutsakis. The Ninth International Workshop on the Regulation of Metabolism, Genetics, and Development of the solvent- and acid- forming Clostridia. Rice University's Clostridium IX meeting. Houston, Texas, USA. May 18-21, 2006.
 187. Genome-scale transcriptional analysis in *Clostridium acetobutylicum*. Eleftherios T. Papoutsakis. The Ninth International Workshop on the Regulation of Metabolism, Genetics, and Development of the solvent- and acid- forming Clostridia. Rice University's Clostridium IX meeting. Houston, Texas, USA. May 18-21, 2006.
 188. Evidence for transdifferentiation potential of committed hematopoietic cells. Papoutsakis E.T. (Presenter), Huang L.T., Chen C., Apostolidis P.A. and Miller W.M. American Chemical Society National Meeting, San Francisco, CA, September 2006.
 189. Nicotinamide enhances megakaryocyte differentiation from hematopoietic stem cells. Giammona L.M. (Presenter), Fuhrken P.G., Papoutsakis E.T. and Miller W.M. BMES Annual Meeting, Chicago, IL, October, 2006.
 190. Apoptosis in megakaryocyte-directed differentiation of hematopoietic stem cells. Fuhrken P.G. (Presenter), Chen C., Miller W.M. and Papoutsakis E.T. BMES Annual Meeting, Chicago, IL, October, 2006.
 191. A Gene-Ontology Driven Analysis of Complex Phenotypes. Eleftherios T. Papoutsakis (Presenter), Carlos J. Paredes, Keith V. Alsaker, Chi Chen, Peter G. Fuhrken and William M. Miller. AIChE 2006 Annual Meeting. San Francisco, California, USA. November 2006.
 192. Differentiation and Apoptosis in Megakaryocyte-Directed Hematopoietic Stem Cell Cultures. Fuhrken P.G., Miller W.M. and Papoutsakis E.T. (Presenter) AIChE Annual Meeting, San Francisco, CA, November, 2006.
 193. Genomic-Based Identification of the Sporulation Restoring Gene in Degenerate *Clostridium Acetobutylicum* Strains. Tracy, B.P. (Presenter) and Papoutsakis, E.T. AIChE National Conference. San Francisco, CA November 2006.
 194. Development of High-Throughput Flow-Cytometry Techniques for Prokaryotic Cell Culture Analysis. Tracy, B.P. (Presenter) and Papoutsakis, E.T. Biochemical Engineering XV, Quebec City, Canada, July, 2007.
 195. Transcriptional orchestration and control of clostridial sporulation. Shawn W. Jones (Presenter), Nathan Cheng, Bryan Tracy, Carlos J. Paredes, Ryan Sillers, and Eleftherios T. Papoutsakis. Biochemical Engineering XV, Quebec City, Canada, July, 2007.
 196. Nicotinamide (Vitamin B3) Increases the Ploidy and Proplatelet Production of Human Megakaryocytes: Phenotypic Characterization and Mechanism of Action. Miller W.M. (Presenter), Giammona L.M., Papoutsakis E.T., Engineering Conferences International Conference on Biochemical Engineering 15, Quebec City, Quebec, July, 2007.
 197. P53 tumor suppressor protein affects hematopoietic stem cell differentiation in the megakaryocyte

- compartment. Fuhrken P.G. (Presenter) Apostolidis P.A., Lindsey S., Miller W.M. and Papoutsakis E.T., ACS National Meeting, Boston, MA, August 2007.
198. Role of the p53 tumor suppressor protein on megakaryocytic differentiation. Apostolidis P.A. (Presenter), Fuhrken P.G., Lindsey S., Miller W.M., Papoutsakis E.T., AIChE Annual Meeting. Salt Lake City, UT, November 2007.
199. Development and application of flow-cytometry techniques for Clostridium cell cultures. Tracy, B.P. (Presenter) and Papoutsakis, E.T. Marie Curie Conference on Non-Pathogenic Clostridia. Toulouse, France, February 2008.

CONFERENCES AND SESSIONS CHAIRED; PROFESSIONAL COMMITTEES

1. "Biochemical Reactor Design III: General Aspects," 182nd Annual ACS Meeting, New York, NY. (August 1981). Cosponsored by the IEC and MBT Divisions (Co-chair with H.W. Blanch).
2. "Foundations of Biochemical Engineering: Kinetics and Thermodynamics in Biological Systems," 1982 ACS/IEC Winter Symposium, Boulder, CO, (January 17-20, 1982) (Co-chair with H.W. Blanch and G.N. Stephanopoulos).
3. Organizing Committee: ACS Industrial and Engineering Chemistry Winter Symposia (1980-1982).
4. Vice-Chairman: National Meeting Program Committee of the Division of Industrial and Engineering Chemistry of ACS (1982-85).
5. "Fundamentals of Anaerobic Fermentations", 1984 Annual AIChE Meeting, San Francisco, CA, November 1984.
6. "Kinetics and Reactor Design in Anaerobic and Microaerobic Fermentations", National Meeting of the Amer. Chem. Society, Chicago, IL, Sept. 1985.
7. "Cultivation of Mammalian Cells - A State-of-the Art Review", (2 sessions), National ACS Meeting, Anaheim, CA, Sept. 7-12, 1986.
8. "Shear and Other Hydrodynamic Effects in Animal Cell Culture", (Symposium, 2 Sessions), ACS National Mtg., New Orleans, LA, (Aug.-Sept. 1987).
9. "Regulation of Growth and Product Formation in Microbial Cells", (Symposium, 2 sessions), ACS National Mtg., New Orleans, LA, (Aug.-Sept. 1987).
10. "Symposium on Animal Cell Biotechnology: Engineering", (2 sessions), ACS National Meeting, Toronto, Canada, June 5-11, 1988.
11. "Metabolic Aspects of Animal Cell Culture", Annual AIChE Meeting, Washington, D.C. (Nov. 1988).
12. "Free Forum: New and Creative Research in Chemical Engineering", Annual AIChE Meeting, San Francisco, CA, November 1989.
13. Program Coordinator: Area 15c (Biotechnology) for the 1991 Annual Meeting of the Amer. Inst. of Chem. Engineers, 1991 (23 sessions)
14. "Poster Session" Progress in Recombinant DNA Technology and Applications, Eng. Foundation Conf., Potosi, MO, June 3-8, 1990. (with G. Georgiou)
15. "Crossdisciplinary Research in Biotechnology: Efforts, Problems and Successes", Annual AIChE Meeting, Chicago, IL, November 11-16, 1990.
16. "Free Forum: Unconventional or New Problems and Approaches in Chemical Engineering Research and Education", Annual AIChE Meeting, Chicago, IL, November 11-16, 1990.
17. "Molecular and Cellular Approaches in Bioengineering: Cell Responses to Different Stimuli", Annual AIChE Meeting, Los Angeles, CA, November 17-22, 1991.
18. "Prokaryotic Cellular Processes", Biochemical Engineering VIII Conference, Princeton, NJ, July 11-16, 1993.
19. "Shear and Other Environmental Effects of Cultured Cells and Their Metabolism", Annual Meeting, Amer. Inst. of Chem. Engineers, St. Louis, MO, November 7-12, 1993

20. "Fluid-Mechanical Considerations in Animal Cell Bioreactors: A Progress Report", Cell Culture Engineering IV, San Diego, CA, March 7-12, 1994.
21. Organizing Committee: RecDNA Biotechnology III (Engineering Foundation Conference), Deauville, France, October 16-21, 1994
22. Organizer: CLOSTRIDIUM III (International Workshop), Evanston, IL, June 23-25, 1994
23. Organizing Committee: Cell Culture Engineering V (Engineering Foundation Conference), San Diego, CA, Jan. 28-Feb. 2, 1996.
24. Session Co-Chair: "Tissue Engineering and Somatic Cell Therapies" in Cell Culture Engineering V (Engineering Foundation Conference), San Diego, CA, Jan. 28-Feb. 2, 1996.
25. Advisory Committee: 1996 ESACT (European Society for Animal Cell Technology) Meeting, Portugal, May 1996.
26. Session Co-Chair "Tissue Engineering and Biomedical Devices" in 1996 ESACT (European Society for Animal Cell Technology) Meeting, Portugal, May 1996.
27. Organizing Committee: RecDNA Biotechnology IV/Metabolic Engineering I (Engineering Foundation Conference), Danvers, MA, Oct. 6-11, 1996.
28. Organizing Committee: Biochemical Engineering X (Engineering Foundation Conference), Kananaskis, Alberta, Canada, May 18-23, 1997.
29. Session Co-Chair: "New Technologies for Health-care Products" 1997 ESACT Meeting, Tours, France, Sept. 7-12, 1997.
30. Advisory Committee: Cell Culture Engineering VI (Engineering Foundation Conference), San Diego, CA, Feb. 7-12, 1998.
31. Area Chair: Biotechnology: PAN-AMERICAN WORKSHOP TO PROMOTE COLLABORATION IN CHEMICAL ENGINEERING (NSF sponsored), Rio de Janeiro, Brazil, Aug. 2-5, 1998.
32. Organizing Committee and Session Chair: Engineering Foundation Conference on Metabolic Engineering II in Elmau, Germany, October 1998.
33. Organizing Committee and Session Chair: Engineering Foundation Conference on Biochemical Engineering XI, Salt Lake City, UT, July 25-30, 1999.
34. Advisory Committee and Session Chair: Cell Culture Engineering VII, Santa Fe, NM, Feb. 5-10, 2000.
35. Scientific Program Committee and Session Chair: BIOTECHNOLOGY 2000, THE WORLD CONGRESS ON BIOTECHNOLOGY & the 11th International Biotechnology Symposium, Berlin, Germany, Sept. 2000.
36. "Stem cells & cell-based therapeutics", Annual Meeting of the Amer. Instit. Medical & Biological Engineering (AIMBE), Washington DC, March 1, 2002.
37. "Stem cells & cell therapies (with M. Peshwa), Cell Culture Engineering VIII (Eng. Foundation Conferences), Snowmass, CO, April 1-6, 2002.
38. "Metabolic engineering", 9th International Symposium on the Genetics of Industrial microorganisms (GIM), Gyeongju, Korea, July 1-5, 2002.
39. "Stem Cell Engineering" (with P. Zandstra), EMBS/BMES 2002 (IEEE Engineering in medicine & Biology Society, Biomedical Engineering Society Annual Meeting), Houston, TX, Oct. 23-26, 2002.
40. Advisory & Program Committee: 2003 ESACT (European Society for Animal Cell Technology) Meeting, Granada, Spain, May 2003.
41. Co-Chair: Biochemical Engineering XIII (Engineering Foundation Conference), Boulder, CO, July 19-23, 2003.
42. Scientific Program Committee: Biotechnology 2004, The World Congress on Biotechnology, Santiago, Chile, Oct. 17-22, 2004.
43. Chair Elect and 2006 Conference Programming Chair for Division 15 of the American Institute of Chemical Engineers (AIChE), 2005-2006.
44. Chair: 2006 Merck Cell Culture Engineering Award Committee (2005-2006).

45. Organizing Committee, Cell Culture Engineering X, ECI, Whistler, British Columbia, Canada, April 23-28, 2006.
46. Organizing Committee, Metabolic Engineering VI Conference, ECI, Netherlands, October 2006.
47. Organizing Committee, Biochemical Engineering XV (Engineering Conferences International), Quebec City, CA, July 2007.
48. Scientific Committee & Session Co-Chair. 20th Meeting of ESACT. June 17-20, 2007. Dresden, Germany
49. "Hematopoietic stem cell differentiation in the megakaryocytic compartment: p53 & NFκB, stress, apoptosis and platelets", APBioCheC'07, Nov. 4-7, 2007. Taiwan.

RESEARCH SUPERVISION: TRAINING RECORD

Arranged by category.

Postdoctoral, Research Associates, Visiting Professors

1. Kim O'Connor, (Postdoctoral) 1988-89.
2. Phillippe Soucaille, (Visiting Professor) August 1991- August 1992.
3. Lee Mermelstein, (Postdoctoral), Jan. 1992 - June 1993.
4. Karl Walter, (Postdoctoral), March 1993- May 1994.
5. James Michaels, (Postdoctoral), September 1994 - March 1995.
6. Ramesh Nair, (Postdoctoral), March 1995-96.
7. Lars Nielsen (Postdoctoral; with W.M. Miller), September 1995 - August, 1997.
8. Larissa Wenning (Postdoctoral; NIH NRSA fellow. With W.M. Miller), 1997-1999.
9. Anke Duebeler (Postdoctoral), 1998.
10. Christi McDowell (Postdoctoral), 1998.
11. He (Henry) Yang (Postdoctoral; with W.M. Miller), 1999-2001; (Postdoctoral), January 2002-December 2002.
12. Ruchir Desai (Postdoctoral) 1998- March 2000.
13. Kathleen Carswell (Postdoctoral) November 1999- March 2000.
14. Hendrik Bonarius (Postdoctoral) June 2000- February 2002.
15. Diane L. Hevehan (Postdoctoral; with W.M. Miller), March 2001-December 2001.
16. Carlos Paredes (Postdoctoral), March 2002-2007.
17. Chris Tomas (Postdoctoral): July 2003- February 2004.
18. Ryan Senger (Postdoctoral; NIH NRSA fellow): February 2006- present.
19. Stephan Lindsey (Postdoctoral): January 2007- present.
20. Yili Chen (Postdoctoral): October 2007 – present.

Doctoral and MS Completed

1. Joseph W. Roos, "Investigation of the control of metabolic pathways in *Clostridium acetobutylicum* by the studies of glucose and non-glucose limitation, in vivo enzyme inhibition, and intermediary compound challenges in batch and continuous cultures", M.S. Thesis, Rice Univ. (1984).
2. Thomas A. Keuer, "Isolation, characterization and substrate-transport studies of a new, unique methylotroph", M.S. Thesis, Rice Univ. (1984).
3. Joseph K. McLaughlin, "Gas chromatography and gateway sensors for on-line state estimation of complex fermentations (butanol/acetone fermentation)", M.S. Thesis, Rice Univ. (1984).
4. I-Ming Chu, "Growth dynamics and substrate oxidation and incorporation patterns of *Methylomonas* L3", Ph.D. thesis, Rice Univ. (1985).
5. Anil Diwan, "Transport of methanol and formaldehyde in methylotroph L3 and methylotrophic strain T15",

- Ph.D. thesis, Rice Univ. (1985).
6. Christopher M. Bussineau, "Regulation of substrate-metabolism pathways, its relation to steady-state enzyme levels, and formaldehyde transport in RuMP-Type methylotrophs L3 and T15", Ph.D. Thesis, Rice Univ. (1987).
 7. Charles L. Meyer, "The effect of bioreactor conditions on ATP supply and demand, electron flow, and product formation in the acetone/butanol fermentation", Ph.D., Rice Univ. (1987).
 8. Robert S. Cherry, "Hydrodynamic mechanisms of cell damage in microcarrier bioreactors", Ph.D., Rice Univ. (1987).
 9. Dennis P. Wiesenborn, "Thiolase, phosphotransbutyrylase, and CoA transferase and their role in related formation in *Clostridium acetobutylicum* ATCC 824", Ph.D. Thesis, Rice Univ. (1988).
 10. Michael H.W. Huesemann, "Levels of key enzymes and physiological factors involved in product formation in batch and continuous cultures of *Clostridium acetobutylicum* ATCC 824", Ph.D, Rice Univ. (1989).
 11. Jon F. Petersen, "Shear stress effects on cultured hybridoma cells in a rotational Couette viscometer", Ph.D, Rice Univ., 1989.
 12. Kurt T. Kunas, "Growth and injury of freely suspended animal cells in an agitated and surface-aerated bioreactor", Ph.D, Rice University, 1990.
 13. Sanjay Lakhota, "Effect of viscosity on cell injury in microcarrier bioreactors", M.S., Northwestern Univ, 1990
 14. Michael C. Borys, "Factors affecting recombinant protein production by CHO cells in microcarrier bioreactors", M.S., Northwestern Univ., 1990.
 15. Sang Yup Lee, Ph.D., "Construction of *Escherichia coli*-*Clostridium acetobutylicum* vectors and transformation and characterization of *Clostridium acetobutylicum* strains using these vectors", December 1991.
 16. Lee Mermelstein, Ph.D., "Development and use of tools for the genetic analysis and metabolic engineering of *Clostridium acetobutylicum* ATCC 824", June 1992.
 17. Sanjay Lakhota, Ph.D., "A flow cytometric evaluation of hydrodynamic damage in animal cell bioreactors", July 1992.
 18. Manfred R. Koller, Ph.D., "Development of a perfusion bioreactor system for the expansion of primitive human hematopoietic progenitor cells", July 1992 (with W.M. Miller).
 19. Karl A. Walter, Ph.D., "Molecular characterization of *Clostridium acetobutylicum* genes involved in butanol and butyrate formation", June 1993.
 20. Michael C. Borys, Ph.D. "Effect of extracellular pH, ammonia, and cell aggregation on the specific expression rate and N-linked glycosylation of recombinant mouse-placental lactogen proteins by Chinese hamster ovary (CHO) Cells", July 1993.
 21. Jennifer Tubridy, M. S. "Substrates for improved hematopoietic cultures", June 1993 (with W.M. Miller).
 22. James Michaels, Ph.D. "Agitation and aeration damage and protective additives in freely-suspended animal-cell bioreactors", Northwestern University, August 1994.
 23. R. Nair, Ph. D., "Molecular characterization and regulation of a multifunctional aldehyde/alcohol dehydrogenase gene and its use for metabolic engineering of *Clostridium acetobutylicum* ATCC 824", March 1995
 24. C. E. Sandstrom, Ph. D., "Ex vivo expansion of human hematopoietic cells using better defined culture conditions", April 1995 (with W.M. Miller).
 25. Jennifer A. Laluppa, Ph.D., "Defined culture conditions for ex vivo expansion of megakaryocytes and myeloid progenitors", June 1996 (with W.M. Miller)
 26. Lourdes Bermejo, MS, "Heterologous expression of *Clostridium acetobutylicum* genes in *Escherichia coli* for acetone production, March 1996 (with N. E. Welker).
 27. Christi McDowell, PhD, "The effects of agitation rate, serum concentration and external pH on receptor content and mRNA levels of HL60 cell cultured in a stirred tank reactor", July 1997.
 28. Todd McAdams, PhD, "The characterization of extracellular pH and medium osmolality as important

- parameters in the culture of human hematopoietic cells", July 1997.
29. Paul Collins, PhD, "Development of a stirred culture system for the expansion and characterization of human hematopoietic cells", July 1997.
 30. Marc Horner, MS, "Transport in a grooved perfusion flat-bed bioreactor for cell therapy applications", June 1998.
 31. Latonia Harris, MS, "Fermentation characterization of *Clostridium acetobutylicum* ATCC 824 recombinant strains", December 1997.
 32. Ruchir Desai, PhD, "Development of metabolic flux analysis and antisense RNA technologies as tools for the metabolic engineering of *Clostridium acetobutylicum* ATCC 824", December 1998.
 33. Kathleen Carswell, PhD, "Optimization of culture conditions for the Ex vivo expansion of T-cells: Oxygen tension, agitation, and pH". December 1999.
 34. Dominic Chow, MS, "Modeling oxygen distribution in the hematopoietic compartment of bone marrow", December 1999 (with W.M. Miller).
 35. Sanjay Patel, PhD, "Scale-up and optimization of hematopoietic cell cultures for clinical applications", June 2000 (with W.M. Miller).
 36. Sigma Mostafa, PhD, "Effects of culture oxygen tension on human megakaryocytes: a phenomenological and mechanistic study", December 2000 (with W.M. Miller).
 37. Latonia M. Harris, PhD, "Cloning and characterization of the *Clostridium acetobutylicum* ATCC 824 gene encoding the SpoOA transcription regulator and its role in controlling solvent formation and sporulation-specific gene expression", DATE
 38. Yu Kuang, MS, "Characterization of metabolic patterns of granulocytic, monocytic, erythrocytic, and megakaryocytic Ex vivo expansion cultures", June 2001 (with W.M. Miller)
 39. Diane Hevehan, PhD, "Regulation of ex vivo granulocytic kinetics by oxygen tension, pH and interleukin 3: experimental and model analysis", June 2001 (with W.M. Miller).
 40. Hadar Haddad, PhD, "T-cell expansion for cellular immunotherapy: effects of reduced oxygen tension on cell growth, phenotypic markers, and gene expression kinetics", December 2002.
 41. Seshu Tumala, PhD, "AsRNA & metabolic engineering of clostridia", June 2003.
 42. Dominic Chow, PhD, "Hematopoietic-cell culture engineering using biomimetic supports", June 2003 (with W.M. Miller).
 43. Chris Tomas, PhD, "Clostridia genetics and metabolic engineering using the cellular stress response", June 2003.
 44. Dirk Windgassen, PhD, "Transcriptional program of CD4+ and CD8+ T-cells", December of 2005.
 45. Deborah Pascoe, PhD, "Cell culture engineering based on proteome analysis" 2005 (with W.M. Miller).
 46. Chris Ramsborg, PhD, "Transcriptional analysis of the effects of oxygen tension, serum, and IL-15 on ex vivo T-lymphocyte culture", June of 2005.
 47. Keith Alsaker, PhD, Genomic-scale transcriptional analysis of clostridia sporulation and stress response, December of 2005.
 48. Li Ting Huang, PhD, Transcriptional analysis of ex vivo granulocyte (neutrophil) development. December of 2006 (with W.M. Miller).
 49. Chi Chen, PhD, Megakaryocytic transcriptional program and developmental plasticity. December of 2006 (with W.M. Miller).
 50. Peter Fuhken, PhD, Genome-Scale Transcriptional Analysis of Megakaryocytic Cell Cultures Reveals Insights into Lineage-Specific Differentiation. December of 2007 (with W.M. Miller).
 51. Lisa Giammona, PhD, Nicotinamide Enhances Primary Human Megakaryocytic Differentiation from Hematopoietic Stem Cells: Phenotype Characterization and Mechanism of Action. December of 2007 (with W.M. Miller).
 52. Jacob Borden, PhD, Generation and Elucidation of Complex Bacterial Phenotypes Using High-Throughput

Genomic Techniques. 2007.

53. Nathan Cheng, MS, The Transcriptional Program of Clostridial Sporulation, June, 2007.

Doctoral in Progress

1. Min Wang, PhD. T-cell differentiation and stress response
2. Ryan Sillers, PhD, Transcriptional analysis of clostridial metabolic engineering
3. Bryan Tracy, PhD, Clostridial genomics
4. Panagiotis Apostolidis, PhD. Stem-cell bioengineering (with W.M. Miller)
5. Swapna Panuganti, PhD. Stem-cell plasticity (with W. M. Miller)
6. Shawn Jones, PhD, Clostridial genomics.
7. Sergios Nicolaou, PhD. Genomic approaches to metabolic engineering in prokaryotes.

Visiting PhD and MS students

1. Dario Sepulveda, PhD, Embryonic stem-cell differentiation (with Juan Asenjo, U. Chile), 2003-2005.
2. Maren Mix, PhD (with Hubert Bahl; U. Rostock, Germany), Genetics of phosphate metabolism in clostridia, 2003.
3. Anne Duchoud, MS, June 2008.

M.S. in Biotechnology Student

1. Mohab Al-Hinai, 2005.
2. Jay Cuenca, 2005.
3. Eugene Soo, 2005.
4. Allison Chow, 2006
5. Brandon Ang, 2006
6. Mohamed Ali, 2006
7. Aaron Kuhl, 2006
8. Nikhil Khicha, 2006
9. Jan Kemper, 2006-07

Undergraduate Research Supervision

1. Clyde A. Kelly, ACS/PRF Student Fellow, Summer 1982.
2. Mark D. Durcan, Spring 1983.
3. Mary L. Brannon, Spring 1984.
4. Bradford T. Bell, Spring 1984.
5. Peter J. Campo, Spring 1984.
6. Paul Nealey, Fall 1984.
7. Todd Griffith, Summer, Fall 1985.
8. Susan Long, Fall 1985.
9. Dan Lasko, Fall 1985.
10. Arlene Yeh, Summer 1985.
11. Tim Werner, Summer 1988, Spring 1990.
12. Mitchell Cahn, June 1988-March 1989.
13. Sarah Chaudhry, March-Dec. 1990.
14. Adam Aylor, Summer 1990.
15. Annie Wong, June-Dec. 1990.
16. Ron Atchley, Spring, Fall 1990; Winter and Spring 1991.

17. Deborah C. Urich, Fall 1990- Spring 1991.
18. Ameet Mallik, Spring 1992- Fall 1993, Spring, Fall 1994.
19. Jason Nowak, Spring, Summer, Fall 1992, Spring 1993.
20. Aloka Lahoti, Summer 1992.
21. Alex Saar, Summer 1993.
22. Daniel Gurovich, Summer 1993, 1993-94, summer 1994, fall 1995.
23. Sema Ariman, 1993-94, summer 1994, 1994-95, summer 1995
24. Thor-Olaf Stöver, October 1994-January 1995.
25. Ryan Carver, 1994-95, summer 1995
26. Steve Kotzbauer, summer, fall 1995, summer 1996
27. Daeryun Park, summer 1995
28. Wen Lu, summer 1995
29. John Macris, summer 1995
30. Nancy Ekdawi, fall 1995, spring 1996
31. Preetham Suresh, Spring 1996 to Winter of 1997
32. Jonathan Weiss, 1997-98.
33. Mark Kiel, 1998-99 (with W.M. Miller).
34. Mark Barney, 1998 (with W.M. Miller).
35. Chintan Sampat, 1998.
36. Brooks Rabideau, 1999.
37. Gerrie Liaw, 1999 (with W.M. Miller).
38. Roshandel Payam (2000-2003).
39. Shinie Shaw, 2000 (with W.M. Miller).
40. Jessica Tooredman, 2000 (with W.M. Miller).
41. Omar A. Jaffer, 2000-02.
42. Ryan Kaliney, 2000-01.
43. Jonathan Dillon, 2001-2003.
44. Jeff Beamish, 2002.
45. Jerry Chen, 2003-2004.
46. Ryan Bruskievicz, 2003-2004.
47. Paul Balash, 2003-2005.
48. Jimmy Johannes, 2003-2004 (with W.M. Miller).
49. David A. Shelley, 2003-2004 (with W.M. Miller).
50. Kinjal Shah, 2004.
51. Majid Bourajerdi, 2004.
52. Michael Weinstock, 2004-06.
53. John Park, 2005-07.
54. Greg Martens, 2006-07.