

Michael Thomas Short, Ph. D.

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PROFESSIONAL PROFILE

Scientific Professional with more than 25 years of experience in the biomedical sciences. Dedicated team player, gifted in developing, implementing, and leading change in the laboratory, on a manufacturing floor, and across the globe to achieve new ways of screening, testing, and elucidating molecular attributes helpful in the discovery processes for research and manufacturing. Wide-ranging experience includes management of research and development towards the manufacture of active pharmaceutical ingredients (including sterile proteins), delivery of analytical testing efficiencies in to laboratories to improve performance and productivity, and global knowledge transfer of technologies to other manufacturing locations. Highly trained in fields of biochemistry, biophysics, immunology, and business management.

PROFESSIONAL EXPERIENCE

HOPE COLLEGE, Holland, Michigan 2007-2009
Highly-regarded four-year, liberal arts, undergraduate college, which is ranked in US New and World Report in 2008 as the leading college for undergraduate research in the sciences

Part-time Instructor, Chemistry 2007-2008
Visiting Assistant Professor, Chemistry 2008-2009
Development and implementation of new laboratory experiments. Application of bio-analytical techniques to cell biology research related to cell growth and regulation pathways. Instruction in general chemistry, general education, and advanced level biochemistry laboratories. Co-authorship of educational and research publications.

PFIZER, INC., Holland, Michigan 1993-2007
\$48 billion pharmaceutical firm that produces globally-recognized medicinal therapeutic agents, e.g., Lipitor[®]

Senior Development Chemist, Quality Control 1993-1994
Manager/Team Leader, Quality Analytical Resources 1994-2007
Development and implementation of new technologies and methods, analytical solutions, and written procedures to support local and global manufacturing of pharmaceutical active ingredients as well as formulated drug products. Managed a team of development professionals that was recognized and respected locally and globally within Pfizer, Inc.

- Introduced and implemented Chromatography Data System (CDS) and Laboratory Information Management System (LIMS) at the Holland, MI manufacturing plant.
- Developed and Implemented Automated Information System solutions that increased QC laboratory efficiency by 45% over a six year period.
- Transferred Quality Operations technologies across the globe, to-and-from internal and external sites (i.e., from within and from outside Pfizer) in Asia, Europe, and North America.

- Co-authored global operating procedure that governed the transfer of analytical methods between different Pfizer sites as well as to contract manufacturers.
- Audited compliance of sites in Ireland and Singapore where technologies were transferred.
- Served as Interim Director of Quality Operations at Holland facility from June 2003 through November 2003. Served on the Holland Executive Leadership team during this time period.

ABBOTT LABORATORIES, North Chicago, Illinois 1983-1993
\$23 billion healthcare firm that develops new medicines, new technologies, and new ways to manage health

Senior Development Chemist, Chemical and Agricultural Products Division

Researched and developed new purification processes for therapeutic agent produced by cell culture procedures. Developed monoclonal antibodies (mAb's) and high-throughput immunoassays for screening and production purposes. Implemented new analytical technologies for routine QC testing of production raw materials. Provided analytical support for product registration of bioinsecticides.

- Immunized, selected, and isolated mAbs for urokinase and erythromycin and used these to develop Enzyme Linked Immunoabsorbent Assays (ELISA) for these biomolecules.
- Developed an HPLC test procedure for urokinase that correlated with the enzyme's activity.
- Developed a high-throughput screening technique for erythromycin that permitted process development to screen 40,000-55,000 samples per year in comparison with that previous procedure that permitted screening of 2,000 isolates per year.
- Developed and/or implemented analytical methods used to support market registrations for the bioinsecticides, Centauri[®], Vectobac[®], and Thuringiensin[®].
- Installed, validated, and implemented amino acid analysis to test amino acids in cell culture media used for production using mammalian cell cultures.

COLUMBIA COLLEGE, Chicago, Illinois 1979-1986
From Colleges website the "largest and most diverse private arts and media college in the nation"

Part-time Instructor, Science Department

Taught courses in the Science Department including Science in the News, The History of Science, and Science on Film. Individually developed the Science in the News Teaching during this period was on an as needed basis and was not continuous during the seven year period.

RUSH MEDICAL COLLEGE, Chicago, Illinois 1978
A premier institution medical instruction and training with more than a 170-year history of medical education for health professionals.

Instructor, Immunology Department

Co-developed and co-taught a special eight-week graduate level course in the immunology and biochemistry of cell membranes with Associate Processor, Dr. Alexander P. Osmand.

EDUCATION AND PROFESSIONAL DEVELOPMENT

Master of Business Administration (with Distinction), Leadership Specialization
Ellis College of New York Institute of Technology, Old Westbury, New York

Post-Doctoral Fellowship, Biophysics
Argonne National Laboratories, Darien, Illinois

Doctor of Philosophy, Biological Chemistry
University of Illinois at the Medical Center, Chicago, Illinois

Graduate Studies in Chemistry
University of British Columbia, Vancouver, British Columbia, CANADA

Bachelor of Arts, Chemistry (with Departmental Honors)
Northwestern University, Evanston, Illinois

PROFESSIONAL ASSOCIATIONS

American Chemical Society – Member since 1990

PUBLICATIONS AND PRESENTATIONS

Short, M.T., Molecular Characterization of C-Reactive Protein, Ph.D. Thesis, University of Illinois at the Medical Center, (1980).

Short, M.T., and Osmand, A.P., Secondary Structural Features of C-Reactive Protein, Abst. XIth Int. Cong. Biochem. (IUB), 523, (1979).

Osmand, A.P. and Short, M.T., Structural Basis for the Functional Homologies Between C-Reactive Protein and Immunoglobulins, Fed. Proc., v.40, 1064, (1981).

Short, M.T., and Osmand, A.P., Luminescence Energy Transfer Studies of C-Reactive Protein. Binding of Terbium (III) Ions in C-Reactive Protein, Immun. Comm., v.12, 291, (1983).

Short, M.T., Eisler, W.J., and Stevens, F.J., Automated Fail-Safe Control for Independent Operation of Two Radiation Shutters on a Rotating Anode X-Ray Source, J. Appl. Crystallog., v. 16, 359, (1983).

Short, M., Hodges, S., and Hirata, A., The Use of Two-Dimensional Gel Electrophoresis in Protein Chemistry: Urokinase, Abbott Laboratories Technology Exchange, internal publication, (1984).

Short, M. T. and Long, M. D., Conversion of 55,000 M.W. Urokinase to 35000 MW Urokinase Following Purification, Abbott Laboratories Technology Exchange, internal publication, (1984).

Sesin, P. G., Short, M. T. and Huther, D. L., Concentration of Urokinase with the Millipore Minitan System, Abbott Laboratories Technology Exchange, internal publication, (1984).

Huther, D. L., Short, M. T., and Long, M. D., A Comparison of Sephadex G-75 and Ultrogel AcA54 Gels for Urokinase Purification, Abbott Laboratories Technology Exchange, internal publication, (1984).

Short, M.T., Westholm, F.A., Schiffer, M., and Stevens, F.J., Comparison of Chromatographic Characteristics of a Series of Homologous Bence-Jones Proteins during Size Exclusion Chromatography by High Performance Liquid Chromatography and by Sephadex, J. Chromatog., v. 323, 418, (1985).

Short, M. T. and Hahn, E., Ultrogel AcA54 Optimization Parameters for Production, Abbott Laboratories Technology Exchange, internal publication, (1985).

Chang, C.-H., Short, M.T., Westholm, F.A., Stevens, F.J., Wang, B.C., Furey, W., and Solomon, A., A Novel Arrangement of Immunoglobulin Variable Domains: X-Ray Crystallography Analysis of the light-Chain Dimer, Bence-Jones Protein, Loc, Biochemistry, (1986).

Cox, R.A., McFarland, K.N., Holt Sackett, P., and Short, M.T., Correlation of Urokinase Activity from Biopotency and High-Performance Liquid Chromatographic Assays, J. Chromatog., v. 370, 495, (1986).

Short, M. T., Bruce, W., Tribby, I. and Long, M. D., Development of a Mab ELISA Assay for S2 (55,000 Dalton) Urokinase, Abbott Laboratories Technology Exchange, internal publication, (1987).

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PUBLICATIONS AND PRESENTATIONS (continued)

Short, M. T., Paulus, T. J., and DeWitt, J. P., Erythromycin Strain Improvement: Analysis of Phosphate Uptake in S. erythreus Strains selected by Altered Phosphate Metabolism, Abbott Laboratories Technology Exchange, internal publication, (1987).

Short, M. T., Novel Isolation of Hemolysin from Bacillus thuringiensis v. israelensis, Abbott Laboratories Technology Exchange, internal publication, (1987).

Short, M. T., Paulus, T. J., Kiyono, P., Luebke, V., Bryce, W., DeWitt, J. and Tribby, I., Assay of Erythromycin and Related Macrolides by TDx Methodologies, Abbott Laboratories Technology Exchange, internal publication, (1989).

Short, M. T., Coddens, M., Grischeau, D., and McFarland, K. N., Analysis of Calcium Exotoxin TGAI for the Presence of Delta-Endotoxin (DET) , Abbott Laboratories Technology Exchange, internal publication, (1989).

Short, M. T., Kowalewicz, A., Stec, R. J., Coddens, M., and McFarland, K. N., Amino Acid Analysis as a Quality Assurance Tool, Abbott Laboratories Technology Exchange, internal publication, (1989).

Short, M.T., Andre, J., McClendon, K, Manning, B., Gernhardt, K., and Coddens, M., GC Analysis of Reaction Waste Stream Solvents Using a Packed Column, Abst. Pittcon '92, 134P, (1992).

Moeller, M., Seymour, M., and Short, M., Analysis of Heavy Metals in Bulk Drug Substance Using Microwave Digestion-Inductively Coupled Plasma (ICP) Emission Spectroscopy, Abst. Pittcon '97, 899, (1997).

Tapler, P., Vogt, C., and Short, M., USP Monograph – Ketamine Hydrochloride, Assay and Chromatographic Purity, USP 25, (2002).

Tapler, P., Vogt, C., and Short, M., USP Monograph – Phenytoin Sodium, Assay and Related Compounds, USP 25, (2002).

Tapler, P., Vogt, C., and Short, M., USP Monograph – Fosphenytoin Sodium, USP 26, (2003).

Tapler, P., Vogt, C., and Short, M., USP Monograph - Quinapril Hydrochloride, USP 28, (2005).

Short, M., Kling, S., Elliott, M., and Vanden Bosch, K., Spero Pharma Business Plan, published to RDV Corporation and Roundtable Healthcare Partners Private Equity Firm, (2006).

Travis, P., Tapler, P., Jeyaraj, G., Shira, B., Warren, W., Cicchetti, C. and Short, M., USP Monograph - Gabapentin, USP 29, (2007).

Buck, M., Nagelkirk, K., Bagley, E., Short, M., and McDonald, R., Aqua Clara Foundation – 2007 Annual Report, (2008).

PUBLICATIONS AND PRESENTATIONS (continued)

Burnatowska-Hledin, M. and Short, M., Biochemistry 315 Laboratory Curriculum and Manual – Hope College, (2008-2009).

Oxendine, J., Clow, B., Short, M., Seymour, M., Hledin, M., Using Fluorescence Polarization to Study the Binding of Vasopressin and a Novel Ligand to VACM-1/Cul5 Protein, West Michigan Regional Undergraduate Science Research Conference, November 2008.

Poel, N., Short, M., Murray, K.G. Identifying Antifungal Toxins in *Phytolacca rivinoides*, a Neotropical Pioneer Plant, West Michigan Regional Undergraduate Science Research Conference, November 2008..