CURRICULUM VITAE

NAME

Hollis D. Showalter

CONTACT INFORMATION

Department of Medicinal Chemistry
College of Pharmacy
428 Church Street
Ann Arbor, MI 48109-1065
Phone: 734-649-5478
showalh@umich.edu

EDUCATION

Rice University, Chemistry Department, NIH Postdoctoral Fellow, 1974-1976
(Professor Ernest Wenkert)
Ohio State University, Department of Natural Products and Medicinal Chemistry, PhD, 1970-1974 (Professor Lester A. Mitscher)
University of Virginia, BA, Chemistry, 1966-1970 (undergraduate research with Professor S. Morris Kupchan)

EXPERIENCE (POSITIONS HELD)

Chemistry Department, Pfizer Global R&D Ann Arbor Laboratories (formerly Parke-Davis)

2001-2005	Director, Antibacterials Chemistry
1998-2001	Director, Chemotherapeutics Chemistry
1994-1998	Research Fellow
1991	Secondment, Parke-Davis Discovery Unit, Freiburg, Germany
1990-1994	Associate Research Fellow
1986-1990	Senior Research Associate
1983-1986	Research Associate
1980-1983	Senior Scientist
1976-1980	Scientist

Academic

2020 –pres	Research Professor Emeritus of Medicinal Chemistry, College of Pharmacy, University of Michigan, Ann Arbor, MI
2006 –2020	Research Professor of Medicinal Chemistry, College of Pharmacy, University of Michigan, Ann Arbor, MI

2012-2016	Co-Director, Vahlteich Medicinal Chemistry Core, University of Michigan, Ann Arbor, MI
2007-2012	Director, Vahlteich Medicinal Chemistry Core, University of Michigan, Ann Arbor, MI
2006	Adjunct Professor, College of Pharmacy, University of Michigan, Ann Arbor, MI
2001-2005	Adjunct Associate Professor, College of Pharmacy, University of Michigan, Ann Arbor, MI
2000-2001	Adjunct Assistant Professor, College of Pharmacy, University of Michigan, Ann Arbor, MI
1994-2006	Adjunct Professor of Graduate Faculty, Chemistry Department, Wayne State University, Detroit, MI

RESEARCH BACKGROUND AND INTERESTS

- Organic and heterocyclic synthesis methodologies
- Synthetic modification of natural products
- Designing in physicochemical properties to high-throughput screen hits that confer "drugability" (e.g., conformity to Lipinski rules, absence of toxicophores)
- Development of structure-activity relationships (SAR) to derive compounds with optimal pharmacokinetic and metabolic profiles toward the initiation of in vivo studies
- Medicinal chemistry of inhibitors of protein kinases, principally PKC, EGFr, PDGFr, FGFr, VEGFr, c-Src, and therapeutic application to proliferative processes (cancer, restenosis, angiogenesis, and inflammatory diseases).
- Medicinal chemistry of inhibitors of deubiquitinases and application to haematologic cancers
- Medicinal chemistry of antibacterial agents; new agents for tuberculosis
- Early stage drug development.

PROFESSIONAL AFFILIATIONS

- Member, University of Michigan Comprehensive Cancer Center (developmental therapeutics research program)
- American Chemical Society, Organic and Medicinal Chemistry Divisions
- International Society of Heterocyclic Chemistry
- American Association for Cancer Research
- American Society of Microbiology
- Michigan Chapter American Society of Microbiology
- American Association for the Advancement of Science

- Century Club Member, American Foundation for Pharmaceutical Education

PROFESSIONAL ACTIVITIES (SINCE 1995)

- Member American Chemical Society Medicinal Chemistry Division Awards Committee (2012-2014)
- Consultant for various pharmaceutical companies, biotechs & law firms (2006-present)
- External Review Committee for NIH Program Project Grant "Chemical Modifiers of Radiation Response Tumors" (PA-97-086), J. Martin Brown, PhD., PI, Stanford University (1999-2001)
- Organizing Committee, First International Conference on Inhibitors of Protein Kinases, Warsaw Poland, 1998
- Chair, Steering Committee for University of Michigan/Parke-Davis Symposium on "Contemporary Challenges in Chemistry" (1996-1998)
- Chair of session on "New Directions in Cancer Chemotherapy", 1996 National Medicinal Chemistry Symposium, Ann Arbor, MI, June 19, 1996
- Ad hoc member of National Institutes of Health Medicinal Chemistry Study Section A, 1995, 1997
- Co-chair of symposium on "Tyrosine Kinase Inhibitors", 209th Meeting of the American Chemical Society, Medicinal Chemistry Division, Anaheim, CA, April 4, 1995

CONTINUING EDUCATION (SINCE 1997)

- Workshop on Faculty Recruitment for Diversity and Excellence. University of Michigan, 2012
- "Career 20/20. Putting Your Future in Focus" Right Management, Southfield, MI, 2005
- "Succeeding Through Diversity", Catalyst Mentoring Program, PGRD, Ann Arbor, 2005
- "Managing for Improved Performance", PGRD, Ann Arbor, 2005
- Am Soc Microbiology "PK/PD Workshop", Washington, DC, 2004
- Pharmacokinetics & Drug Metabolism Short Course, PGRD, Ann Arbor (Ronald Borchardt, Kansas U.); 2002
- QT Interval Workshop, PGRD, Ann Arbor; 2002
- Management III ("Leading the Organization"); University of Michigan Business School; 2001
- Behavioral Interviewing, PGRD, Ann Arbor; 2001
- "Building Effective Teams" (Design Collaborative); PGRD, Ann Arbor; 2001
- ACS Antibacterials Short Course, Washington, DC; 2001
- Drug Metabolism Short Course, PGRD, Ann Arbor (Paul Erhardt, U. Toledo); 2001
- Drug Development Short Course, PGRD, Ann Arbor; 2000
- "The Leadership Engine"; Parke-Davis Pharmaceutical Research; 1999
- Management II ("Management of Managers"); University of Michigan Business School; 1997

AWARDS

1987 Warner-Lambert/Parke-Davis CEO's Distinguished Scientific Award

1983	Huron Valley Section of American Chemical Society Award for Excellence in Industrial Chemical Research
1974-1976	National Institutes of Health Postdoctoral Fellow
1971-1974	American Foundation for Pharmaceutical Education S. B. Penick Memorial Fellow
1966-1970	University of Virginia Undergraduate Fellow

MAJOR UNIVERSITY OF MICHIGAN COMMITTEES

Executive Committee of Vahlteich Medicinal Chemistry Core (2008 –2016)
College of Pharmacy Committee on Diversity, Equity, and Inclusion (2015-2016)
Steering Committee for Center for the Discovery of New Medicines (2012 - 2014)
Executive Committee of Center for Chemical Genomics (2006 –2011)
Internal Advisory Committee of Center for Drug Discovery (2008- 2009)
Upjohn Center for Clinical Pharmacology Review Committee (2008-2009)

UNIVERSITY OF MICHIGAN FUNDING

Completed Funding (2008-present)

1. MICHR/CTSA Shayman (PI) 10/15/07-09/30/08
   "The Design, Synthesis, and Evaluation of Glycosphingolipid Synthase Inhibitors"
   This proposal involved the synthesis of novel homologues of a clinically evaluated class of glucosylceramide synthase inhibitors that were screened against a series of glycosyltransferases in a number of cellular assays.
   Role: Co-investigator

2. Global Alliance for Tuberculosis Garcia (PI) 10/01/08 - 08/30/09
   Structure-Based Directed Synthesis of Novel Rifamycin Analogs of Lowered Clinical Toxicity"
   This proposal resulted in the drafting of a white paper and research plan to derive a full understanding of the basis for human toxicity for a representative selection of clinical rifamycins. This information was used to synthesize a select group of novel, structure-based analogs with excellent potency, lowered cross-resistance, and lowered toxicity relative to current clinical agents.
   Role: Co- investigator

3. UNC Linberger Cancer Center Showalter (PI) 02/01/09-05/09/09
   "Synthesis of CDK4 Inhibitors"
   The study provided medicinal chemistry support for the synthesis of various classes of cyclin-dependent kinase 4 (CDK4) inhibitors.
   Role: Principal investigator

4. MICHR/CTSA Donato (PI) 02/01/09 - 01/31/10
   "New therapeutic target in the ubiquitin cycle of mantle cell lymphoma"

This grant aimed to determine the primary target(s) of a unique inhibitor in MCL by constructing affinity matrices and subsequent analysis of associated proteins through chemical proteomics.
Role: Co-investigator

5. SBIR 1R43DK083074-01A1 Hilfinger (PI) 04/01/09 - 03/31/10
"Blockade of Angiotensin II Signaling for the Treatment of Inflammatory Bowel Disease"
This proposal focused on the development of a prototype drug with a high level of angiotensin II type 1a receptor blockade, but with poor intestinal absorption.
Role: Co- investigator

6. NIH U01 GM086873-01 Carlson (PI) 11/01/08 -10/31/10
"Public/Private Collaboration for High-Quality Protein-Ligand Data"
The overarching theme of this proposal was the design of small molecule libraries against three molecular targets.
Role: Co-investigator

7. MICHR/CTSA Fearon (PI) 4/01/11- 03/31/12
"β-catenin inhibitors"
This study involved the design small molecule inhibitors of β-catenin for therapeutic application to colon cancer.
Role: Co-investigator

8. IN Univ Simon Cancer Center Showalter (PI) 01/01/08-04/01/12
"Synthesis of E3330 and Congeners"
The study provided medicinal chemistry support for the synthesis of E3330 and congeners which target the redox function of the bifunctional protein apurinic endonuclease 1/redox-enhancing factor 1 (Ape1/Ref-1)
Role: Principal investigator

9. University MI Cancer Center Talpaz (PI) 10/01/10-09/30/12
"WP1130 Analogues"
This study resulted in improved analogues of the deubiquitinase inhibitor WP1130 for therapeutic application to cancer.
Role: Co-investigator

10. Leukemia & Lymphoma Soc Amer Donato (PI) 09/01/12-04/30/13
"DUB Inhibitors for Treatment of B-cell Malignancies"
This study resulted in improved analogues of the deubiquitinase inhibitor WP1130 for therapeutic application to cancer.
Role: Co-investigator

11. NIH R01 GM095832-01 Andrews (PI) 04/01/11-03/31/15
"Mass Spectrometry Analysis of Membrane Protein Interactions"
This study provides chemical support in the design and synthesis of novel, water-soluble cross-linking probes to conduct proteomic analysis of peptides.
Role: Co-investigator

12. Eli Lilly Co Showalter (PI) 01/01/14 – 05/01/15
"Bicyclic Pyrimidine EZH2 Inhibitors"
The goal of this project is to develop structure-activity relationships on a lead for EZH2 inhibition.

13. NIH R01 EY023725 Antonetti (PI) 04/01/14 - 03/31/17
"Discovering Novel Atypical PKC Inhibitors as in vivo Chemical Probes"
The goal of this project is to develop compounds that control retinal blood vessel permeability via inhibition of atypical protein kinase C toward developing small molecule therapeutics to treat macular edema.
Role: Co-investigator

14. NIH 1 R01 GM105942-01 Andrews/Ruotolo (PIs) 07/01/13 – 05/31/17
"New Structural Mass Spectrometry Tools Applied to the Mitochondrial Membrane Proteome"
This study supports the synthesis of crosslinkers for a suite of new high throughput MS-based technologies that will provide structure information for previously inaccessible and unknown membrane protein complexes.
Role: Co-investigator

15. NIH R33 AI102106 O'Riorden (PI) 07/15/14 - 07/14/17
"Targeting Host Deubiquitinases for Broad Spectrum Anti-infective Therapy"
This study is determining the target deubiquitinases that mediate infectivity in L. monocytogenes and norvirus, and uses medicinal chemistry to develop small molecule leads into agents that selectivity inhibit these pathogens.
Role: Co-investigator

16. NIH R01 DK100319 Saltiel (PI) 01/01/14 – 12/31/17
"IKKε/TBK1 Inhibitors for the Treatment of Obesity and Type 2 Diabetes"
The objective is to develop new classes of inhibitors that will provide increased potency, improved pharmaceutical properties and in vivo activity for the treatment of obesity and type 2 diabetes.
Role: Co-investigator

17. R01 DA037530 Traynor (PI) 07/01/15-06/30/20
"Allosteric Modulation of the Mu-Opioid Receptor"
The goal of this research is to develop mu-opioid receptor modulators as analgesic adjunct drugs and/or novel analgesics.
Role: Co-Investigator

18. R01 GM095832 Ruotolo (PI) 02/08/16-01/31/20
"Next-generation Mass Spectrometry Technologies for Integrated Structural Proteomics"
The goal of this proposal is to construct new, innovative structural mass spectrometry techniques that will be brought to bear to discover the structures of a series of selected protein complexes, each having a critical link to human disease.
Role: Co-Investigator

19. R01 AI110780 Garcia (PI) 08/01/15-01/31/20
"Novel Structure-Based Rifamycins for Drug-resistant TB and HIV Co-infection"

The goal of this proposal is to produce novel candidates for drug development and ultimately improve treatment for tuberculosis, especially in patients with HIV-TB co-infection and drug-resistant tuberculosis.
Role: Co-Investigator

MAJOR PARKE-DAVIS/PFIZER COMMITTEES

Co-chair, Antibacterials Therapeutic Area CAN Team (2005)
Member, SORT team that reviewed company portfolios for potential licensing opportunities (2005)
Member, PDM-Chemistry Educational Interface Team (2004-2005)
Member, "Discovery Partnership" a strategy team of experts from Chemistry, Discovery Technologies, and Molecular Sciences (2004-2005)
Member, Chemistry/Attorney partnership that designed an educational program on intellectual property matters (2005)
Chair, Pfizer Ann Arbor Chemistry/Safety Sciences Partnership (2004 - 2005)
Co-Chair, Triage Oversight and Strategy Team (2004 – 2005)
Member, Joint Research Committee of Pfizer-Vicuron Collaboration (2003 - 2005)
Member, Pfizer Antibacterials Global Strategy Team (2001- 2005)
Manager, Parke-Davis/Pfizer – Auckland, New Zealand Cancer Research Laboratories Collaboration (1992 – 2004)
Chair, Pfizer Global Medicinal Chemistry Symposium Planning Committee (2001- 2002)
PD 0176067 Development Team (2000-2001)
PD 0205520 Development Team (2000- 2001)
Co-Chair, EGFr Kinase Working Group (1998-2000)
Oncology Coordinating Committee (1998)
Recruitment Coordinator for Chemistry Department Postdoctoral Fellow Program (1996-1997)
Senior Scientist Advisory Committee for Fellows Promotions (1995-1998)
Chair, Kinases Chemistry Working Group (1994-1998)
Chemistry Department Recruitment Committee (1982-1995)
Chair, CI-1010 Lead Compound Task Force (1992-1993)
Chemistry Department Synthetic Roundtable Committee (1990-1991)
Chemistry Department External Awards Nominating Committee (1986-1991)
Amsacrine/Anticancer 2 Development Team (1988-1989)
Chair, Anticancer 2 (CI-935,937,941,942,958) Development Team (1987-1988)
Chair, Topoisomerase II Inhibitors Cancer Chemotherapy Predevelopment Team (1985-1986)
Parke-Davis representative for local ACS ad hoc Committee on Academic-Industrial Relations (1980)
Chemistry Department Seminar Committee (1978-1982; Chair 1980-1982)

ASSOCIATION WITH DRUGS IN DEVELOPMENT

CI-825 (pentostatin; Nipent™). NDA approved in 1991 for treatment of hairy cell leukemia *(developed medium-scale total synthesis; developed recovery process for drug isolated from fermentation & currently utilized in production)*

CI-937 (teloxantrone). Progressed through Phase II studies via external collaboration with National Cancer Institute, Canada. Terminated due to lack of efficacy
(discovery and early stage development)
CI-941 (losoxantrone). Progressed through Phase II studies via external collaboration with Cancer Research Campaign, UK. Later traded to DuPont/Merck for prophenetoin, which became a marketed product. DuPont terminated CI-941 due to lack of efficacy
(discovery and early stage development)
CI-942 (piroxantrone). Progressed through Phase II studies via external collaboration with National Cancer Institute, US. Terminated due to lack of efficacy
(discovery and early stage development)
CI-958 (ledoxantrone) Progressed through Warner-Lambert sponsored Phase II studies. Terminated due to lack of efficacy
(discovery and early stage development)
CI-1010 (dual function nitroimidazole radiation sensitizer). Progressed through early stage preclinical toxicology. Terminated due to ocular toxicity.
(development of scaleable synthesis and early stage development)
PD 0176067 (anticancer FGF inhibitor). Progressed through early stage preclinical toxicology. Terminated due to toxicity.
(discovery and early stage development)
PD 0205520 (anticancer erbB inhibitor). Progressed through early stage preclinical toxicology. Terminated due to toxicity.
(discovery and early stage development)
PF 00708093 (oxazolidinone antibacterial). Preclinical development toward first in humans
(discovery and early stage development)

STUDENTS/POSTDOCTORAL FELLOWS MENTORED

Industry (all postdoctoral fellows)
Li Sun (July 1993 – May 1995)
Terri Boehm (Feb 1995 – July 1996)
Kai Schiemann (April 1997 – Feb 1999)
Lalgudi Harikrishnan (July 1997 – July 1999)
Zhuoyi Su (April 1999-December 2000)

University of Michigan (graduate students unless designated otherwise)
Joseph P. Klesko (summer rotation 2006)
Adaora Nwokoye (winter rotation 2007)
Jacob Houghton (fall rotation 2007)
Leah Makley (fall rotation 2009)
Jason Witek – undergraduate research student; 2008 – 2009.
Billy Clifford-Nunn (co-mentored with Biological Chemistry; Sept 2009 – Sept 2012)
Ian Powelson (co-mentored with Internal Medicine; Jan 2010 – Aug 2010)
Anjanette Koritnik-Turbiak (Jan 2007 – July 2009) – PhD mentor
Allen Brooks (Jan 2007 – Dec 2011) – PhD co-mentor
Alexander Allweil, undergraduate research student; Sept 2012-Aug 2013
Fardokht Abulwerdi (co-mentored with Dept of Pathology; July 2010 – December 2014)
Hao Xu (co-mentored with Pharmaceutical Sciences; Jan 2010 – June 2015)
Joseph Madak (co-mentored with Dept of Medicinal Chemistry); May 2013 – present

Irosha Nawarathne – postdoctoral fellow (co-mentored with Dept of Medicinal Chemistry); May 2012 – August 2014)
Maxwell Stefan (co-mentored with Dept of Medicinal Chemistry); August 2014 – February 2015

Dissertation committees
Alexandre Cavezza, Chemistry Department, Wayne State University (graduated 1998)
Caleb Bates, Dept of Medicinal Chemistry, University of Michigan (graduated 2010)
James Patrone, Dept of Medicinal Chemistry, University of Michigan (graduated 2010)
Amy Danowitz, Chemistry Department, University of Michigan (graduated 2011)
Jiyoung Hong, Chemistry Department, University of Michigan (graduated 2011)
Suman Gill, Dept of Medicinal Chemistry, University of Michigan (graduated 2012)
Jacob Houghton, Dept of Medicinal Chemistry, University of Michigan (graduated 2012)
Leah Makley, Dept of Medicinal Chemistry, University of Michigan (graduated 2014)
Garrett Gibbons, Dept of Pathology, University of Michigan (graduated 2014)
Anthony Emmanuel, Dept of Medicinal Chemistry, University of Michigan
Ahmed Mady, Dept of Medicinal Chemistry, University of Michigan
Yangbing Li, Dept of Medicinal Chemistry, University of Michigan
Joseph Madak, Dept of Medicinal Chemistry, University of Michigan

TEACHING EXPERIENCE (all at University of Michigan)

Co-coordinator and lecturer for Medicinal Chemistry 740-741 (2015 - 2017)
Co-coordinator and/or lecturer for Medicinal Chemistry 533 (biannually; 2001-2019)
Lecturer for Medicinal Chemistry 635 (2008, 2011)
Pharm D Investigations (2010 - 2013)

JOURNAL REFEREE

J. Org. Chem., Org. Lett., J. Med. Chem., J. Het. Chem., Eur. J. Med. Chem., Tet. Lett., Tet., ACS Med. Chem. Lett., Bioorg. & Med. Chem. Lett., Chem. & Biol., J. Am. Chem. Soc., Med. Chem. Comm., and others

INVITED LECTURES

1. Synthetic Approaches to Vincadifformine-type Alkaloids via ß-Oxycyclopropyl-carbonyl and Related Intermediates. University of Houston, Houston, TX, 1975.

2. Synthetic Approaches to Vincadifformine-type Alkaloids via ß-Oxycyclopropyl-carbonyl and Related Intermediates. University of Michigan, Ann Arbor, MI, 1977.

3. Synthetic Approaches Toward the Aspidosperma Alkaloids. University of Colorado, Boulder, CO, 1978.

4. Studies Related to the Total Synthesis of Pentostatin, the Potent Inhibitor of Adenosine Deaminase. Ohio State University, Columbus, OH, 1978.

5. Studies Related to the Total Synthesis of Pentostatin, the Potent Inhibitor of Adenosine Deaminase. University of Houston, Houston, TX, 1979.

6. Heteroaryl-1,3-Diazepines. Synthetic Approaches to and Chemical Reactivity of Tetrahydroimidazo[4,5-*d*][1,3]diazepines. Heterocyclic Symposium, 14th Central Regional Meeting of the American Chemical Society, Midland, MI, 1982.

7. The Total Synthesis of Heteroaryl-1,3-diazepines Related to Pentostatin, the Potent Inhibitor of Adenosine Deaminase. Hope College, Holland, MI, 1982.

8. The Isolation, Structural Elucidation, and Total Synthesis of Pentostatin, the Potent Inhibitor of Adenosine Deaminase. Huron Valley Section of the American Chemical Society, Ann Arbor, MI, 1983.

9. 5-[(Aminoalkyl)amino]-substituted Anthra[1,9-*cd*]pyrazol-6(2*H*)ones (Anthrapyrazoles) as Novel, Broad-spectrum Anticancer Agents. Gordon Research Conference on Medicinal Chemistry, New London, NH, 1984.

10. Anthrapyrazoles. Design, Synthesis, Antitumor Activity and Biochemical Pharmacology. Symposium on Progress in Antitumor Drugs, 15th Northeast Regional Meeting of the American Chemical Society, New Platz, NY, 1985.

11. Anthrapyrazoles. Design, Synthesis, and Biological Activity of a Novel Class of Broad-spectrum Anticancer Agents. University of Michigan, Ann Arbor, MI, 1985.

12. Anthrapyrazoles. Design, Synthesis, and Biological Activity of a Novel Class of Broad-spectrum Anticancer Agents. Ohio State University, Columbus, OH, 1985.

13. Current Issues and Future Directions in the Pharmaceutical Industry. Goshen College, Goshen, IN, 1988

14. Anticancer DNA Binders. Overview and Recent Advances. Ohio State University, Columbus, OH, 1988.

15. The Synthesis of Novel Thioglucose Analogues of the Anticancer Clinical Agent Etoposide. Wenkert Symposium of Natural Products Research, Oxford, MS, 1990.

16. Synthesis and Anticancer Activity of Novel Classes of Heterocyclic Chromophore-Modified Anthracenediones. University of Virginia, Charlottesville, VA, 1991.

17. Synthesis and Anticancer Activity of Novel Classes of Heterocyclic Chromophore-Modified Anthracenediones. Virginia Polytechnic University, Blacksburg, VA, 1991.

18. The Preclinical Development of PD144872, the *R*-Enantiomer of the Novel Dual Function 2-Nitroimidazole Radiation Sensitizer RB6145. New Zealand Institute of Chemistry Conference 1993, Auckland, New Zealand, 1993:

19. Small Molecule Inhibitors of Protein Tyrosine Kinases as Potential Agents for Cancer Chemotherapy. 6th International Symposium on Molecular Aspects of Chemotherapy, Gdansk, Poland, 1997.

20. The Development of Pyrido[2,3-*d*]pyrimidines as Potent c-Src Tyrosine Kinase Inhibitors. 9th RSC-SCI Medicinal Chemistry Symposium, Churchill College, Cambridge, United Kingdom, 1997.

21. Designing Selectivity into the Pyrido[2,3-*d*]pyrimidines, a Novel and Potent Class of Tyrosine Kinase Inhibitors. First International Conference on Inhibitors of Protein Kinases, Warsaw, Poland, 1998.

22. Tyrosine Kinase Inhibition as a Therapeutic Strategy to Regulate Tumor Angiogenesis. 27th National Medicinal Chemistry Symposium, Kansas City, MO, 2000.

23. Outwitting Nature: Future Targets for Antimicrobial Therapy. Joint session of the College of Pharmacy First Annual Science Symposium and the Tom D. Rowe 55th Annual Pharmacy Lectures, University of Michigan, Ann Arbor, MI, 2006.

24. Medicinal Chemistry and Drug Discovery at the University of Michigan - Where We've Been and Where We're Going. University of Detroit Mercy, Detroit, MI, 2007.

25. University of Michigan Medicinal Chemistry Core Synthesis Laboratory: Who We Are and What Our Role in Drug Discovery is. Center for Chemical Genomics Colloquium Series, University of Michigan, Ann Arbor, MI, 2007.

26. The UM Medicinal Chemistry Core Synthesis Lab: a Catalyst to Drug Discovery at the University of Michigan. Department of Pharmacology Colloquium Series, University of Michigan, Ann Arbor, MI, 2008.

27. Careers in Industry. Pulmonary Core Lecture Series, University of Michigan, Ann Arbor, MI, 2008.

28. Medicinal Chemistry and Drug Discovery within Industry and Academia - Sharing my Experience within Both Sectors. Goshen College, Goshen, IN, 2010.

29. Studies Directed toward the Design of Benzoxazinorifamycins less Susceptible to Emerging Resistance. 247th American Chemical Society National Meeting, Dallas, TX, 2014.

30. Deubiquitinases: the New Kinases in Human Medicine. 34th National Medicinal Chemistry Symposium, Charleston, SC, 2014.

31. A Search for Novel Rifamycins and Small Molecule Leads against *M. tuberculosis* RNA Polymerase. Joint Meeting of the Great Lakes and Central Regions of the American Chemical Society, Grand Rapids, MI, 2015.

32. Making Medicines that Matter. Stories of Drug Discovery within Academia. Eastern Mennonite University, Harrisonburg, VA, 2017.

33. My Professional Journey and Uses of Technology in My Career. Zoom lecture to Zambian Christian University, Choma, Zambia, 2020.

ABSTRACTS

1. Proton-transfer Chemical Ionization Mass Spectrometry. Principles and Application to Representative Antibiotics. Sixth Annual Graduate Student Symposium in Medicinal Chemistry, Battle Creek, MI, 1973.

2. Showalter HDH. I. Chemical Ionization Mass Spectrometry of Macrolide Antibiotics, ß-Lactam Antibiotics, and Model Compounds. II. Antimicrobial Agents from Higher Plants Isolation of Canthin-6-one from Zanthoxylum Elephantiasis and Approaches to its Synthesis and Analogs. Diss Abstr Int B 1975;35:4014.

3. Showalter HDH, Putt SR. Studies Related to the Total Synthesis of Pentostatin. An Efficient, Regiospecific Glycosylation of 6,7-Dihydroimidazo[4,5-*d*][1,3]diazepin-8(3*H*)-one and Related Homologs. 181st American Chemical Society National Meeting, Atlanta, GA, CARB 1981:Abstract 41.

4. Showalter HDH, Baker DC, Putt SR, Chan E. Heteroaryl-1,3-Diazepines. Synthetic Approaches to and Chemical Reactivity of Tetrahydroimidazo[4,5-*d*][1,3]diazepines 14th Central Regional Meeting of the American Chemical Society, Midland, MI, Heterocyclic Symposium. ORGN 1982:Abstract 168.

5. Showalter HDH, Putt SR, Borondy PE, Shillis JL. Synthesis and Biological Activity of Selected C-5 Alkyl Homologs of Pentostatin and an Acyclic Analog of its Aglycone. 184th American Chemical Society National Meeting, Kansas City, MO, MEDI 1982:Abstract 30.

6. Showalter HDH, Johnson JL, Hoftiezer JM, Werbel LM, Shillis JL, Plowman J. 5-[(Aminoalkyl)amino]-substituted Anthra[1,9-*cd*]pyrazol-6(2*H*)-ones as Novel Anticancer Agents. 75th Annual Meeting of the American Association for Cancer Research, Toronto, Canada, 1984:Abstract 1396.

7. Johnson JL, Showalter HDH, Hoftiezer JM. Facile Syntheses of 5-Hydroxy- and 5,6,8-Trihydroxy-1,4-dichloro-9,10-anthracenedione. 3rd Joint Great Lakes and Central Regional Meeting of the American Chemical Society, Kalamazoo, MI, ORGN 1984:Abstract 297.

8. Johnson JL, Showalter HDH, Hoftiezer JM. Heteroannulated 9, 10-Anthracenediones. Synthesis of Substituted Anthra[1,9-*cd*]pyrazol-6(2*H*)-ones. 3rd Joint Great Lakes and Central Regional Meeting of the American Chemical Society, Kalamazoo, MI, ORGN 1984:Abstract 330.

9. Showalter HDH, Johnson JL, Hoftiezer JM, Werbel LM, Fry DW, Jackson RC, Shillis JL, Plowman J. 5-[(Aminoalkyl)amino]-substituted Anthra[1,9-*cd*]pyrazol-6(2*H*)-ones

(Anthrapyrazoles) as Novel Anticancer Agents. 189th American Chemical Society National Meeting, Miami Beach, FL, MEDI 1985:Abstract 72.

10. Werbel LM, Elslager EF, Ortwine DF, Shillis JL,Showalter HDH,Worth DF, Plowman J. 2-(Aminoalkyl)-5-amino-2*H*-[1]benzothiopyrano[4,3,2-*cd*]indazoles, a New Class of Anticancer Agents. 76th Annual Meeting of the American Association for Cancer Research, Houston, TX, 1985:Abstract 1000.

11. Fry DW, Jackson RC, Showalter HDH, Werbel LM, Leopold WR. Broad-spectrum Antitumor Activity and Biochemical Pharmacology of the Novel Anthrapyrazole, CI-941. 76th Annual Meeting of the American Association for Cancer Research, Houston, TX, 1985:Abstract 862.

12. Showalter HDH. Anthrapyrazoles. Design, Synthesis, Antitumor Activity and Biochemical Pharmacology. 15th Northeast Regional Meeting of the American Chemical Society, New Platz, NY, 1985, Symposium on Progress in Antitumor Drugs; MEDI Abstract 139.

13. Jackson RC, Fry DW, Leopold WR, Sebolt JS, Klohs WD, Showalter HDH, Werbel LM, Elslager EF. Biochemical Pharmacology and Experimental Chemotherapy Studies with the Anthrapyrazole, CI-937, a Synthetic Intercalating Agent with Broad-spectrum Murine Anticancer Activity. 14th International Congress of Chemotherapy, Kyoto, Japan, 1985:Abstract P-18-27.

14. 2-(Aminoalkyl)-5-amino-2*H*-[1]benzothiopyrano[4,3,2-*cd*]indazoles (Benzothiopyranoindazoles), a New Class of Anticancer Agents. Turner WR, Elslager EF, Ortwine DF, Shillis JL, Showalter HDH, Werbel LM, Worth DF, Plowman J. 190th American Chemical Society National Meeting, Chicago, IL, MEDI 1985:Abstract 7.

15. Sercel AD, Angelo MM, Berman EM, Kanter G, Ortwine DF, Showalter HDH, Turner WR, Worth DF. Synthesis of 2,5-Substituted 2*H*-[1]benzothiopyrano[4,3,2-*cd*]indazoles(Benzothiopyranoindazoles), Novel Chromophore Modified Anthracenedione Anticancer Agents. 190th American Chemical Society National Meeting, Chicago, IL, ORGN 1985:Abstract 220.

16. Hicks JL, Huang CC, Showalter HDH. Synthesis of Double Carbon-14 Labeled CI-937, a Potential New Anticancer Drug. 2nd International Symposium on the Synthesis and Applications of Isotopically Labeled Compounds, Kansas City, MO, 1985.

17. Showalter HDH, Winters RT, Sercel AD. Efficient Synthesis of 9,10-Anthracenedione and Salicylate Ethers via Alkylation of Cesium Phenolates. 18th Central Regional Meeting of the American Chemical Society, Bowling Green, OH, ORGN 1986:Abstract 276.

18. Whitfield LR, Tucker E, Ferry J, Chang T, Showalter H, Malspeis L. Development of an HPLC Assay with Electrochemical Detection of CI-921 in Human Plasma. 78th Annual Meeting of the American Association for Cancer Research, Atlanta, GA, 1987:Abstract 773.

19. Berman E, Klohs W, Leopold WR, Plowman J, Sercel AD, Shillis JL, Showalter HDH, Werbel LM. 2-(Aminoalkyl)-5-amino-2*H*-[1]benzoselenino[4,3,2-*cd*]indazoles. A New Class of Selenium Heterocycle with Potent Antitumor Activity. 78th Annual Meeting of the American Association for Cancer Research, Atlanta, GA, 1987:Abstract 1194.

20. Showalter HDH, Berman EM, Besserer JA, Fry DW, Hokanson GC, Klohs WD, Leopold WR, Werbel LM, Plowman J. Anticancer Benzochalcogenoindazoles. Comparative Tumor Biology, Biochemistry, and Aqueous Stability. 194th American Chemical Society National Meeting, New Orleans, LA, MEDI 1987:Abstract 25.

21. Beylin VB, Goel OP, Lustgarten DM, Sercel AD, Showalter HDH. An Improved Synthesis of Anticancer Benzothiopyranoindazole CI-958. An Efficient Large Scale ß-Aminoethylation Procedure. 196th American Chemical Society National Meeting, Los Angeles, CA, MEDI 1988:Abstract 14.

22. Nordblom GD, Coon MJ, Barksdale CM, Pachla LA, Chang T, Showalter HDH. Development of a Radioimmunoassay for the Cancer Chemotherapy Agent CI-937 in Several Biological Matrices. 15th Annual Meeting of the Clinical Ligand Assay Society, Los Angeles, CA, 1989.

23. Nordblom GD, Pachla LA, Showalter HDH. Preparation of a [^{125}I]-CI-958 Analogue for Use in a Radioimmunoassay for the Cancer Chemotherapy Agent CI-958. International Isotope Society, 2nd Central US Regional Meeting, Ann Arbor, MI, 1989.

24. Nordblom GD, Pachla LA, Showalter HDH. Preparation of a [^{125}I]-CI-958 Analogue for Use in a Radioimmunoassay for the Cancer Chemotherapy Agent CI-958. 13th Annual Midwest Clinical Ligand Assay Society Meeting, Detroit, MI, 1989.

25. Showalter HDH, Winters RT, Elliott W, Boritzki JJ, Denny WA. Anticancer Activity of a Novel Thioglucose Congener of Etoposide, 81st Annual Meeting of the American Association for Cancer Research, Washington, DC, 1990:Abstract 2592.

26. Hoeschele JD, Kraker AJ, Sercel AD, Showalter HDH, Elliott WL, Farrell NP. Antitumor Activity of Bisplatinum Complexes Varying in the Nature of the Bridging Diamine Linker Group. 81st Annual Meeting of the American Association for Cancer Research, Washington, DC, 1990:Abstract 1960.

27. Showalter HDH, Winters RT, Sercel AD. The Synthesis of Novel Thioglucose Analogues of the Anticancer Clinical Agent Etoposide. In: Abstracts of Symposium Lectures, Wenkert Symposium of Natural Products Research, Oxford, MS, 1990.

28. Hoeschele JD, Kraker AJ, Sercel AD, Showalter HDH, Elliott WL, Farrell NP. Synthesis and Antitumor Activity of Bisplatinum Complexes Varying in the Nature of the Binding Diamine Linker Group. J. Inorg. Biochem. 1991;43:606.

29. Showalter HDH, Sercel AD, Winters RT, Leopold WR, Elliott WL, Arundel-Suto CM, Sebolt-Leopold JS. A New Class of Bifunctional Nitroimidazole Radiosensitizers Incorporating Soft Alkylating and Acylating Functionality. 82nd Annual Meeting of the American Association for Cancer Research, Houston, TX, 1991:Abstract 2311.

30. Sercel AD, Showalter HDH, Winters RT, Elliott WL, Grachek SJ. Topoisomerase Inhibition and Anticancer Activity of Novel 4-Demethylepipodophyllotoxin Analogs. 202nd American Chemical Society National Meeting, New York, NY, MEDI 1991:Abstract 11.

31. Huang CC, Hicks JL, Showalter HDH. Synthesis of Multiple ^{14}C-Labeled 2,6-Dichloro-3-nitrobenzoic Acid and its Incorporation in the Synthesis of [^{14}C]CI-958, a Potential Anticancer Agent. 4th Meeting of the International Isotopes Society, Toronto, Canada, 1991.

32. Hoeschele JD, Kampf JW, Showalter HDH. Large Ring Pt(II) Chelate Complexes of the Form, [$PtAX_2$]: A=*cis*-1,4-Diaminocyclohexane and 1,*n*-Diaminoalkanes (*n*= 5,6,7). 205th American Chemical Society National Meeting, Denver, CO, INORG 1993:Abstract 379.

33. Sebolt-Leopold JS, Elliott WL, Showalter HDH, Leopold WR. Rationale for Selection of PD 144872, the *R*-Isomer of RB6145, for Clinical Development as a Radiosensitizer. 84th Annual Meeting of the American Association for Cancer Research, Orlando, FL, 1993:Abstract 2155.

34. Hoeschele JD, Showalter HDH, Kraker AJ, Elliott WL. Antitumor Activity of Large Ring Pt(II) Chelate Complexes of the Type, [$PtAX_2$]: A=*cis*-1,4-Diaminocyclohexane(dach) and 1,*n*-Diaminoalkanes (*n*=5,6,7). 84th Annual Meeting of the American Association for Cancer Research, Orlando, FL, 1993:Abstract 2424.

35. Showalter HDH, Elliott WL, Sebolt-Leopold JS. Development of Rigid Nicotinamide Analogs as a New Class of Potent Poly (ADP-ribose) Polymerase (ADPRP) Inhibitors. 1,6-Naphthyridin-5(6*H*)-ones and Reduced Congeners. 84th Annual Meeting of the American Association for Cancer Research, Orlando, FL, 1993:Abstract 1583.

36. Sercel AD, Goel OP, Showalter HDH, Betche H-J, Elliott WL, Leopold WR, Sebolt-Leopold JS. Synthesis and Biological Evaluation of the Enantiomers of the Radiation Sensitizer RB 6145 and its Cometabolites. 206th American Chemical Society National Meeting, Chicago, IL, MEDI 1993:Abstract 116.

37. Sercel AD, Showalter HDH, Sebolt-Leopold JS. Synthesis of 4- and 4,5-Substituted Isoquinolinones via Electrophilic Trapping of Mono- and Dilithiated Precursors. 206th American Chemical Society National Meeting, Chicago, IL, ORGN 1993:Abstract 175.

38. Beylin VG, Goel OP, Leja B, Marlatt ME, Sercel AD, Showalter HDH. An Efficient Large Scale Synthesis of *R*(+)- and *S*(-)-enantiomers of a Novel 2-Nitroimidazole Radiosensitizer. 14th International Congress of Heterocyclic Chemistry, Antwerp, Belgium, 1993:Abstract P01-8.

39. Rewcastle GW, Denny WA, Palmer BD, Thompson AM, Dobrusin EM, Showalter HD, Kraker AJ. Indoline-2-Thiones and Their Disulfide Dimers as Potent Tyrosine Kinase Inhibitors. 14th International Congress of Heterocyclic Chemistry, Antwerp, Belgium, 1993:Abstract OP-DA-16.

40. Showalter HDH. The Preclinical Development of PD144872, the *R*-Enantiomer of the Novel Dual Function 2-Nitroimidazole Radiation Sensitizer RB6145. New Zealand Institute of Chemistry Conference 1993, Auckland, New Zealand, 1993:Abstract MED-ORG 7.

41. Rewcastle GW, Denny WA, Palmer BD, Dobrusin EM, Showalter HDH, Kraker AJ. Lithiation Routes to Oxindole and 2-Indolinethione Precursors of 2,2'-Dithiobisindoles: Novel Compounds with Potent Tyrosine Kinase Inhibitory Properties. New Zealand Institute of Chemistry Conference 1993, Auckland, New Zealand, 1993:Abstract MED-ORG 6.

42. Sebolt-Leopold JS, Suto MJ, Elliott WL, Showalter HDH, Leopold WR. Pharmaceutical Issues Important to the Development of PD 144872 (CI-1010), the *R*-Isomer of RB 6145. Proceedings of the MRC Conference on Successful Exploitation of Biomedical Research, Regent College, London, UK, March 7-8, 1994.

43. Showalter HDH, Sercel AD, Fry DW, Nelson JM, Kraker AJ, Ambroso LA, Lu GH, Moore CW. Development of Indoline-2-selenone Dimers as a Novel Class of Potent Tyrosine Kinase Inhibitors. 85th Annual Meeting of the American Association for Cancer Research, San Francisco, CA, 1994:Abstract 2643.

44. Sun L, Showalter HDH, Kraker AJ, Fry DW. Synthesis and Biological Evaluation of Photoaffinity Labeled Indoline-2-thione Dimers as Inhibitors of EGF Receptor Tyrosine Kinase. 208th American Chemical Society National Meeting, Washington, DC, MEDI 1994:Abstract 93.

45. Cole S, Stratford IJ, Adams GE, Sebolt-Leopold JS, Showalter HD. Preclinical Evaluation of *R* and *S* Isomers of RB6145, a Hypoxic Cell Radiosensitizer and Cytotoxin. Meeting of the British Institute of Radiology, 1994:Abstract 117.

46. Showalter HDH, Sercel AD. A Novel Synthesis of Symmetrical 1,2-Bis(2-Indolyl)alkynes and Reduced Congeners via Palladium-Catalyzed Couplings of Activated 2-Bromoindole Precursors. 209th American Chemical Society National Meeting, Anaheim, CA, ORGN 1995:Abstract 108.

47. Sun L, Showalter HDH, Kraker AJ. Synthesis and Biological Evaluation of Novel Pyrroloquinazolines as Potent Epidermal Growth Factor Receptor Tyrosine Kinase Inhibitors. 209th American Chemical Society National Meeting, Anaheim, CA, MEDI 1995:Abstract 36.

48. Rewcastle GW, Thompson AM, Palmer BD, Denny WA, Bridges AJ, Showalter HDH, Sun L, Fry DW, McMichael A. Tricyclic Quinazoline Derivatives as Potent and Specific Inhibitors of the Epidermal Growth Factor Receptor Tyrosine Kinase. Hong Kong International Symposium on Heterocyclic Chemistry, 1995:Abstract OP-26

49. Boehm TI, Showalter HDH. Development of a Silicon-Based Traceless Linker for Solid-Phase Organic Synthesis. 211th American Chemical Society National Meeting, New Orleans, LA, BIOT 1996:Abstract 121.

50. Showalter HDH, Sercel AS, Fry DW, Nelson JM, McMichael A, Kraker AJ, Amar AM, Shen C, Spencer MM, Lu GH. Synthesis and SAR for a Series of 4-Substituted 1*H*-Pyrimido[4,5-*b*] and 5*H*-Pyrimido[5,4-*b*]indoles as EGF Receptor Tyrosine Kinase Inhibitors. 87th Annual Meeting of the American Association for Cancer Research, Washington, DC, 1996:Abstract 2899.

51. Kraker AJ, Moore CW, Amar A, Shen C, Nelson J, Slintak V, Fry DW, Lu G, Panek R, Schroeder M, Winters T, Hamby J, Showalter HDH. Effects of c-Src Specific Tyrosine Kinase Inhibitors on Cellular Phosphorylation, Signalling, and Proliferation. 87th Annual Meeting of the American Association for Cancer Research, Washington, DC, 1996:Abstract 2894.

52. Bridges AJ, Rewcastle GW, Thompson AM, Palmer B, Denny WA, Cody DR, Zhou H, Showalter HDH, Winters RT, Rubin RA, Trumpp-Kallmeyer S, Nelson JM, Kraker AJ, Elliott WL, Roberts WJ, Hook KE, Vincent PW, Fry DW, McMichael A. The SAR of Very High Affinity Inhibitors of the Epidermal Growth Factor Receptor Tyrosine Kinase. Program Book of the 25th National Medicinal Chemistry Symposium of the American Chemical Society. Ann Arbor, MI, 1996, p 55.

53. Schroeder MC, Hamby JM, Grohar PJ, Winters RT, Connolly CJC, Showalter HDH, Kraker AJ, Amar AM, Shen C, Lu GH, Dahring TK, Panek RL, Doherty AM. The Synthesis and SAR of Pyrido[2,3-*d*]pyrimidine-2,7-diamines in the Development of Potent, Water Soluble Tyrosine Kinase Inhibitors. Program Book of the 25th National Medicinal Chemistry Symposium of the American Chemical Society. Ann Arbor, MI, 1996:Abstract 4.

54. Winters RT, Rewcastle GW, Showalter HDH, Denny WA, Elliott WL, Roberts B, Vincent P. Bulk Synthesis and Formulation Studies of PD 158780: A Potent Inhibitor of the EGFr Tyrosine Kinase. Program Book of the 25th National Medicinal Chemistry Symposium of the American Chemical Society. Ann Arbor, MI, 1996:Abstract 5.

55. Elliott WL, Fry DW, Vincent PW, Roberts BJ, Howard CT, Slintak V, Nelson JM, Hook KE, Showalter HDH, Winters TR, Denny WA, Thompson AM. In vitro and in vivo Activity of 4-Anilinopyridopyrimidine EGF Family Specific Tyrosine Kinase Inhibitors. 88th Annual Meeting of the American Association for Cancer Research, San Diego, CA, 1997:Abstract 3144.

56. Showalter HDH, Klutchko S, Boschelli D, Barvian MR, Hamby J, Schroeder M, Trumpp-Kallmeyer S, Kraker AJ, Lu G, Moore CW, Doherty AM. The Development of Substituted 2-Anilinopyrido[2,3-*d*]pyrimidines as Novel, Potent Inhibitors of the c-Src Tyosine Kinase. 88th Annual Meeting of the American Association for Cancer Research, San Diego, CA, 1997:Abstract 3146.

57. Doherty AM, Connolly CJ, Schroeder MC, Showalter HDH, Winters RT, Bridges AJ, Fry DW, Klutchko SR, Keiser JA, Hamby JM, Boschelli DH. Tyrosine Kinase Inhibitors as Novel Antiproliferative Agents. The National Managed Health Care Congress on Cell Signaling, San Diego, CA. 1997.

58. Denny WA, Palmer BD, Rewcastle GW, Thompson AM, Bridges AJ, Doherty AM, Fry DW, Nelson JM, Rubin JR, Showalter HDH, Trumpp-Kallmeyer S. Pyrido[*d*]pyrimidine Inhibitors of the Tyrosine Kinase Activity of the EGF Receptor; a Binding Model and Structure-Activity Relationships for Soluble Analogues. 88th Annual Meeting of the American Association for Cancer Research, San Diego, CA, 1997:Abstract 4250.

59. Doherty A.M, Klutchko S, Boschelli D, Hamby J, Connolly C, Schroeder M, Winters T, Rewcastle G, Showalter H. Synthetic Strategies to Novel Heterocycles Blocking Mitogenic Signalling. 4th French-American Chemical Society Meeting, Tucson, AZ, 1997.

60. Palmer BD, Trumpp-Kallmeyer S, Fry DW, Nelson JM, Showalter HDH, Denny WA. Soluble Analogues of Pyrrolo- and Pyrazolo[*g*]quinazolines as EGFr Inhibitors: Synthesis, Biological Evaluation and Modelling of the Mode of Binding. BACR 38th Annual Meeting, University of Southampton, UK, April 1997: Abstract-1.1 (Brit. J. Cancer, 1997, 75:Suppl 1, p 5).

61. Barvian MR, Panek RL, Lu GH, Kraker AJ, Amar AM, Hartl B, Hamby JM, Showalter HDH. 3-Arylindene-1-one-2-carboxylic Acid Derivitives as Selective Antagonists for Fibroblast Growth Factor Receptor-1 Tyrosine Kinase. 29th Central Regional Meeting of the American Chemical Society, Midland, MI, 1997:Abstract 278.

62. Barvian MR, Panek RL, Lu GH, Kraker AJ, Amar AM, Hartl B, Hamby JM, Showalter HDH. 3-Arylindene-1-one-2-carboxylic Acid Derivitives as Selective Antagonists for Fibroblast Growth Factor Receptor-1 Tyrosine Kinase. Parke-Davis/Wayne State University Poster Day 1997, Detroit, MI, May 1997.

63. Showalter HDH, Klutchko S, Boschelli D, Barvian MR, Hamby J, Schroeder M, Trumpp-Kallmeyer S, Kraker AJ, Lu G, Moore CW, Doherty AM. The Development of Substituted 2-Anilinopyrido[2,3-*d*]pyrimidines as Novel, Potent Inhibitors of the c-Src Tyosine Kinase. 2nd Annual Parke-Davis Drug Discovery Symposium, Ann Arbor, MI, May 1997:Abstract C-11.

64. Rewcastle GW, Thompson AM, Palmer BD, Denny WA, Bridges AJ, Elliot WL, Fry DW, Rubin JR, Showalter HDH, Winters RT. 4-Anilinopyrido[*d*]- and Pyrimido[5,4-*d*]pyrimidines as Potent and Specific Inhibitors of the Epidermal Growth Factor Receptor Tyrosine Kinase. 16th International Conference on Heterocyclic Chemistry, Bozeman, MT, 1997.

65. Showalter HDH, Hamby JM, Trumpp-Kallmeyer S, Elliott WL, Kraker AJ, Doherty AM. Small Molecule Inhibitors of Protein Tyrosine Kinases as Potential Agents for Cancer Chemotherapy. Program Book of the 6th International Symposium on Molecular Aspects of Chemotherapy, Gdansk, Poland, 1997, p 25.

66. Schroeder MC, Eummer JT, Slutsky MM, Showalter HDH, Panek RL, Lu GH, Batley BL, Dahring TK, Kraker AJ, Moore CW, Hartl BG, Klohs WD, Steinkampf RD, Doherty AM. The Synthesis and SAR of 2-Anilinopyrido[2,3-*d*]pyrimidines as Potent Tyrosine Kinase Inhibitors. 214th American Chemical Society National Meeting, Las Vegas, NV, MEDI 1997:Abstract 199.

67. Showalter HDH, Hamby JM, Trumpp-Kallmeyer S, Elliott WL, Kraker AJ, Doherty AM. The Development of Pyrido[2,3-*d*]pyrimidines as Potent c-Src Tyrosine Kinase Inhibitors. 9th RSC-SCI Medicinal Chemistry Symposium, Churchill College, Cambridge, UK, 1997.

68. Barvian MR, Klutchko S, Hamby JM, Kraker AJ, Moore C, Hartl BG, Lu GH, Panek RL, Fry DW, Doherty AM, Showalter HDH. Development of c-Src Selective 8*H*-Pyrido[2,3-d]pyrimidin-7-one Tyrosine Kinase Inhibitors via Parallel Synthesis**.** 89th Annual Meeting of the American Association for Cancer Research, New Orleans, LA, 1998:Abstract 1201.

69. Kraker AJ, Moore CW, Hartl BG, Panopoulos AD, Lu GH, Nelson JM, Barvian MR, Showalter HDH. Effects of c-Src Selective Pyrido[2,3-*d*]pyrimidine Tyrosine Kinase Inhibitors on the Phosphorylation of p130cas, Paxillin, and STAT3 and on Proliferation in Human Carcinoma Cell Lines. 89th Annual Meeting of the American Association for Cancer Research, New Orleans, LA, 1998:Abstract 3800.

70. Fry DW, Nelson JM, Slintak V, Keller PR, Loo J, Greis K, Trumpp-Kallmeyer S, Denny WA, Smaill JB, Showalter HDH, Bridges AJ, Zhou H, McNamara DJ, Dobrusin EM. Specific, Irreversible Inhibitors of the Epidermal Growth Factor Receptor (EGFR) Family of Tyrosine Kinases. 89th Annual Meeting of the American Association for Cancer Research, New Orleans, LA, 1998:Abstract 3806.

71. Nelson JM, Slintak V, Denny WA, Smaill JB, Rewcastle GW, Showalter HDH, Bridges AJ, Zhou H, McNamara DJ, Dobrusin EM, Fry DW. In Vitro Comparison of Irreversible Versus Reversible Inhibition for a Series of Substituted Quinazolines and Pyridopyrimidines that are Potent and Specific Inhibitors of the Epidermal Growth Factor Receptor (EGFR) Family of Tyrosine Kinases. 89th Annual Meeting of the American Association for Cancer Research, New Orleans, LA, 1998:Abstract 2158.

72. Denny WA, Smaill JB, Fry DW, Nelson JM, Showalter HDH, Winters RT, Bridges AJ, Zhou H, McNamara DJ, Dobrusin EM. Structure-Activity Relationships for 4-Anilinoquinazoline and Related Pyridopyrimidine Acrylamides as Specific, Irreversible Inhibitors of the ATP Site of the Epidermal Growth Factor Receptor. 89th Annual Meeting of the American Association for Cancer Research, New Orleans, LA, 1998:Abstract 3804.

73. Zhou H, Bridges AJ, Denny WA, Dobrusin EM, McNamara D, Showalter HDH, Slintak V, Smaill JB, Fry DW, Nelson JM. An Examination of the Michael Acceptor Side Chain for Irreversible EGFr Inhibitors Related to PD 158780. 89th Annual Meeting of the American Association for Cancer Research, New Orleans, LA, 1998:Abstract 2154.

74. Connolly CJC, Hamby JM, Schroeder MC, Barvian MR, Trumpp-Kallmeyer S, Lu GH, Panek RL, Amar A, Chen C, Kraker AJ, Fry DW, Driscoll D, Klohs WD, Showalter HDH, Doherty AM. SAR and Anti-Angiogenic Activity of a Series of FGF-Selective Tyrosine Kinase Inhibitors. 30th Central Regional Meeting of the American Chemical Society, Cleveland, OH, 1998:Abstract 103.

75. Schiemann K, Showalter HDH. Preparation and Application of Solid-Supported Benzotriazole. 31st Meeting of the Great Lakes Region of the American Chemical

Society, Milwaukee, WI, 1998:Abstract 207.

76. Smaill JB, Denny WA, Fry DW, Nelson JM, Leopold WR, Vincent PW, Hook KE, Elliott WL, Bridges AJ, Zhou H, Showalter HDH, McNamara DJ, Dobrusin EM. Development of Irreversible EGFr Tyrosine Kinase Inhibitors with Anti-tumor Activity Against Human Tumor Xenografts. NCI-EORTC Conference, Amsterdam, Netherlands, 1998.

77. Smaill JB, Denny WA, Fry DW, Nelson JM, Leopold WR, Vincent PW, Patmore SJ, Elliott WL, Hook KE, Bridges AJ, Zhou H, Showalter HDH, McNamara DJ, Dobrusin EM. Development, Structure-Activity Relationships and Anti-tumor Activity of a Novel Class of Specific, Irreversible EGFr TK Inhibitors. BACR Conference, Dublin, Ireland, 1998.

78. Showalter HDH. Designing Selectivity into the Pyrido[2,3-*d*]Pyrimidines, a Novel and Potent Class of Tyrosine Kinase Inhibitors. Cell. Mol. Biol. Lett. 1998, 3:337.

79. Bridges AJ, Denny WA, Dobrusin EM, Doherty AM, Elliott WL, Fry DW, Hook K, Leopold WR, McNamara D, Nelson JW, Palmer BD, Patmore S, Rewcastle GW, Roberts WJ, Showalter HDH, Slintak V, Smaill JB, Thompson AM, Trumpp-Kallmeyer S, Vincent PW, Winters RT, Zhou H. The Development of Highly Selective, Irreversible Inhibitors of the EGFR Family of Receptor Tyrosine Kinases (RTKs). National Managed Health Care Conference, San Diego, CA, 1998.

80. Thompson AM, Denny WA, Hamby JM, Connolly CJC, Kraker AJ, Hartl B, Showalter HDH. 7-Substituted [1,6]Napthyridin-2-amines and Ureas – Potent and Selective Inhibitors of the FGF-1 Receptor Tyrosine Kinase. European Federation of Medicinal Chemistry Meetings, Edinburgh, United Kingdom, 1998.

81. Harikrishnan L, Showalter HDH. Solid-Phase Synthesis of 2,3-Disubstituted Chromen-4-ones. 50th Southeastern Regional Meeting of the American Chemical Society, Research Triangle Park, NC, 1998:Abstract 413.

82. Palmer BD, Kraker AJ, Hartl BG, Panopoulos AD, Panek RL, Batley BL, Lu GH, Trumpp-Kallmeyer S, Showalter HDH and Denny WA. Structure-Activity Relationships For 5-Substituted 1-Phenyl- Benzimidazoles As Selective Inhibitors Of The Platelet-Derived Growth Factor Receptor. BACR Conference, Edinburgh, United Kingdom, 1999.

83. Rewcastle GW, Smaill JB, Denny WA, Bridges AJ, Dobrusin EM Elliot WL, Fry DW, Hook KE, Leopold WR, McNamara DJ, Nelson JM, Showalter HDH, Sherwood V, Vincent PW, Zhou H. Synthesis And Antitumor Activity Of Quinazoline And Pyridopyrimidine Inhibitors Of The Epidermal Growth Factor Receptor Family Of Tyrosine Kinases. 17th International Conference on Heterocyclic Chemistry, Vienna, Austria, 1999

84. Kramer JB, Fry DW, Harvey P, Keller P, Sherwood V, and Showalter HDH. Synthesis and Biological Activity of a Novel Series of Pyrimidopyrimidinones as Inhibitors of

Cyclin-Dependent Kinases. 219th American Chemical Society National Meeting, San Francisco, CA, MEDI 2000: Abstract 40.

85. Showalter HDH, Hamby JM, Elliott WL, Johnson LL, Klohs WD, Omer CA, Lipka E. Tyrosine Kinase Inhibition As A Therapeutic Strategy To Regulate Tumor Angiogenesis. Program Book of the 27th National Medicinal Chemistry Symposium of the American Chemical Society. 2000:Abstract S-21

86. Harikrishnan LS, and Showalter HDH. Synthesis and Evaluation of 9-(Methoxymethoxy)anthracene as a Linker in Solid Phase Organic Synthesis, 29th Northeast Regional Meeting of the American Chemical Society, Storrs, CT, 2000:Abstract 66.

87. Smaill JB, Denny WA, Bridges AJ, Zhou H, McNamara DJ, Fry DW, Nelson JM, Sherwood V, Showalter HDH. 4-Anilinoquinazoline and 4-anilinopyrido[3,4-*d*]pyrimidines as Irreversible Inhibitors of the EGFR Tyrosine Kinase. SAR Around the Michael Acceptor. NCI-EORTC Conference, Amsterdam, Netherlands, 2000. Abstract 331.

88. Tran TP, Ellsworth EL, Sanchez JP, Werner KM, Stier MA, Blair SA, Watson BM, Showalter HDH, Domagala JM, Gracheck SJ, Shapiro MA, Huband MD, Gage JW, Joannides TE. Synthesis and Biological Evaluation of 3-Aminoquinazoline-2,4-diones as Antibacterial Agents. 2nd PGRD Med Chem Symposium, Ann Arbor, Michigan, 2002. Abstract 9

89. Limberakis C, Taylor C, Hoyer D, Showalter H, Hamby J, Deur C, Connolly C, Kramer J, Schroeder M, Winters R, Gan X, Reed J, Omer C, Spoon T, Delaney A, Elliot B, Gieseg M, Miller R, Ellis P, Hallek H, Cleton A, Marlatt M, Beylin V, Barr B, Coughenor L, Mathews A, Scholten J. Synthesis and Biological Evaluation Of Novel 1-Substituted Piperidinyl and Cyclohexyl Carboxy Aminopyrimido[4,5-*d*]pyrimidin-2-ones as Selective FGFR1 Inhibitors. 2nd PGRD Med Chem Symposium, Ann Arbor, Michigan, 2002. Abstract 79

90. Deur C, Hamby J, Showalter H, Schroeder M, Limberakis C, Winters R, Connolly C, Kramer J. Modulation Of Lck Activity Through Attenuation of Side Chain Basicity in FGFR Inhibitors. 2nd PGRD Med Chem Symposium, Ann Arbor, Michigan, 2002. Abstract 80.

91. Watson B, Hutchings K, Jalaie M, Powell S, Tran T, Ellsworth E, Huband M, Johnson G, Shapiro M, Piddington D, Barr B, Mathews A, Coughenour L, Scholten J, Showalter H, Li T, Yip J, Nguyen D, Sidhu I, Tajammul S, Khlebnikov V, Thomas G, Maiti S. 3-Aminoquinazoline-2,4-dione Antibacterial Agents – Developing an SAR to Defeat Binding to the Herg/Iκr Channel. 3rd PGRD Med Chem Symposium, Paris, France, 2002. Abstract A21.Ellsworth E, Showalter H, Tran T, Hutchings K, Powell S, Kuss T, Starr J, Limberakis C, Taylor C, Sciotti R, Gracheck S, Huband M, Joannides T. The Design, Properties, and Preparation of Fluroquinolones Demonstrating Extraordinary Antibacterial Activity Against Wild-type and Fluoroquinolone-resistant Organisms. A Back-up Strategy to DK-507k. 4th PGRD Med Chem Symposium, Alton Jones Conference Center, Rhode Island, 2003.

93. Heemstra KR, Boyer FE, Vara Prasad JVN, Showalter HD, Huband MD, Pagano PJ, VanderRoest S. The Synthesis of Oxazolidinones as Potential Antimicrobial Agents. PGRD Summer Intern Poster Showcase. Ann Arbor, Michigan, 2004.

94. Ellsworth E, Showalter H, Murphy S, Tran T, Hutchings K, Powell S, Limberakis C, Taylor C, Rauckhorst M, Haddock P, Marotti K. 3-Aminoquinazolinedione and Fluoroquinolone Antibacterial Agents – How to and not to Predict and Manage Cardiovascular Risk. 5th PGRD Medicinal Chemistry Symposium, West Dean College, Chichester, England, 2004.

95. Tran TP, Ellsworth EL, Sanchez JP, Watson BM, Stier MA, Hutchings KM, Powell SA, Showalter HDH, Domagala JM, Shapiro MA, Huband MD, Gage JW, Joannides ET, Gracheck SJ, Bird P, Nguyen DQ, Yip J, Li T, Tailor J, Singh R. 3-Amino-1*H*-Quinazoline-2,4-diones: a Novel Class of Antibacterial Agents. American Chemical Society National Meeting, San Diego, CA, 2005; Abstract 352.

96. Ellsworth EL , Tran TP, Showalter HDH, Sanchez JP, Watson BM, Stier MA, Domagala JM, Nguyen DQ, Singh R, Gracheck S, Joannides ET, Shapiro MA, Dunham SA, Hanna DL, Huband MD, Gage JW, Bronstein JC. 3-Aminoquinzolinediones (3-AQDs) as Novel Bacterial Topoisomerase Inhibitors. Gordon Conference on New Antibacterial Discovery & Development. Ventura, CA, 2006.

97. Kirchhoff P, Lee H, Showalter H. Medicinal Chemistry Core Synthesis Laboratory. College of Pharmacy First Annual Science Symposium, University of Michigan, Ann Arbor, MI, 2006.

98. Fribley AM, Larsen MJ, Cai Y, Nerula N, Neubig RR, Showalter HD, Kaufman RJ. Complementary High Throughput Genomic Screens Identify Small Molecule Inhibitors of Unfolded Protein Response Signaling. Annual Life Sciences Institute Poster Session, University of Michigan, Ann Arbor, MI, 2007.

99. Brooks A, Jin Y, Kirchhoff P, Turbiak A, Showalter H. Showalter Research Group and Medicinal Chemistry Core Synthesis Laboratory (MCCSL). 19th Annual Cancer Research Symposium, University of Michigan, 2007.

100. Evelyn CR, Ryu JG, Larsen SD, Showalter HD, Neubig RR. Structure Activity Relationship Study of CCG-1423, an Inhibitor of Rho/MKL1-stimulated Gene Transcription. 99th Annual Meeting of the American Association for Cancer Research, San Diego, CA, 2008:Abstract 4776.

101. Turbiak A, Bommer G, Fearon E, Showalter, H. New Antagonists of the β-catenin/Tcf Complex. Annual Pharmacological Sciences Training Grant (PSTP) Symposium, University of Michigan, Ann Arbor, MI, 2008.

102. Fribley AM, Larsen MJ, Cai P, Nerula N, Showalter HD, Neubig RR, Larsen S, Kaufman RJ. Complementary Cell-Based Screens Identify Specific Inhibitors of the Unfolded Protein Response Apoptotic Sub-Pathway and Reduce False Positive Hits. 14th Annual Conference of the Society for Biomolecular Sciences, St. Louis, MO, 2008.

103. Turbiak A, Bommer G, Fearon E, Showalter, H. New Antagonists of the β-catenin/Tcf Complex. 236th American Chemical Society National Meeting, Philadelphia, PA, 2008. Abstract 464.

104. Evelyn CR, Wade SM, Larsen SD, Showalter HD, Merajver S, Neubig RR. Small Molecule Inhibitors of the Rho/MKL1 Transcriptional Pathway Identified by High Throughput Screening and Structure Activity Relationship Studies. National Institutes of Health, 2008.

105. Evelyn CR, Wade SM, Larsen SD, Showalter HD, Merajver S, Neubig RR. Small Molecule Inhibitors of the Rho/MKL1 Transcriptional Pathway Identified by High Throughput Screening and Structure Activity Relationship Studies. Life Sciences Advisory Board Meeting, University of Michigan, Ann Arbor, MI, 2008.

106. Okawada M, Koga H, Larsen SD, Showalter HD, Turbiak AJ, Jin X, Lucas PC, Teitelbaum DH. Use of Enterally-delivered Angiotensin II Type Ia Receptor Antagonists to Reduce the Severity of Colitis. Annual Moses Gunn Surgery Conference, University of Michigan, Ann Arbor, MI, 2009.

107. Okawada M, Koga H, Larsen SD, Showalter HD, Turbiak AJ, Jin X, Lucas PC, Teitelbaum DH. Use of Enterally-delivered Angiotensin II Type Ia Receptor Antagonists to Reduce the Severity of Colitis. Digestive Disease Week of American Gastroenterology Association Annual Conference, Chicago, IL, 2009.

108. Turbiak A, Bommer G, Fearon E, Showalter, H. Synthesis and Evaluation of Potential New Antagonists of the β-Catenin/Tcf Complex. Gordon Research Conference on Medicinal Chemistry, New London, NH, 2009.

109. Turbiak A, Bommer G, Fearon E, Showalter, H. Synthesis and Evaluation of Potential New Antagonists of the β-Catenin/Tcf Complex. 238th American Chemical Society National Meeting, Washington, DC, 2009. Abstract 203.

110. Peterson LF, Turbiak AJ, Giannola D, Donato NJ, Showalter HDH, Fearon ER, Talpaz M. Wnt-pathway directed compound targets blast crisis and chronic phase CML leukemia stem progenitors. 51st Annual Meeting of the American Society of Hematology, New Orleans, LA, 2009.

111. Brooks AF, Klesko JP, Garcia GA, Showalter HDH. Development of a Short, Concise Synthesis of Queuine and Related Congeners for Application to Radiolabeled Probes to Study their Prevalence and the Mechanism of tRNA-Guanine Transglycosylase. 14th Annual Contemporary Challenges in Chemistry - Pfizer Symposium, University of Michigan, Ann Arbor, MI, 2009.

112. Clifford-Nunn B, Maddock JR, Showalter HDH, Andrews PC. A New Category of Protein Crosslinkers for Protein Complexes. 58th ASMS Conference on Mass Spectrometry, Salt Lake City, UT, 2010; Abstract 689.

113. Brooks AF, Garcia GA, Showalter HDH. Synthesis of Tritium-labeled Queuine, Pre-Q_1, and Related Azide Probes. 30th Annual Graduate Student Symposium in the

Pharmacological Sciences and Bio-related Chemistry, University of Michigan, Ann Arbor, MI, 2010.

114. Brooks AF, Chen Y-C, Garcia GA, and Showalter HDH. Synthesis of Tritium Labeled Queuine, $PreQ_1$ and Related Azide Probes for Determining the Prevalence of Queuine in RNA. 32nd National Medicinal Chemistry Symposium, Minneapolis, MN, 2010; Abstract 47.

115. Velez CS, Brooks AF, Showalter HDH, and Garcia GA. Determining the Prevalence of Queuine in *Escherichia coli* RNA. Regional Chemistry REU Symposium, Hope College, Holland, MI, 2010.

116. Brooks AF, Chen Y-C, Garcia GA, and Showalter HDH. Synthesis of Tritium Labeled Queuine, $PreQ_1$ and Related Azide Probes for Determining the Prevalence of Queuine in RNA. Novartis Symposium, University of Michigan, 2010.

117. Velez CS, Brooks AF, Showalter HDH, and Garcia GA. Determining the Prevalence of Queuine in *Escherichia coli* RNA. 2010 Annual Biomedical Research Conference for Minority Students (ABRCMS), Charlotte, NC, 2010.

118. Chen Y-C, Brooks AF, Goodenough-Lashua DM, Kittendorf JD, Showalter HDH, and Garcia GA. Evolution of tRNA-Guanine Transglycosylase: Insight Gained from the Heterocyclic Substrate Recognition by the Human and *E. coli* tRNA-Guanine Transglycosylases. 30th Midwest Enzyme Chemistry Conference, Evanston, IL, 2010.

119. Zeller J, Turbiak A, Powelson I, Lee S, Bommer G, Kim E, Zhai Y, Cho K, Showalter H, and Fearon E. Identification of Small Molecule Wnt/β-Catenin Antagonists. 22nd Annual Cancer Research Symposium, University of Michigan, 2010; Poster 66.

120. Showalter H and Larsen S. Vahlteich Medicinal Chemistry Core. 22nd Annual Cancer Research Symposium, University of Michigan, 2010; Poster 71.

121. Brooks AF, Garcia GA, and Showalter HD. Evaluation of Azide Congeners of $PreQ_1$ as Substrates for tRNA Guanine Transglycosylase. 241st American Chemical Society National Meeting, Anaheim, CA, 2011. Abstract MEDI-237.

122. Brooks AF, Velez CS, Showalter HD, and Garcia GA. Investigating the Prevalence of Queuine in *Escherichia coli* RNA via Incorporation of Tritium Labeled Precursor, $PreQ_1$. 241st American Chemical Society National Meeting, Anaheim, CA, 2011. Abstract MEDI-19.

123. Brooks AF, Velez CS, Showalter HD, and Garcia GA. Investigating the Prevalence of Queuine in *Escherichia coli* RNA via Incorporation of Tritium Labeled Precursor, $PreQ_1$. 241st American Chemical Society National Meeting, Anaheim, CA, 2011. Abstract MEDI-236.

124. Brooks, A.F., Showalter, H.D.H. and Garcia, G.A., "Evaluation of Azide Congeners of PreQ1 as Substrates for tRNA Guanine Transglycosylase", 241st ACS

National Meeting, Anaheim, CA, 2011.

125. Brooks AF, Velez CS, Showalter HD, and Garcia GA. Investigating the Prevalence of Queuine in *Escherichia coli* RNA via Incorporation of Tritium Labeled Precursor, $PreQ_1$. 31st Annual Graduate Student Symposium in the Pharmacological Sciences and Bio-related Chemistry, University of Michigan, Ann Arbor, MI, 2011.

126. Abulwerdi FA, DiBernardo J, Showalter HD, Nikolovska-Coleska Z. Development of Novel Small Molecule Mcl-1 Inhibitors. 31st Annual Graduate Student Symposium in the Pharmacological Sciences and Bio-related Chemistry, University of Michigan, Ann Arbor, MI, 2011.

127. Peterson LF, Sun H, Young M, Showalter HD, Talpaz M, Donato NJ. Mechanism of Action of a Small Molecule Inhibitor that Targets Usp9x Deubiquitinase Activity in Multiple Myeloma and Mantle Cell Lymphoma. American Society of Hematology Annual Meeting, San Diego, CA, 2011.

128. Zeller J, Turbiak A, Powelson I, Lee S, Showalter H, Fearon ER. Identification and characterization of small molecule Wnt/ β-catenin/Tcf pathway antagonists. 19th Annual Internal Medicine Research Symposium, University of Michigan, 2011.

129. Abulwerdi FA, DiBernardo J, Showalter HD, Nikolovska-Coleska Z. Development of Novel Small Molecule Mcl-1 Inhibitors. 23rd Annual Cancer Research Symposium, University of Michigan, Ann Arbor, MI, 2011.

130. Abulwerdi FA, DiBernardo J, Showalter HD, Nikolovska-Coleska Z. Development of Novel Small Molecule Mcl-1 Inhibitors. 10th Annual Molecular and Cellular Pathology Symposium, Ann Arbor, MI, 2011

131. Gill S, Jin Y, Showalter HDH, Garcia GA. Screening of Novel C-8 Substituted Rifamycin Analogues. 31st Midwest Enzyme Chemistry Conference, Chicago, IL, 2011.

132. Abulwerdi F, Liao C, Mady A, Asfar A, Cierpicki T, Showalter HD, Mohammad R, Nikolovska-Coleska Z. Development of Novel Small-Molecule Mcl-1 Inhibitors. Novartis Symposium, University of Michigan, 2011.

133. Gill, S.K., Showalter, H.D.H. and Garcia, G.A., "Characterization of rifamycin-resistant Mycobacterium tuberculosis RNA polymerases", Experimental Biology 2012, San Diego, CA,, 2011.

134. Larsen S, Keep R, Abe A, Shu L, Wilson M, Kirchhoff P, Showalter HDH, Xiang J, Shayman J. The Property Based Design of Inhibitors of Glycosphingolipid Synthesis that Act Within the Central Nervous System. Lysozomal Disease Network World Symposium San Diego, CA, 2012.

135. Bajwa N, Abulwerdi FA, Liao C, Mady A, Di Bernardo J, Asfar A, Cierpicki T, Stuckey J, Showalter HD, Mohammad R, Nikolovska-Coleska Z. Design, Synthesis and Biological Evaluation of Two Chemical Classes as Novel Small Molecule Mcl-1

Inhibitors. 103th Annual Meeting of the American Association for Cancer Research, Chicago , IL, 2012:Abstract 2917.

136. Abulwerdi FA, Liao C, Mady A, Di Bernardo J, Asfar A, Cierpicki T, Stuckey J, Showalter HD, Mohammad R, Nikolovska-Coleska Z. Design, Synthesis and Biological Evaluation of Substituted Sulfonamido-1-hydroxynaphthalene Compounds as Novel Small-Molecule Mcl-1 Inhibitors. 243rd American Chemical Society National Meeting, San Diego, CA, 2012. Abstract MEDI-322.

137. Gill S, Showalter HD, Garcia GA. Characterization of Rifamycin-resistant Mycobacterium tuberculosis RNA Polymerases. Annual Meeting of the American Society for Biochemistry and Molecular Biology, San Diego, CA, 2012.

138. Zeller J, Turbiak AJ, Powelson IA, Lee S, Showalter HDH, Fearon ER. Identification and characterization of small molecule Wnt/β-catenin/TCF pathway antagonists. Meeting on Mechanisms and Models of Cancer, Cold Spring Harbor, NY, 2012.

139. Rubin R, Cates A, Day K, Wilson S, El-Sawy L, Brown C, Sorenson R , Showalter H, Day M. Target Specific Adam Inhibitors Deliniate the Specific Roles of Adam Disintegrins in Breast and GU Tumor Progression. Cancer Center Research Fall Symposium, University of Michigan, Ann Arbor, MI, 2012.

140. Abulwerdi FA, Mady ASA, Liao C, Gavin J, Du Y, Fu H, Stuckey JA, Showalter HD, Nikolovska-Coleska Z. Structure-based Design and Development of Novel Small Molecule Inhibitors of Mcl-1. Gordon Research Conference on High Throughput Chemistry and Chemical Biology, Colby-Sawyer College, New London, NH, 2013.

141. Murai M, Bao A, Sun H, Kirchhoff P, Peterson L, Talpaz M, Ermann M, Showalter H, Donato NJ, Young MA. Small Molecule Deubiquitinase Inhibitor Cancer. Therapeutics. Keystone Symposia on Molecular and Cellular Biology, Big Sky, MT, 2014.

142. Abulwerdi FA, Mady ASA, Perdih A, Stuckey JA, Showalter HD, Nikolovska-Coleska Z. Structure-based Design and Development of Pyrazolopyridine-based Inhibitors of Mcl-1 105th Annual Meeting of the American Association for Cancer Research, San Diego, CA, 2014:Abstract 1641.

143. Nawarathne IN, Scharf NT, Molodtsov V, Kirchhoff PD, Murakami KS, Garcia GA, Showalter HDH. Studies Directed toward the Design of Benzoxazinorifamycins less Susceptible to Emerging Resistance. 247th American Chemical Society National Meeting, Dallas, TX, 2014. Abstract MEDI-156.

144. Walker A, Piersimoni L, Zhang C, Kyong Kweon H, Tse E, Clifford-Nunn B, Maddock J, Southworth D, Showalter H, Andrews P. Applications of New Reagents for in vitro and in vivo Chemical Crosslinking of Protein Complexes by Mass Spectrometry (CXL-MS). American Society for Mass Spectrometry, June 2014.

145. Jin Y, Kirchhoff PD, Sun H, Pal A, Potu H, Peterson L, Liu Y, Bao Z-Q, Murai

M, Talpaz M, Sun D, Young MA, Donato NJ, Ermann M, Courtney SM, Showalter HD. Deubiquitinases: the New Kinases in Human Medicine. 34th National Medicinal Chemistry Symposium, Charleston, SC, May 2014.

146. Ermann M, Morao I, Courtney SM, Showalter HD, Jin Y, Kirchhoff PD, Young MA, Donato NJ. Tuning Covalent Reactivity: A Chemist's Toolbox. 34th National Medicinal Chemistry Symposium, Charleston, SC, May 2014.

147. Piersimoni L, Walker A, Kweon H-K, Showalter HD; Andrews PC. Structural MS Analysis of Aldolase Using a Dual Crosslinker Approach and the New CID-cleavable Crosslinker, MC4. 63rd ASMS Conference on Mass Spectrometry, St. Louis, MO, 2015; Abstract 2934.

148. Carpenter C, Mikelman S, Showalter H, Gnegy M. Novel CNS-Permeant PKC Inhibitor and Tamoxifen Analog Reduces Amphetamine Neurochemical and Behavioral Effects. Annual Meeting of the American Society for Pharmacology and Experimental Therapeutics at Experimental Biology, Boston, MA, 2015; Poster D16.

149. Nawarathne IN, Scharf NT, Stefan MA, Molodtsov V, Kirchhoff PD, Murakami KS, Garcia GA, Showalter HD. A Search for Novel Rifamycins and Small Molecule Leads against *M. Tuberculosis* RNA Polymerase. Joint Meeting of the Great Lakes and Central Regions of the American Chemical Society, Grand Rapids, MI, 2015.

150. Piersimoni L, Walker A, Kyong Kweon H, Showalter HD, Andrews PC. Structural MS Analysis of Aldolase Using a Dual Crosslinker Approach and the New CID-cleavable Crosslinker, MC4. American Society for Mass Spectrometry, St. Louis, MO, 2015.

151. Piersimoni L, Walker A, Showalter H, Kyong Kweon H, Maddock J, Andrews P. Structural MS Analysis of Aldolase Using a Dual CID-Cleavable Crosslinker Approach. 2nd Annual Protein Folding Diseases Initiative Symposium. University of Michigan, Ann Arbor, MI, 2015.

152. Carpenter C, Altshuler R, Zestos A, Sorenson R, Jutkiewicz E, Kennedy R, Showalter H, Gnegy M. Revisiting the Tamoxifen Scaffold for Therapeutics against Amphetamine Abuse. Annual Meeting of the American Society for Pharmacology and Experimental Therapeutics at Experimental Biology, San Diego, CA, 2016

153. Carpenter C, Zestos A, Sorenson R, Kennedy R, Showalter H, Gnegy M. A Tamoxifen Analog is an Asymmetric Dopamine Transporter Modulator and Reduces Amphetamine *in vitro* and *in vivo*. Annual Meeting of the British Pharmacology Society, London, UK, 2016.

154. Piersimoni L, Plasencia MD, Showalter HD, Andrews PC. Crosslinking Mass Spectrometry (XL-MS) Probes Changes in Protein Domain Structures and Distinguishes Rigid from Flexible Domains. American Society for Mass Spectrometry, Indianapolis, IN, 2017.

155. Piersimoni L, Polasky D, Plasencia MD, Liu K, Showalter HD, Ruotolo B,

Andrews PC. Crosslinking MS and Ion Mobility MS Provide Complementary Information on Changes in Protein Secondary, Tertiary, and Quaternary Structures. Advancing Mass Spectrometry for Biophysics and Structural Biology Meeting, Ann Arbor, MI, 2017.

156. Garcia GA, Scharf N, Ashkar S, Rajeswaran W, Showalter H, White A. Antibiotic Discovery for Tuberculosis: Returning to a "Golden Target", RNA Polymerase. Tuberculosis Drug Discovery and Development Gordon Research Seminar, Lucca, Italy, 2017

157. Piersimoni L, Polasky D, Plasencia MD, Liu K, Showalter HD, Tse E, Southworth D, Ruotolo B, Andrews PC. Crosslinking MS and Ion Mobility MS Provide Complementary Information on Protein Structural Changes. 7th Symposium on Structural Proteomics, Vienna, Austria, 2017.

158. Garcia, G.A., Scharf, N.T., Ashkar, S.R., Rajeswaran, R., Showalter, H., and White, A., "Antibiotic Discovery for Tuberculosis: Returning to a "Golden Target", RNA Polymerase", MichBio Symposium, Wayne State University, Detroit, MI, 2017

159. Leon DR, McDonald AJ, Heckendorf CF, Showalter HD, McComb ME, Andrews PC; Harris DA, Costello CE. Identification and Quantification of a Prion Protein Tertiary Structural Interaction Using APDC4, a Novel Mass Spectrometry Cleavable Cross-Linker. American Society for Mass Spectrometry, San Diego, CA, 2018.

160. Piersimoni L, Tse E, Wiggin A, Southworth D, Showalter H, Andrews PC. Crosslinking Mass Spectrometry to Probe Solution Conformations of Tau as Monomer and in Triage Complex. American Society for Mass Spectrometry, San Diego, CA, 2018.

161. Ashkar, S.R., Rajeswaran, W., Showalter, H.D.H., White, A., Sherman, D.H., Tripathi, A. and Garcia, G.A., "Development of novel inhibitors for Rifamycin-resistant RNA polymerase of Mycobacterium tuberculosis", Tuberculosis Drug Discovery & Development Gordon Research Conference, Castelldefels, Spain, 2019.

REVIEWS, BOOK CHAPTERS

1. Jackson RC, Fry DW, Leopold WR, Sebolt JS, Klohs WD, Showalter HDH, Werbel LM, Elslager EF. Biochemical Pharmacology and Experimental Chemotherapy Studies with the Anthrapyrazole CI-937, a Synthetic Intercalating Agent with Broad-spectrum Murine Anticancer Activity. In: Recent Advances in Chemotherapy: Anticancer Section. J. Ishigami, ed, University of Tokyo Press, Tokyo, 1985;568-9.

2. Hicks JL, Huang CC, Showalter HDH. Synthesis of Double Carbon-14 Labeled CI-937, a Potential New Anticancer Drug. In: Synthesis and Applications of Isotopically Labeled Compounds 1985. R. R. Muccino, ed, Elsevier Science Publishers B.V., Amsterdam, 1986;305-6.

3. Showalter HDH, Fry DW, Leopold WR, Lown JW, Plambeck JA, Reszka K. Design, Biochemical Pharmacology, Electrochemistry, and Tumor Biology of Antitumor Anthrapyrazoles. Anti-Cancer Drug Des. 1986;1:73-85.

4. Werbel LM, Elslager EF, Fry DW, Jackson RC, Leopold WR, Showalter HDH. 5-Aminoanthrapyrazoles (CI-937; CI-941; CI-942). A Novel Class of DNA Binders with Broad-spectrum Anticancer Activity. In: New Avenues in Developmental Cancer Chemotherapy. Bristol-Myers Cancer Symposia, Vol 8, Harrap KR, Connors TA, eds, Academic Press 1987;355-65.

5. Showalter HDH, Werbel LM, Leopold WR, Fry DW, Klohs WD, Jackson RC. Design, Tumor Biology, and Biochemical Pharmacology of Anthrapyrazoles. In: Anthracycline and Anthracenedione-Based Anticancer Agents. Lown JW, ed, Elsevier Science Publishers B.V., Amsterdam, 1988;201-43.

6. Iyengar BS, Dorr RT, Remers WA, Kowal CD, Showalter HDH. Nucleotide Derivatives of 2,7-Diaminomitosene. Chemtracts: Org. Chem. 1989;2:13-6.

7. Thurston LS, Imakura Y, Harunda M,Li D-H, Showalter HDH. Antitumor Agents. 100. Inhibition of Human DNA Topoisomerase II by Cytotoxic Ether and Ester Derivatives of Podophyllotoxin and α-Peltatin. Chemtracts: Org. Chem. 1989;2:310-3.

8. Temple C Jr, Rener GA, Comber RN, Showalter HDH. New Anticancer Agents: Alterations of the Carbamate Group of Ethyl (5-Amino-1,2-dihydro-3-phenylpyrido[3,4-*b*]pyrazin-7-yl)carbamates. Chemtracts: Org. Chem. 1990;3:143-6.

9. Riley TA, Larson SB, Avery TL, Finch RA, Robins RK, Showalter HDH. 1,2,4-Diazaphosphole Nucleosides. Synthesis, Structure, and Antitumor Activity of Nucleosides with a γ3 Phosphorous Atom. Chemtracts: Org. Chem. 1990;3:311-3.

10. Farrell N, Qu Y, Hacker MP, Showalter HDH. Cytotoxicity and Antitumor Activity of Bis(platinum) Complexes. A Novel Class of Platinum Complexes Active in Cell Lines Resistant to Both Cisplatin and 1,2-Diaminocyclohexane Complexes. Chemtracts: Org. Chem. 1990;3:471-4.

11. Rewcastle GW, Atwell GJ, Zhaung L, Baguley BC, Denny WA, Showalter HDH. Potential Antitumor Agents. 61. Structure-Activity Relationships for In Vivo Colon 38 Activity Among Disubstituted 9-Oxo-9*H*-xanthene-4-acetic Acids. Chemtracts: Org. Chem. 1991;4:168-71.

12. Showalter HDH, Putt SR, Baker DC. 3-[2-Deoxy-3,5-di-*O*-*p*-toluoyl-ß(and α)-*D*-*erythro*-pentofuranosyl]-6,7-dihydroimidazo[4,5-*d*][1,3]diazepin-8(3*H*)-one. Regiospecific glycosylation of 6,7-dihydroimidazo[4,5-*d*][1,3]diazepin-8(3*H*)-one. In: Improved and New Synthetic Procedures, Methods and Techniques in Nucleic Acid Chemistry Vol 4, Townsend LB, Tipson RS, eds, John Wiley & Sons, Inc, 1991;308-13.

13. Islam I, Skibo EB, Dorr RT, Alberts DS, Showalter HDH. Structure-Activity Studies of Antitumor Agents Based on Pyrrolo[1,2-*a*]benzimidazoles: New Reductive Alkylating DNA Cleaving Agents. Chemtracts: Org. Chem. 1992;5:166-70.

14. Huang CC, Hicks JL, Showalter HDH. Synthesis of Multiple ^{14}C-Labeled 2,6-Dichloro-3-nitrobenzoic Acid and its Incorporation in the Synthesis of [^{14}C]CI-958, a Potential Anticancer Agent. In: Synthesis and Applications of Isotopically Labelled Compounds 1991. Buncel E, Kabalka GW, eds, Elsevier, 1992;187-92.

15. Taylor EC, Kuhnt D, Shih C, Rinzel SM, Grindey GB, Barredo J, Jannatipour M, Moran RG, Showalter HDH. A Dideazatetrahydrofolate Analogue Lacking a Chiral Center at C-6, *N*-[4-[2-(2-Amino-3,4-dihydro-4-oxo-7*H*-pyrrolo[2,3-*d*]pyrimidin-5-yl)ethyl]benzoyl]-*L*-glutamic Acid, is an Inhibitor of Thymidylate Synthase. Chemtracts: Org. Chem. 1993;6:63-6.

16. Burke TR Jr, Lim B, Marquez VE, Li Z-H, Bolen JB, Stefanova I, Horak ID, Showalter HDH. Bicyclic Compounds as Ring-Constrained Inhibitors of Protein Tyrosine Kinase p56^{lck}. Chemtracts: Org. Chem. 1993;6:258-61.

17. Hatanaka Y, Hashimoto M, Kurihara H, Nakayama H, Kanaoka Y, Sun L, Showalter, HDH. A Novel Family of Aromatic Diazirines for Photoaffinity Labeling. Chemtracts: Org. Chem. 1994;7:235-7.

18. Trinks U, Buchdunger E, Furet P, Kump W, Mett H, Meyer T, Muller M, Regenass U, Rihs G, Lydon N, Traxler P, Showalter HDH. Dianilinophthalimides: Potent and Selective ATP-Competitive Inhibitors of the EGF-Receptor Protein Tyrosine Kinase. Chemtracts: Org. Chem. 1994;7:257-61.

19. Kick EK, Ellman JA, Boehm TI, Showalter HDH . Expedient Method for the Solid-Phase Synthesis of Aspartic Acid Protease Inhibiors Directed Toward the Generation of Libraries. Chemtracts: Org. Chem. 1995;8:331-5.

20. Plunkett MJ, Ellman JA, Chenera B, Finkelstein JA, Veber DF, Showalter HDH. A Silicon-Based Linker for Traceless Solid-Phase Synthesis**.** Protodetachable Arylsilane Polymer Linkages for Use in Solid Phase Organic Synthesis. Chemtracts: Org. Chem. 1996;9:231-6.

21. Kaldor SW, Siegel MG, Fritz JE, Dressman BA, Hahn PJ, Showalter HDH. Use of Solid Supported Nucleophiles and Electrophiles for the Purification of Non-Peptide Small Molecule Libraries. Chemtracts: Org. Chem. 1997;10:673-6.

22. Showalter HDH, Kraker AJ. Small Molecule Inhibitors of the Platelet-Derived Growth Factor Receptor, the Fibroblast Growth Factor Receptor, and Src Family Tyrosine Kinases. Pharmacol. Ther. 1997;76:55-71.

23. Traxler P, Bold G, Frei J, Lang M, Lydon N, Mett H, Buchdunger E, Meyer T, Mueller M, Furet P, Trumpp-Kallmeyer S, Showalter HDH. Use of a Pharmacophore Model for the Design of EGFr Tyrosine Kinase Inhibitors: 4-(Phenylamino)pyrazolo[3,4-*d*]pyrimidines. Chemtracts: Org. Chem. 1998;11:550-60.

24. White JR, Lee JM, Young PR, Hertzberg RP, Jurewicz AJ, Chaikin MA, Widdowson K, Foley JJ, Martin LD, Griswold DE, Sarau HM, Li JJ, Low JE, Showalter HDH.

Identification of a Potent, Selective Non-peptide CXCR2 Antagonist that Inhibits Interleukin-8-Induced Neutrophil Migration. Chemtracts: Org. Chem. 1999;12:57-60.

25. Hamby JM, Showalter HDH. Small Molecule Inhibitors Of Tumor-Promoted Angiogenesis, Including Protein Tyrosine Kinase Inhibitors. Pharmacol. Ther., 1999;82:169-193.

26. Macielag MJ, Demers JP, Fraga-Spano SA, Hlasta DJ, Johnson SG, Kanojia RM, Russell RK, Sui Z, Weidner-Wells MA, Werblood H, Foleno BD, Goldschmidt RM, Loeloff MJ, Webb GC, Barrett JF, Ellsworth EL, Olson ER and Showalter HDH. Substituted Salicylanilides as Inhibitors of Two-Component Regulatory Systems in Bacteria. Chemtracts: Org. Chem. 1999;12:656-661.

27. Rewcastle GW, Denny WA, Showalter HDH. Synthesis of 4-(Phenylamino)pyrimidine Derivatives as ATP-Competitive Protein Kinase Inhibitors with Potential for Cancer Chemotherapy, Curr. Org. Chem., 2000; 4:679-706.

28. Bridges AJ, Denny WA, Dobrusin EM, Doherty AM, Elliott WL, Fry DW, Hook K, Leopold WR, McNamara DJ, Nelson JW, Palmer BD, Patmore S, Rewcastle GW, Roberts BJ, Showalter HDH, Slintak V, Smaill JB, Thompson AM, Trumpp-Kallmeyer S, Vincent PW, Winters RT and Zhou H. The Ineradicable Impact of Irreversible Inhibitors: Can ErbBicide Contribute to the Tumouricide of EGFr-Dependent Cancers? In *Medicinal Chemistry into the Millennium*, M. C. Campbell and I. S. Blagbrough eds., Royal Society of Chemistry, Cambridge, England. 2001; 151-162.

29. Showalter HDH, Denny WA. A Roadmap for Drug Discovery and its Translation to Small Molecule Agents in Clinical Development for Tuberculosis Treatment. Tuberculosis, 2008; 88: Suppl 1:S3-S17. PMID:18762151

30. Aristoff PA, Garcia GA, Kirchhoff PD, Showalter HDH. Rifamycins – Obstacles and Opportunities. Tuberculosis, 2010; 90: 94-118; PMID: 20236863

31. Showalter HDH. Progress in the Synthesis of Canthine Alkaloids and Ring-Truncated Congeners. J. Nat. Prod., 2013; 76: 455 – 467; PMID: 23311415

32. Madak JT, Bankhead A III, Cuthbertson CR, Showalter HD, Neamati N. Revisiting the Role of Dihydroorotate Dehydrogenase (DHODH) as a Therapeutic Target for Cancer. Pharmacol. Therap., 2019; 195: 111-131; PMID: 30347213

33. Showalter, HD. Recent Progress in the Discovery and Development of 2-Nitroimidazooxazines and 6-Nitroimidazooxazoles to Treat Tuberculosis and Neglected Tropical Diseases. Molecules (Basel, Switzerland), 2020; 25: 4137. PMID: 32927749. PMID: 32927749https://doi.org/10.3390/molecules25184137

PEER-REVIEWED MANUSCRIPTS

1. Mitscher LA, Showalter HDH, Shipchandler MT, Leu RP, Beal JL. Antimicrobial Agents from Higher Plants. IV. Zanthoxylum Elephantiasis. Isolation and Identification of Canthin-6-one. Lloydia 1972;35:177-80.

2. Mitscher LA, Showalter HDH, Foltz RL. Chemical Ionization Mass Spectra of Macrolide Antibiotics. J. Chem. Soc., Chem. Commun. 1972;796-7.

3. Mitscher LA, Showalter HDH, Foltz RL. Chemical Ionization Mass Spectrometry of Some Representative 16-Membered Ring Macrolide Antibiotics. J. Antibiot. 1973;26:55-9.

4. Foltz RL, Fentiman AF Jr, Mitscher LA, Showalter HDH. Fragmentation Processes Occurring in Proton-transfer Chemical Ionization Mass Spectrometry. J. Chem. Soc., Chem. Commun. 1973;872-4.

5. Mitscher LA, Shipchandler MT, Showalter HDH, Bathala MS. Antimicrobial Agents from Higher Plants. Synthesis in the Canthin-6-one (6*H*-Indolo[3,2,1-*de*][1,5]-naphthyridin-6-one) Series. Heterocycles 1975;3:7-14.

6. Mitscher LA, Showalter HDH, Shirahata K, Foltz RL. Chemical Ionization Mass Spectrometry of Some Representative ß-lactam Antibiotics. J. Antibiot. 1975;28:668-75.

7. Mitscher LA, Clark GW III, Bokelman GH, Showalter HDH, Shirahata K, Hudson PB, Fager E, Wideburg N, Theriault RJ. Terrein, an Optically Active Prostaglandin Synthon of Fungal Origin. I. Chemical Conversion to a Corey-Type Lactone. Heterocycles 1977;7:779-86.

8. Wenkert E, Hudlicky T, Showalter HDH. Short Syntheses of Eburnamonine via ß-Oxycyclopropylcarbonyl and Related Intermediates. J. Am. Chem. Soc. 1978;100:4893-4

9. Wenkert E, Gottlieb HE, Showalter HDH. A Pathway of Synthesis Toward the Aspidosperma Alkaloids. Synth. Commun. 1979;9:505-13.

10. Showalter HDH, Shipchandler MT, Mitscher LA, Hagaman EW. A Facile Entry into the Thiazolo[3,2-*a*]-indol-3(2*H*)-one System via an Unusual Reaction with Thionyl Chloride. J. Org. Chem. 1979;44:3994-6.

11. Showalter HDH, Haskell TH. Functionalization of Substituted 2-(1*H*)pyridones. I. A Novel Synthesis of α-Arylglyoxylates and Related Systems. J. Heterocycl. Chem. 1981;18:367-70.

12. Putt SR, Hartman JD, Showalter HDH, Kepler JA, Taylor G. Synthesis of [8-^{3}H]Pentostatin. J. Labelled Compd. Radiopharm. 1981;18:925-31.

13. Showalter HDH, Putt SR. Studies Related to the Total Synthesis of Pentostatin. An Efficient, Regiospecific Glycosylation of 6,7-Dihydroimidazo[4,5-*d*][1,2]diazepin-8(3*H*)-one and Related Homologs. Tetrahedron Lett. 1981;22:3155-8.

14. Wenkert E, Halls TDJ, Kwart LD, Magnusson G, Showalter HDH. Total Syntheses of Eburnamonine, Quebrachamine, Vincadine, and Epivincadine. Tetrahedron 1981;37:4017-25.

15. Domagala JM, Haskell TH, Showalter HDH. Semisynthetic Cephalosporins with α-Oximino Acid Side Chains. The Preparation and Coupling of 4-Acylamino-α-oximinobenzeneacetic acids and 1,2-Dihydro-6-methyl-α-oximino-2-oxo-3-pyridineacetic Acid to 7-Aminocephalosporanic Acid. J. Antibiot. 1981;34:1447-55.

16. Showalter HDH, Domagala JM, Sanchez JP. Functionalization of Substituted 2-(1*H*)pyridones. II. Synthetic Pathways to C-6 Modified 3-Cyano- and 3-Carboxy-2-(1*H*)pyridones from a Common Precursor. J. Heterocycl. Chem. 1981;18:1609-12.

17. Chan E, Putt SR, Showalter HDH, Baker DC. A Total Synthesis of (*R*)-3-(2-Deoxy-ß-*D*-*erythro*pentofuransyl)-3,6,7,8-tetrahydroimidazo[4,5-*d*][1,3]diazepin-8-ol (Pentostatin), the Potent Inhibitor of Adenosine Deaminase. J. Org. Chem. 1982;47:3457-64.

18. Baker DC, Putt SR, Showalter HDH. Studies Related to the Total Synthesis of Pentostatin. Approaches to the Synthesis of (8*R*)-3,6,7,8-Tetrahydroimidazo[4,5-*d*][1,3]diazepin-8-ol and N-3 Alkyl Congeners. J. Heterocycl. Chem. 1983;20:629-34.

19. Showalter HDH, Putt SR, Borondy PE, Shillis JL. Adenosine Deaminase Inhibitors. Synthesis and Biological Evaluation of (±)-3,6,7,8-Tetrahydro-3-[(2-hydroxyethoxy)methyl]imidazo[4,5-*d*][1,3]diazepin-8-ol and Some Selected C-5 Homologues of Pentostatin. J. Med. Chem. 1983;26:1478-82.

20. Hawkins LD, Hanvey JC, Boyd FL Jr, Baker DC, Showalter HDH. Inhibitors of Adenosine Deaminase. Synthesis of Coformycin and 3-Deoxycoformycin. Nucleosides Nucleotides 1983;2:479-94.

21. Showalter HDH, Johnson JL,Werbel L, Leopold MWR, Jackson RC, Elslager EF. 5-[(Aminoalkyl)amino]-substituted Anthra[1,9-*cd*]pyrazol-6(2*H*)-ones as Novel Anticancer Agents. Synthesis and Biological Evaluation. J. Med. Chem. 1984;27:253-5.

22. Johnson JL, Showalter HDH. Studies in the Synthesis of Halogenated Anthraquinones. I. A Convenient Preparation of 1,4-Dichloro-5-hydroxy-9,10-anthracenedione. Org. Prep. Proced. Int. 1984;16:85-9.

23. Showalter HDH, Hoftiezer JM. Studies in the Synthesis of Halogenated Anthraquinones. II. A Facile Preparation of 1,4-Dichloro-5,6,7-trihydroxy-9,10-anthracenedione (5,8-Dichloropurpurin). Org. Prep. Proced. Int. 1984;16:309-14.

24. Showalter HDH, Berman EM, Johnson JL, Atwood JL,Hunter WE. A Facile Synthesis of Functionalized 9,10-Anthracenediones via Tosylate and Triflate Phenolic Activation. Tetrahedron Lett. 1985;26:157-60.

25. Showalter HDH, Johnson JL, Hoftiezer JM. Heteroannulated-9,10-anthracenediones. The Synthesis of Substituted 5- and 7-Chloroanthra[1,9-*cd*]pyrazol-6(2*H*)-ones, Precursors to Anticancer Anthrapyrazoles. J. Heterocycl. Chem. 1986;23:1491-1501.

26. Showalter HDH, Johnson JL, Hoftiezer JM, Turner WR,Werbel LM, Leopold WR, ShillisJL, Jackson RC, Elslager EF. Anthrapyrazole Anticancer Agents. Synthesis and Structure-Activity Relationships against Murine Leukemias. J. Med. Chem. 1987;30:121-31.

27. Hicks JL, Huang CC, Showalter HDH. Synthesis of Double Carbon-14 Labeled CI-937 and CI-942, Potential New Anticancer Drugs. J. Labelled Compd. Radiopharm. 1987;24:1209-20.

28. Showalter HDH, Angelo MM, Berman EM, Kanter GD, Ortwine DF, Ross-Kesten SG, Sercel AD, Turner WR, Werbel LM, Worth DF, Elslager EF,Leopold WR, Shillis JL. Benzothiopyranoindazoles, A New Class of Chromophore Modified Anthracenedione Anticancer Agents. Synthesis and Activity Against Murine Leukemias. J. Med. Chem. 1988;31:1527-39.

29. Winters RT, Sercel AD, Showalter HDH. Efficient Synthesis of Peri-Hydroxylated 9,10-Anthracenedione Ethers via Alkylation of Cesium Phenolates. Synthesis 1988;712-4.

30. Beylin VG, Colbry NL, Goel OP, Haky JE, Johnson DR, Johnson JL, Kanter GD, Leeds RL, Leja B, Lewis EP, Rithner CD, Showalter HDH, Sercel AD, Turner WR, Uhlendorf SE. Anticancer Anthrapyrazoles. Improved Syntheses of Clinical Agents CI-937, CI-941, and Piroxantrone. J. Heterocycl. Chem. 1989;26:85-96.

31. Nordbloom GD, Pachla LA, Showalter HDH, Chang T, Whitfield LR. Development of a ^{125}I-Radioimmunoassay for CI-937 in Rat Plasma. Cancer Res. 1989;49:5345-51.

32. Brennan ST, Colbry NL, Leeds RL, Leja B, Priebe SR, Reily MD, Showalter HDH, Uhlendorf SE, Atwell GJ, Denny WA. Anticancer Anilinoacridines. A Process Synthesis of the Disubstituted Amsacrine Analog CI-921. J. Heterocycl. Chem. 1989;26:1469-76.

33. Berman EM,Showalter HDH. Trimethylsilyl Polyphosphate for Intramolecular Friedel-Crafts Cyclizations. J. Org. Chem. 1989;54:5642-4.

34. Beylin VG, Colbry NL, Giordani AB, Goel OP, Johnson DR, Leeds RL, Leja B, Lewis EP, Lustgarten DM, Showalter HDH, Sercel AD, Reily MD, McDonnell P, Uhlendorf SE, Zisek KA. An Improved Synthesis of Anticancer Benzothiopyranoindazoles. An Efficient Large-scale ß-Aminoethylation Procedure. J Heterocycl. Chem. 1991;28:517-27.

35. Showalter HDH, Winters RT, Sercel AD, Michel A. Facile Synthesis of Thioglucose Analogs of the Anticancer Agent Etoposide. Tetrahedron Lett. 1991;32:2849-52.

36. Showalter HDH, Pohlmann G. An Improved Synthesis of 4,7-Dimethoxy-1*H*-indole. Org. Prep. Proced. Int. 1992;24:484-8.

37. Kraker AJ, Hoeschele JD, Elliott WL, Showalter HDH, Sercel AD, Farrell NP. Anticancer Activity in Murine and Human Tumor Cell Lines of Bis(platinum)

Complexes Incorporating Straight-Chain Aliphatic Diamine Linker Groups. J. Med. Chem. 1992;35:4526-32.

38. Showalter HDH, Bunge RH, French JC, Hurley TR, Leeds RL, Leja B, McDonnell PD, Edmunds CR. Improved Production of Pentostatin and Identification of Fermentation Cometabolites. J. Antibiot. 1992;45:1914-18.

39. Showalter HDH, Turner WR. Anticancer Anthrapyrazoles. Synthetic Pathways to 5-NO_2 and 5-NH_2 Analogs. J. Heterocycl. Chem. 1993;30:493-6.

40. Naylor MA, Threadgill MD, Showalter HDH, Stratford IJ, Stephens MA, Fielden EM, Adams GE. Synthesis of the Enantiomers of the Bioreductively-Activated Cytotoxin RSU-1069 and its Prodrug RB-6145 and Lack of Stereoselectivity in Their Cytotoxicity and Radiosensitization In Vitro. Drug Des. Discovery 1993;10:249-55.

41. Hoeschele JD, Showalter HDH, Kraker AJ, Elliott WL, Roberts BJ, Kampf J. Synthesis, Structural Characterization, and Antitumor Properties of a Novel Class of Large-Ring Platinum(II) Chelate Complexes Incorporating the *cis*-1,4-Diaminocyclohexane Ligand in a Unique Locked Boat Conformation. J. Med. Chem. 1994;37:2630-6.

42. Fry DW, Kraker AJ, Connors RC, Elliott WL, Nelson JM, Showalter HDH, Leopold WR. Strategies for the Discovery of Novel Tyrosine Kinase Inhibitors with Anticancer Activity. Anti-Cancer Drug Des. 1994;9:331-51.

43. Palmer BD, Rewcastle GW, Thompson AM, Boyd M, Showalter HDH, Sercel AD, Fry DW, Kraker AJ, Denny WA. Tyrosine Kinase Inhibitors. 4. Structure-Activity Relationships among *N*- and 3-Substituted 2,2'-Dithiobis(1*H*-indoles) for *in vitro* Inhibition of Receptor and Non-receptor Protein Tyrosine Kinases. J. Med. Chem. 1995; 38:58-67.

44. Bridges AJ, Zhou H, Cody DR, Rewcastle, GW, McMichael A, Showalter HDH, Fry DW, Kraker AJ, Denny WA. Tyrosine Kinase Inhibitors 8. An Unusually Steep Structure Activity Relationship for Analogues of 4-(3-Bromoanilino)-6,7-dimethoxyquinazoline (PD 153035), a Potent (Picomolar) Inhibitor of the Epidermal Growth Factor Receptor. J. Med. Chem. 1996;39:267-76.

45. Rewcastle GW, Palmer BD, Bridges AJ, Showalter HDH, Sun L, Nelson J, McMichael A, Kraker AJ, Fry DW, Denny WA. Tyrosine Kinase Inhibitors. 9. Synthesis and Evaluation of Fused Tricyclic Quinazoline Analogues as ATP Site Inhibitors of the Tyrosine Kinase Activity of the Epidermal Growth Factor Receptor. J. Med. Chem. 1996; 39:918-28.

46. Showalter HDH, Sun L, Sercel AD, Winters RT, Denny WA, Palmer BD. Concise Syntheses of the Novel 1*H*-Pyrrolo[3,2-*g*]quinazoline Ring System and its [2,3-*f*] Angular Isomer. J. Org. Chem. 1996;61:1155-8.

47. Boehm TL, Showalter HDH. Development of a Novel Silyl Ether Linker for Solid-Phase Organic Synthesis. J. Org. Chem. 1996; 61:6498-6499. PMID: 11667511.

48. Rewcastle GW, Denny WA, Winters RT, Colbry NL, Showalter HDH. Synthesis of 6-Substituted Pyrido[3,4-*d*]pyrimidin-4(3*H*)-ones via Directed Lithiation of 2-Substituted 5-Aminopyridine Derivatives. J. Chem. Soc., Perkin Trans. 1 1996;2221-6.

49. Showalter HDH, Sercel AD, Leja BM, Wolfangel CD, Ambroso LA, Elliott WL, Fry DW, Kraker AJ, Howard CT, Lu GH, Moore CW, Nelson JM, Roberts BJ, Vincent PW, Denny WA, Thompson AM. Tyrosine Kinase Inhibitors. 6. Structure-Activity Relationships Among *N*- and 3-Substituted 2,2'-Diselenobis(1*H*-indoles) for Inhibition of a Panel of Receptor and Nonreceptor Tyrosine Kinases and Comparative *in vitro* and *in vivo* Studies Against Selected Sulfur Congeners. J. Med. Chem. 1997;40:413-26.

50. Palmer BD, Trumpp-Kallmeyer S, Fry DW, Nelson JM, Showalter HDH, Denny WA. Tyrosine Kinase Inhibitors. 11. Soluble Analogues of Pyrrolo- and Pyrazoloquinazolines as Epidermal Growth Factor Receptor Inhibitors: Synthesis, Biological Evaluation and Modeling of the Mode of Binding. J. Med. Chem. 1997;40:1519-29.

51. Hamby JM, Connolly CJC, Schroeder MC, Winters RT, Showalter HDH, Panek RL, Major TC, Olsewski B, Ryan MJ, Dahring T, Lu GH, Keiser J, Amar A, Shen C, Kraker AJ, Slintak V, Nelson JM, Fry DW, Bradford L, Hallak H, Doherty AM. Structure-Activity Relationships for a Novel Series of Pyrido[2,3-*d*]pyrimidine Tyrosine Kinase Inhibitors. J. Med. Chem. 1997;40:2296-2303.

52. Sun L, Showalter HDH, Rubin JR, Kraker AJ. Synthesis and Binding of Photoaffinity Labeled Indoline-2-Thione and Selenone Dimers as Ligands of the Catalytic Domain of the Epidermal Growth Factor Receptor Tyrosine Kinase. J. Heterocycl. Chem. 1997;34:1399-1405

53. Barvian M, Showalter H, Doherty A. Preparation Of N,N'-Bis(Aryl)Guanidines From Electron Deficient Amines via Masked Cabodiimides. Tetrahedron Lett. 1997;38:6799-6802.

54. Thompson AM, Murray DK, Elliott WL, Fry DW, Nelson JA, Showalter HDH, Roberts BJ, Vincent PW, Denny WA. Tyrosine Kinase Inhibitors. 13. Structure-Activity Relationships for Soluble 7-Substituted 4-[(3-Bromophenyl)amino]pyrido[4,3-*d*]pyrimidines Designed as Inhibitors of the Tyrosine Kinase Activity of the Epidermal Growth Factor Receptor. J. Med. Chem. 1997;40: 3915-25.

55. Barvian MR, Panek RL, Lu GH, Kraker AJ, Amar A, Hartl B, Hamby JM, Showalter HDH. 1-Oxo-3-Aryl-1H-Indene-2-Carboxylic Acid Derivatives as Selective Inhibitors of Fibroblast Growth Factor Receptor-1 Tyrosine Kinase. Bioorg. Med. Chem. Lett. 1997; 7:2903-8.

56. Rewcastle GW, Murray DK, Elliott WL, Fry DW, Howard CT, Nelson JM, Roberts BJ, Vincent PW, Showalter HDH, Winters RT, Denny WA. Tyrosine Kinase Inhibitors. 14. Structure-Activity Relationships for Methylamino-Substituted Derivatives of 4-[(3-bromophenyl)amino]-6-(methylamino)pyrido[3,4-*d*]pyrimidine (PD 158780), a Potent and Specific Inhibitor of the Tyrosine Kinase Activity of Receptors for the EGF Family of Growth Factors J. Med. Chem. 1998, 41:742-51.

57. Trumpp-Kallmeyer S, Rubin JR, Humblet C, Hamby JM, Showalter HDH. Development of a Binding Model to Protein Tyrosine Kinases for Substituted Pyrido[2,3-*d*]pyrimidine Inhibitors. J. Med. Chem. 1998, 41:1752-63.

58. Klutchko SR, Hamby JM, Boschelli DH, Wu Z, Kraker AJ, Amar AM, Hartl BG, Shen, C, Klohs WD, Steinkampf RW, Driscoll DL, Nelson JM, Elliott WL, Roberts BJ, Stoner CL, Vincent PW, Dykes DJ, Panek RL, Lu GH, Major TC, Dahring TK, Hallak H, Bradford LA, Showalter HDH, and Doherty, AM. 2-Substituted Aminopyrido[2,3-*d*]pyrimidin-7(8H)-ones. Structure-Activity Relationships Against Selected Tyrosine Kinases and in Vitro and in Vivo Anticancer Activity. J. Med. Chem. 1998, 41:3276-92.

59. Boschelli DH, Wu Z, Klutchko SR, Showalter HDH, Hamby JM, Lu GH, Major TC, Dahring TK, Batley B, Panek RL, Keiser J, Hartl BG, Kraker AJ, Klohs WD, Roberts BJ, Patmore S, Elliott WL, Steinkampf R, Bradford LA, Hallak H, and Doherty AM. The Synthesis and Tyrosine Kinase Inhibitory Activity of a Series of 2-Amino-8*H*-pyrido[2,3-*d*]pyrimidines. Identification of Potent, Selective Platelet Derived Growth Factor Receptor Tyrosine Kinase Inhibitors. J. Med. Chem. 1998, 41:4365-77.

60. Palmer BD, Smaill JB, Boyd M, Boschelli DH, Doherty AM, Hamby JM, Khatana SS, Kramer JB, Kraker AJ, Panek RL, Lu GH, Dahring TK, Winters RT, Showalter HDH and Denny WA. Structure-Activity Relationships for 1-Phenylbenzimidazoles as Selective ATP Site Inhibitors of the Platelet-Derived Growth Factor Receptor. J. Med. Chem. 1998, 41:5457-65.

61. Smaill JB, Palmer BD, Rewcastle GW, Denny WA, McNamara DJ, Dobrusin EM, Bridges AJ, Zhou H, Showalter HDH, Winters. RT, Leopold WR, Fry DW, Nelson JM, Slintak V, Elliot WL, Roberts BJ, Vincent PW and Patmore SJ. Tyrosine Kinase Inhibitors. 15. 4-(Phenylamino)quinazolines and -pyrido[*d*]pyrimidine Acrylamides as Irreversible Inhibitors of the ATP Binding Site of the Epidermal Growth Factor Receptor, J. Med. Chem. 1999, 42:1803-15.

62. Palmer BD, Kraker AJ, Hartl BG, Panopoulos AD, Panek RL, Batley BL, Lu GH, Trumpp-Kallmeyer S, Showalter HDH and Denny WA. Structure-Activity Relationships for 5-Substituted 1-Phenylbenzimidazoles as Selective Inhibitors of the Platelet-Derived Growth Factor Receptor, J. Med. Chem. 1999, 42:2373-82.

63. Schiemann K, Showalter HDH. Development of Polymer-Supported Benzotriazole as a Novel Traceless Linker for Solid-Phase Organic Synthesis, J. Org. Chem. 1999;64:4972-4975. PMID: 11674585.

64. Showalter HDH, Bridges AJ, Zhou H, Sercel AD, McMichael A, Fry DW. Tyrosine Kinase Inhibitors. 16. [6,5,6]-Tricyclic Benzothieno[3,2-*d*]pyrimidines and Pyrimido[5,4-*b*] and [4,5-*b*]indoles as Potent Inhibitors of the Epidermal Growth Factor Receptor Tyrosine Kinase, J. Med. Chem, 1999, 42;5464-74.

65. Harikrishnan LS, Showalter HDH. A Novel Synthesis of 2,3-Disubstituted Benzopyran-4-ones and Application to the Solid Phase, Tetrahedron, 2000, 56;515-519

66. Smaill JB, Rewcastle GW, Bridges AJ, Zhou H, Showalter HDH, Fry DW, Nelson JM, Sherwood V, Elliott WL, Vincent PW, DeJohn DE, Loo JA, Greis KD, Chan OH, Reyner EL, Lipka E, Denny WA. Tyrosine Kinase Inhibitors. 17. Irreversible Inhibitors of the Epidermal Growth Factor Receptor: 4-(Phenylamino)quinazoline- and 4-(Phenylamino)pyrido[3,2-*d*]pyrimidine-6-acrylamides Bearing Additional Solubilizing Functions, J. Med. Chem, 2000, 43:1380-1397

67. Thompson AM, Showalter HDH and Denny WA. Synthesis of 7-Substituted 3-Aryl-1,6-naphthyridin-2-amines and 7-Substituted 3-Aryl-1,6-naphthyridin-2(1*H*)-ones via Diazotization of 3-Aryl-1,6-naphthyridine-2,7-diamines, J. Chem. Soc. Perkin Trans. I., 2000, 1843-1852.

68. Kraker AJ, Hartl BG, Amar AM, Barvian MR, Showalter HDH, Moore CW. Biochemical and Cellular Effects of c-Src Selective Pyrido[2,3-*d*]pyrimidine Tyrosine Kinase Inhibitors, Biochem. Pharm., 2000, 60:885-898

69. Thompson AM, Rewcastle GW, Boushelle SL, Hartl BG, Kraker AJ, Lu GH, Batley BL, Panek RL, Showalter HDH, Denny WA. Synthesis and Structure-Activity Relationships of 7-Substituted 3-(2,6-Dichlorophenyl)-1,6-naphthyridin-2(1*H*)-ones as Selective Inhibitors of $pp60^{c\text{-}src}$, J. Med. Chem., 2000, 43:3134-3147.

70. Harikrishnan LS and Showalter HDH. Synthesis and Reactivity of a Solid-Supported Dialkoxybenzaldehyde with an Extended Spacer, Syn. Lett., 2000, 1339-1341.

71. Thompson AM, Connolly CJC, Hamby JM, Boushelle S, Hartl BG, Amar AM, Kraker AJ, Driscoll DL, Steinkampf RW, Patmore SJ, Vincent PW, Roberts BJ, Elliott WL, Klohs W, Leopold WR, Showalter HDH, Denny WA. 3-(3,5-Dimethoxyphenyl)-1,6-naphthyridine-2,7-diamines and Related 2-Urea Derivatives are Potent and Selective Inhibitors of the FGF-1 Receptor Tyrosine Kinase, J. Med. Chem., 2000, 43:4200-4211.

72. Smaill JB, Showalter HDH, Zhou H, Bridges AJ, McNamara DJ, Fry DW, Nelson JM, Sherwood V, Vincent PW, Roberts BJ, Elliott WL, Denny WA. Tyrosine Kinase Inhibitors. 18. 6-Substituted 4-Anilinoquinazolines and 4-Anilinopyrido[3,4-*d*]pyrimidines as Soluble, Irreversible Inhibitors of the Epidermal Growth Factor Receptor, J. Med. Chem., 2001, 44:429-440

73. Harikrishnan LS, Boehm TL, Showalter HDH. A Synthesis of the Pyrano[3,2-*b*]pyridine Ring System under Mild Conditions, Syn Commun, 2001, 31:519-525.

74. Schroeder MC, Hamby JM, Connolly CJC, Grohar PJ, Winters RT, Barvian MR, Moore CW, Boushelle SL, Crean SM, Kraker AJ, Driscoll DL, Vincent PW, Elliott WL, Lu GH, Batley BL, Dahring TK, Major TC, Panek RL, Doherty AM, Showalter HDH. Soluble 2-Substituted Aminopyrido[2,3-*d*]pyrimidin-7-yl Ureas. Structure-Activity Relationships Against Selected Tyrosine Kinases and Exploration of *in Vitro* and *in Vivo* Anticancer Activity. J. Med. Chem., 2001, 44:1915-1926

75. Showalter HDH, Sercel AD, Stier MA, Turner WR. Synthesis of 3,4-Dihydro-1(2*H*)-isoquinolinones, J. Heterocycl. Chem., 2001, 38:961-964.

76. Tran TP, Ellsworth EL, Stier MA., Domagala JM., Showalter HDH, Gracheck SJ, Shapiro MA, Joannides TE, Singh R. Synthesis and Structural-Activity Relationships of 3-Hydroxyquinazoline-2,4-dione Antibacterial Agents. Bioorg. Med. Chem. Lett., 2004, 14:4405-4409.

77. Tran TP, Ellsworth EL, Sanchez JP, Watson BM, Showalter HDH, Rubin JR, Stier MA, Bird P, Nguyen DQ, Yip J, Singh R. A Facile Synthesis of Substituted 3-Amino-1*H*-Quinazoline-2,4-diones, J. Heterocycl. Chem., 2005, 42:669-674.

78. Thompson AM, Delaney AM, Hamby JM, Schroeder MC, Spoon TA, Showalter HDH, Denny WA. Synthesis and Structure-Activity Relationships of Soluble 7-Substituted 3-(3,5-Dimethoxyphenyl)-1,6-naphthyridin-2-amines and Related Ureas as Dual Inhibitors of the Fibroblast Growth Factor Recptor-1 and Vascular Endothelial Growth Factor Receptor-2 Tyrosine Kinases. J. Med. Chem., 2005, 48:4628-4653. PMID: 16000000.

79. Klutchko SR, Zhou H, Winters RT, Tran TP, Bridges AJ, Althaus IW, Amato DM, Elliott WL, Ellis PA, Meade MA, Roberts BJ, Fry DW, Gonzales AJ, Harvey PJ, Nelson JM, Sherwood V, Han H-K, Pace G, Smaill JB, Denny WA, Showalter HDH. Tyrosine Kinase Inhibitors. 19. 6-Alkynamides of 4-Anilinoquinazolines and 4-Anilinopyrido[3,4-*d*]pyrimidines as Irreversible Inhibitors of the erbB Family of Tyrosine Kinase Receptors. J. Med. Chem. 2006, 49:1475-1485. PMID: 16480284.

80. Sercel AD, Showalter HDH. The Synthesis of Symmetrical 1,2-bis(2-Indolyl)ethynes and Reduced Congeners via Palladium-catalyzed Couplings of Activated 2-Bromoindole Precursors. J. Heterocycl. Chem. 2006, 43:701-707.

81. Showalter HDH. Ready Access to 7,8-Dihydro- and 1,2,3,4-Tetrahydro- 1,6-Naphthyridine-5(6*H*)-ones from Simple Pyridine Precursors. J. Heterocycl. Chem., 2006, 43:1311-1317.

82. Ellsworth EL, Tran TP, Showalter HDH, Sanchez JP, Watson BM, Stier MA, Domagala JM, Gracheck SJ, Joannides ET, Shapiro MA, Dunham S, Hanna D, Huband MD, Gage JW, Bronstein JC, Liu JY, Nguyen DQ, Singh R. 3-Aminoquinazolinediones as a New Class of Antibacterial Agents Demonstrating Excellent Antibacterial Activity against Wild-type and Multidrug Resistant Organisms. J. Med. Chem. 2006, 49:6435-6438. PMID: 17064062.

83. Sercel AD, Beylin VG, Marlatt ME, Leja B, Showalter HDH, Synthesis of the Enantiomers of the Dual Function 2-Nitroimidazole Radiation Sensitizer RB 6145. J. Heterocycl. Chem., 2006, 43:1594-1604.

84. Tran TP, Ellsworth EL, Sanchez JP, Watson BM, Stier MA, Showalter HDH, Domagala JM, Shapiro MA, Joannides ET, Gracheck SJ, Nguyen DQ, Bird P, Yip J, Sharadendu A, Ha C, Ramezani S, Wu X, Singh R. Structure-activity Relationships of 3-Aminoquinazolinediones, a New Class of Bacterial Type-2 Topoisomerase (DNA Gyrase and Topo IV) Inhibitors. Bioorg. Med. Chem. Lett., 2007, 17:1312-1320. PMID: 17196390.

85. Sercel AD, Sanchez, JP, Showalter HDH. Simple Synthesis of 4-Substituted 1(2*H*)-Isoquinolinones via Electrophilic Trapping of Lithiated Mono- and Dianion Precursors. Syn. Commun., 2007, 37:4199-4208.

86. Hutchings KM, Tran TP, Ellsworth EL, Watson BM, Sanchez JP, Showalter HDH, Stier MA, Shapiro M, Joannides ET, Huband M, Nguyen DQ, Maiti S, Li T, Tailor J, Thomas G, Ha C, Singh R. Synthesis and Antibacterial Activity of the C-7 Side Chain of 3-Aminoquinazolinediones. Bioorg. Med. Chem. Lett., 2008, 18:5087-5090.

87. Turbiak AJ, Showalter HDH. A Novel Synthesis of N_1-(Substituted)-pyrimido[5,4-*e*]-1,2,4-triazine-5,7(1*H*,6*H*)-diones. Tet. Lett., 2009, 50:1996-1997; PMID: 3105757

88. Aminoff D, Bochar DA, Fuller AA, Mapp AK, Showalter HDH, Kirchhoff PD. Research into Selective Biomarkers of Erythrocyte Exposure to Organophosphorus Compounds. Anal. Biochem. 2009, 392:155-161. PMID: 19497294

89. Turbiak AJ, Showalter HDH. A New Route to Substituted Pyrimido[5,4-*e*]-1,2,4-triazine-5,7(1*H*,6*H*)-diones and Facile Extension to 5,7(6*H*,8*H*) Isomers. Synthesis, 2009, 4022-4026; PMID: 3021411.

90. Turbiak AJ, Kampf JW, Showalter HDH. A Novel Synthesis of 3-(Substituted)pyrimido[4,5-*c*]pyridazine-5,7(1*H*,6*H*)-diones. Tet. Lett., 2010, 51:1326-1328. PMID: 2987637

91. Evelyn CR, Bell JL, Ryu JG, Wade SM, Kocab A, Harzdorf NL, Showalter HDH, Neubig RR, Larsen SD. Design, Synthesis and Prostate Cancer Cell-based Studies of Analogs of the Rho/MKL1 Transcriptional Pathway Inhibitor, CCG-1423. Bioorg. Med. Chem. Lett., 2010, 20:665-672; PMID: 19963382

92. Brooks AF, Garcia GA, Showalter HDH. A Short, Concise Synthesis of Queuine. Tet. Lett., 2010, 51:4163-4165.

93. Chen Y-C, Brooks AF, Goodenough-Lashua DM, Kittendorf JD, Showalter HD, Garcia GA. Evolution of tRNA Guanine Transglycosylase: Insight gained from the Heterocyclic Substrate Recognition by the Wild-type and Mutant Human and E. coli tRNA Guanine Transglycosylases. Nucleic Acids Research, 2011, 39:2834-2844. PMID:21131277

94. Yep A, Sorenson RJ, Wilson MR, Showalter HDH, Larsen SD, Keller PR, Woodard RW. Enediol Mimics as Inhibitors of the D-arabinose 5-phosphate Isomerase (KdsD) from Francisella tularensis. Bioorg. Med. Chem. Lett., 2011, 21:2679-2682. PMID:21236668

95. Kapuria V, Peterson LF, Showalter HDH, Kirchhoff PD, Talpaz M, Donato NJ. Novel Protein Cross-linking Activity of a Ubiquitin-activating Enzyme Inhibitor. Biochem. Pharmacol., 2011, 82:341-349. PMID:21621524

96. Okawada M, Koga H, Larsen SD, Showalter HD, Turbiak AJ, Jin X, Lucas PC, Lipka, E, Hillfinger J, Kim JS, Teitelbaum DH. Use of Enterally-delivered Angiotensin II Type Ia Receptor Antagonists to Reduce the Severity of Colitis, Dig. Dis. Sci., 2011, 56:2553-2565. PMID:21399927

97. Jin Y, Gill SK, Kirchhoff PD, Wan B, Franzblau SG, Garcia GA, Showalter HDH. Synthesis and Structure-activity Relationships of Novel Substituted 8-Amino, 8-Thio, and 1,8-Pyrazole Congeners of Antitubercular Rifamycin S and Rifampin. Bioorg. Med. Chem. Lett., 2011, 21:6094-6099. PMID:21903392

98. Fribley AM, Cruz PG, Miller JR, Callaghan MU, Cai P, Narula N, Neubig RR, Showalter HD, Larsen SD, Kirchhoff PD, Larsen MJ, Burr DA, Schultz PJ, Jacobs RR, Tamayo-Castillo G, Ron D, Sherman DH, Kaufman RJ. Complementary Cell-Based High Throughput Screens Identify Novel Modulators of the Unfolded Protein Response. J. Biomolec. Screen. 2011, 16:825-835. PMID:21621524

99. Kapuria V, Levitzki A, Bornmann WG, Maxwell D, Priebe W, Sorenson RJ, Showalter HD, Talpaz M, Donato NJ. A Novel Small Molecule Deubiquitinase Inhibitor Blocks Jak2 Signaling Through Jak2 Ubiquitination. Cell. Signal., 2011, 23:2076-2085. PMID:21855629

100. Burkholder K, Perry J, Wobus C, Donato N, Showalter H, Kapuria V, O'Riordan MA. Small Molecule Deubiquitinase Inhibitor Increases Localization of Inducible Nitric Oxide synthase to the Macrophage Phagosome and Enhances Bacterial Killing. Infect. Immun., 2011, 79:4850-4857. PMID:21911458

101. Larsen SD, Wilson MW, Abe A, Shu L, George CH, Kirchhoff P, Showalter HD, Xiang J, Keep RF, Shayman JA. Property-based Design of a Glucosylceramide Synthase Inhibitor that Reduces Glucosylceramide in the Brain. J. Lipid Res., 2012, 53:282-291. PMID:22058426

102. Grembecka J, He S, Shi A, Purohit T, Muntean AG, Sorenson RJ, Showalter HD, Murai M, Belcher A, Hartley T, Hess JL, Cierpicki T. Menin-MLL Inhibitors Reverse Oncogenic Activity of MLL Fusion Proteins in Leukemia. Nat. Chem. Biol., 2012, 8:277-284. PMID:22286128

103. Clifford-Nunn B, Showalter HDH, Andrews PC. Cyclic Diamines as Mass Spectrometry Cleavable Crosslinkers for Protein Interactions. J. Am. Soc. Mass Spectr., 2012, 23: 201-212. PMID:22131227

104. Gill SK, Xu H, Kirchhoff PD, Cierpicki T, Turbiak AJ, Wan B, Zhang N, Peng K-W, Franzblau SG, Garcia GA, Showalter HDH. Structure-based Design of Novel Benzoxazinorifamycins with Potent Binding Affinity to Wild-type and Rifampin-resistant Mutant *Mycobacterium Tuberculosis* RNA Polymerases. J. Med. Chem., 2012, 55: 3814-3826. PMID:22452568

105. Lall MS, Hoge G, Tran T, Kissel W, Murphy ST, Taylor C, Hutchings K, Samas B, Ellsworth E, Curran T, Showalter HDH. Stereoselective Synthesis of *(S)*-3-(Methylamino)-3-(*(R)*-pyrrolidin-3-yl)propanenitrile. J. Org. Chem., 2012, 77: 4732-4739. PMID: 2524537.

106. Shen D, Wang X, Li X, Zhang X, Yao Z, Dibble S, Dong X-P, Yu T, Lieberman A, Showalter HD, Xu H. Lipid Storage Disorders Block Lysosomal Trafficking by

Inhibiting TRP Channel and Calcium Release. Nat. Commun., 2012, 3:1735/1. PMID:22415822.

107. Perry JW, Ahmed M, Chang K-O, Donato NJ, Showalter HD, Wobus CE. Antiviral Activity of a Small Molecule Deubiquitinase Inhibitor Occurs via Induction of the Unfolded Protein Response. Plos. Pathog., 2012, 8: e1002783. PMID: 22792064.

108. Brooks AF, Velez-Martinez CS, Showalter HDH, Garcia GA. Investigating the Prevalence of Queuine in *Escherichia coli* RNA via Incorporation of the Tritium Labeled Precursor, $PreQ_1$. Biochem. Bioph. Res. Com., 2012, 425:83-88. PMID: 22819844.

109. Xu H, Sabit H, Amidon GL, Showalter HDH. An Improved Synthesis of a Fluorophosphonate –polyethyleneglycol-biotin Probe and its Use against Competitive Substrates. Beilstein J. Org. Chem., 2013, 9: 89-96. PMID: 23400700.

110. Titchenell PM, Showalter HDH, Pons J-F, Barber AJ, Jin Y, Antonetti DA. Synthesis and Structure-activity Relationships of 2-Amino-3-carboxy-4-phenylthiophenes as Novel Atypical Protein Kinase C Inhibitors. Bioorg. Med. Chem. Lett., 2013, 23:3034-3038. PMID: 23566515.

111. Molodtsov V, Nawarathne IN, Scharf NT, Kirchhoff PD, Showalter HDH, Garcia GA, Murakami KS. X-ray Crystal Structures of the Escherichia coli RNA Polymerase in Complex with Benzoxazinorifamycins. J. Med. Chem., 2013, 56: 4758-4763. PMID: 23679862.

112. Zeller J, Turbiak AJ, Powelson IA, Lee S, Sun D, Showalter HDH, Fearon ER. Investigation of 3-Aryl-pyrimid[5,4-*e*][1,2,4]triazine-5,7-diones as Small Molecule Antagonists of β-catenin/TCF Transcription. Bioorg. Med. Chem. Lett., 2013, 23:5814-5820. PMID: 24060489.

113. Peng Z, Maxwell D, Sun D, Pal A, Ying Y, Han D, Gao L, Wang S, Kapuria V, Talpaz M, Young M, Showalter HD, Donato NJ, Bornmann W. Tyrphostin-like Compounds with Deubiquitinase Inhibitory Activity as Possible Therapeutic Agents for Multiple Myeloma (II). Bioorg. Med. Chem., 2014, 22:1450–1458. PMID: 24457091

114. Winters T, Sercel A, Suto C, Elliott W, Leopold W, Leopold J**,** Showalter H. Design and Synthesis of 2-Nitroimidazoles with Variable Alkylating and Acylating Functionality. Chem. Pharm. Bull., 2014, 62:301-303. PMID: 24583786.

115. Abulwerdi FA, Liao C, Mady AS, Shen C, DiBernardo J, Gavin J, Cierpicki T, Stuckey JA, Showalter HDH, Nikolovska-Coleska Z. Structure-Based Design and Synthesis of 3-Substituted-N-(4-Hydroxynaphthalen-1-yl)arylsulfonamides as Potent, Selective Inhibitors of the Anti-apoptotic Protein Mcl-1. J. Med. Chem., 2014, 57:4111-4133. PMID: 24749893.

116. Gonzalez-Hernandez MJ, Gyan KE, Charbonneau M-E, Showalter HD, Donato NJ, O'Riordan M, Wobus CE. Chemical Derivatives of a Small Molecule Deubiquitinase Inhibitor have Antiviral Activity against Several RNA Viruses. Plos One, 2014, 9:e94491. PMID:24722666.

117. Lenhart JS, Brandes ER, Schroeder JW, Sorenson RJ, Showalter HD, Simmons LA. RecO and RecR are Necessary for RecA Loading in Response to DNA Damage and

Replication Fork Stress in Bacillus Subtilis. Journal of Bacteriology, 2014, 196:2851-2860. PMID: 24891441.

118. Charbonneau M-E, Gonzalez-Hernandez MJ, Showalter HD, Donato NJ, Wobus CE, O'Riordan MXD. Small Molecule Deubiquitinase Inhibitors Promote Macrophage Anti-infective Capacity. Plos One, 2014, 9:e104096. PMID: 25093325.

119. Gibbons GS, Showalter HD, Nikolovska-Coleska Z. Novel Carboxaldehyde Mediated Synthetic Pathway for 5'-Amino Adenosine Analogues. Nucleosides, Nucleotides and Nucleic Acids, 2015, 34:348-360. PMID: 25874943.

120. Peterson LF, Sun H, Liu Y, Potu H, Kandarpa M, Ermann M, Courtney SM, Young MA, Showalter HD, Sun D, Jakubowiak AJ, Malek SN, Talpaz M, Donato NJ. Targeting Deubiquitinase Activity with a Novel Small Molecule Inhibitor as Therapy for B-cell Malignancies. Blood, 2015,125:3588-3597. PMID: 25814533.

121. Xu H, Majmudar JD, Davda D, Ghanakota P, Kim KH, Carlson HA, Showalter HD, Martin BR, Amidon GL. Substrate-competitive Activity-based Profiling of Ester Prodrug Activating Enzymes. Molecular Pharmaceutics, 2015, 12:3399-3407. PMID: 26262434.

122. Passalacqua KD, Charbonneau M-E, Donato NJ, Showalter HD, Sun D, Wen B, He M, Sun H, O'Riordan MXD, Wobus CE. Anti-infective Activity of 2-Cyano-3-acrylamide Inhibitors with Improved Drug-like Properties against two Intracellular Pathogens. Antimicrobial Agents and Chemotherapy, 2016, 60:4183-4196. PMID: 27139470.

123. Carpenter C, Sorenson RJ, Jin Y, Klossowski S, Cierpicki T, Gnegy M, Showalter HD. Design and Synthesis of Triarylacrylonitrile Analogues of Tamoxifen with Improved Binding Selectivity to Protein Kinase C. Bioorg. Med. Chem., 2016, 24:5495-5504. PMID: 27647375.

124. Kehrl JH, Althaus JC, Showalter HD, Rudzinski DM, Sutton MA, Ueda T. Vesicular Glutamate Transporter Inhibitors: Structurally Modified Brilliant Yellow Analogs. Neurochemical Research, 2017, 42:1823-1832. PMID: 28255754.

125. Jin Y, Huang X, Papke RL, Jutkiewicz E, Showalter HD, Zhan C-G. Design, Synthesis, and Biological Activity of 5′-Phenyl-1,2,5,6-tetrahydro-3,3'-bipyridine Analogues as Potential Antagonists of Nicotinic Acetylcholine. Bioorg. Med. Chem. Lett., 2017, 27:4350-4353. PMID: 28838693.

126. Carpenter C, Zestos AG, Altshuler R, Sorenson RJ, Guptaroy B, Showalter HD, Kennedy RT Jutkiewicz E, Gnegy ME. Direct and Systemic Application of a CNS-permeant Tamoxifen Analog Reduces Amphetamine-induced Dopamine Release and Reinforcing Effects. Neuropsychopharmacology, 2017, 42:1940-1949. PMID: 28492278.

127. Madak JT, Cuthbertson CR, Chen W, Showalter HD, Neamati N. Design, Synthesis, and Characterization of Brequinar Conjugates as Probes to Study DHODH Inhibition. Chemistry – A European Journal, 2017, 23:13875-13878. PMID: 28833638.

128. Madak JT, Cuthbertson CR, Miyata Y, Tamura S, Petrunak EM, Stuckey JA, Han Y, He M, Sun D, Showalter HD, Neamati N. Design, Synthesis, and Biological Evaluation of 4-Quinoline Carboxylic Acids as Inhibitors of Dihydroorotate Dehydrogenase. J. Med. Chem., 2018, 61: 5162–5186. PMID: 29727569.

129. Beyett TS, Gan X, Reilly SM, Chang L, Gomez AV, Saltiel AR, Showalter HD, Tesmer JJG. Carboxylic Acid Derivatives of Amlexanox Display Enhanced Potency towards TBK1 and IKKε and Reveal Mechanisms for Selective Inhibition. Mol. Pharm., 2018, 94: 1210-1219. PMID: 30082428.

130. Hagen SE, Liu K, Jin Y, Piersimoni L, Andrews PC, Showalter HD. Synthesis of CID-cleavable Protein Crosslinking Agents Containing Quaternary Amines for Structural Mass Spectrometry. Org. Biomol. Chem., 2018, 16: 8245 – 8248. PMID: 29537042

131. Beyett TS, Gan X, Reilly SM, Gomez AV, Chang L, Tesmer JJG, Saltiel AR, Showalter HD. Design, Synthesis and Biological Activity of Substituted 2-Amino-5-oxo-5H-chromeno[2,3-b]pyridine-3-carboxylic Acid Derivatives as Inhibitors of the Inflammatory Kinases TBK1 and IKKε for the Treatment of Obesity. Bioorg. Med. Chem., 2018, 26: 5443-5461. PMID: 30270002.

132. Gan X, Wilson MW, Beyett TS, Wen B, Sun D, Larsen SD, Tesmer JJG, Saltiel AR, Showalter HD. Synthesis of Deuterium-labelled Amlexanox and its Metabolic Stability against Mouse, Rat and Human Microsomes. J. Label. Compd. Radiopharm., 2019, 62: 202 – 208. PMID: 30828860.

133. McDonald AJ, Leon DR, Markham KA, Wu B, Heckendorf CF, Schilling K, Showalter HD, Andrews PC, McComb ME, Pushie MJ, Costello CE, Millhauser GL, Harris DA. Altered Domain Structure of the Prion Protein Caused by Cu^{2+} Binding and Functionally Relevant Mutations: Analysis by Cross-Linking, MS/MS, and NMR. Structure, 2019, 27: 907-922.e5. PMID: 30956132.

134. Gan X, Showalter HD, A Concise Synthesis of 3-Substituted-7-Amino-6-Carboxyl-8-Azachromones, Tet. Lett., 2019, 60: 2035 - 2037. PMID: 32831416.

135. Charbonneau M-E, Passalacqua KD, Hagen SE, Showalter HD, Wobus CE, O'Riordan MXD. Perturbation of Ubiquitin Homeostasis Promotes Macrophage Oxidative Defenses. Scientific Reports, 2019, 9: 1-14. PMID: 31308397.

136. Liu X, Wilson MW, Liu K, Lee P, Yeomans L, Hagen SE, Lin C-M, Wen B, Sun D, White AD, Showalter HD, Antonetti DA. Synthesis and Structure-activity Relationships of Thieno[2,3-d]pyrimidines as Atypical Protein Kinase C Inhibitors to Control Retinal Vascular Permeability and Cytokine-induced Edema. Bioorg. Med. Chem., 2020, 28: article ID 115480. PMID: 32327351.

137. Brooks AF, Garcia GA, Showalter HD. Synthesis of Azide Congeners of $PreQ_1$ as Potential Substrates for tRNA Guanine Transglycosylase. J. Heterocycl. Chem., 2021, 58: 1192 – 1198.

138. Xu H, Powelson IA, Jin Y, Showalter HD. A Novel Synthesis of Substituted 3-Amino and 3–Thio Pyrimido[5,4-e]-1,2,4-triazine-5,7(1H,6H)-diones. J. Heterocycl. Chem., 2021, 58: 1690 – 1694.

139. Ashkar SR, Rajeswaran W, Lee PH, Yeomans L,Thrasher CM, Franzblau SG, Murakami KS, Showalter HD, Garcia GA. Optimization of Benzoxazinorifamycins to Minimize hPXR Activation for Treatment of Tuberculosis and HIV Coinfection. ACS Infect. Dis., 2022, 8: 1408 - 1421. PMID: 35772743.

140. Rajeswaran W, Ashkar SR, Lee PH, Yeomans L, Shin Y, Franzblau SG, Murakami KS, Showalter HD, Garcia GA. Optimization of Benzoxazinorifamycins to Improve *Mycobacterium tuberculosis* RNA Polymerase Inhibition and Treatment of Tuberculosis. ACS Infect. Dis., 2022, 8: 1422 – 1438. PMID: 35772744.

PATENTS

Issued US Patents (42)

1. Showalter HDH, Johnson JL,Werbel LM, Elslager EF. Antimicrobial Substituted Anthra[1,9-*cd*]pyrazolo-6(2*H*)-ones. US 4,556,654 (1985).

2. Elslager EF, Werbel LM, Ortwine DF, Worth DF, Showalter HDH, Capps DB, Berman EM, Gregor VE, Sercel, AD. Antibacterial Benzo(chalcogeno)[4,3,2-*cd*]indazoles. US 4,604,390 (1986).

3. Johnson JL, Showalter HDH. Process for Preparing Substituted Anthra[1,9-*cd*]pyrazole-6(2*H*)-ones. US 4,608,439 (1986).

4. Beylin VG, Goel OP, Showalter HDH. Process for Preparing Substituted Anthra[1,9-*cd*]pyrazole-6(2*H*)-ones. US 4,672,129 (1987).

5. Beylin VG, Goel OP, Sercel AD, Showalter HDH. Process for the Preparation of Benzo(chalcogeno)(4,3,2-*cd*)indazoles and Intermediates thereof. US 4,806,654 (1989).

6. Showalter HDH,Winters RT. Method for Producing 4-Bromo-4-demethylepipodophyllotoxin and New Derivatives. US 5,061,791 (1991).

7. Beylin VG , Sercel AD., Showalter HDH., Adams GE., Fielden EM., Naylor MA., Stratford IJ. Process for Preparing Chiral [[(2-Bromoethyl)amino]methyl]-2-nitro-1*H*-imidazol-1-ethanol and Related Compounds US 5,342,959 (1994).

8. Showalter HDH. Dihydro- and Tetrahydronaphthyridines. US 5,391,554 (1995).

9. French JC, Edmunds CR, McDonnell P, Showalter HDH. Process for Purifying Pentostatin. US 5,463,035 (1995).

10. Dobrusin EM, Showalter HDH, Denny WA, Palmer BD, Rewcastle GW, Tercel M, Thompson AM. 2-Thioindoles (Selenoindoles) and Related Disulfides (Selenides) which Inhibit Protein Tyrosine Kinases and which have Antitumor Properties. US 5,464,861 (1995).

11. Beylin VG, Sercel AD, Showalter HDH, Adams GE, Fielden EM, Naylor MA, Stratford IJ. Process for Preparing Chiral [[2-Bromoethyl)amino]methyl]-2-nitro-1*H*-imidazol-1-ethanol and Related Compounds. US 5,481,000 (1996).

12. Beylin VG, Sercel AD, Showalter HDH, Adams GE, Fielden EM, Naylor MA, Stratford IJ. Process for Preparing Chiral [[2-Bromoethyl)amino]methyl]-2-nitro-1*H*-imidazol-1-ethanol and Related Compounds. US 5,543,527 (1996)

13. Dobrusin EM, Showalter HDH, Denny WA, Palmer BD, Rewcastle GW, Tercel M, Thompson AM. 2-Thioindoles (Selenoindoles) and Related Disulfides (Selenides) which Inhibit Protein Tyrosine Kinases and which have Antitumor Properties. US 5,556,874 (1996)

14. Beylin VG, Sercel AD, Showalter HDH, Adams GE, Fielden EM, Naylor MA, Stratford IJ. Chiral [[(2-Bromoethyl)-amino]methyl]-2-nitro-1H-imidazol-1-ethanol and Related Compounds. US 5,659,048 (1997)

15. Bridges AJ, Denny WA, Fry D, Kraker A, Meyer R, Rewcastle GW, Thompson AM, Showalter HDH. Tricyclic Compounds Capable of Inhibiting Tyrosine Kinases of the Epidermal Growth Factor Receptor Family. US 5,679,683 (1997).

16. Blankley CJ, Connolly C, Doherty AM, Hamby JM, Panek RL, Schroeder MC, Showalter, HDH. 6-Aryl Pyrido[2,3-*d*]pyrimidines and Naphthyridines for Inhibiting Protein Tyrosine Kinase Mediated Cellular Proliferation. US 5,733,913 (1998).

17. Blankley CJ, Connolly C, Doherty AM, Hamby JM, Panek RL, Schroeder MC, Showalter, HDH. 6-Aryl Naphthyridines for Inhibiting Protein Tyrosine Kinase Mediated Cellular Proliferation. US 5,952,342 (1999).

18. Boschelli DH, Denny WA, Doherty AM, Hamby JM, Khatana SS, Kramer JB, Palmer, BM, Showalter HDH. Benzimidazoles for Inhibiting Protein Tyrosine Kinase Mediated Cellular Proliferation. US 5,990,146 (1999).

19. Barvian MR, Denny WA, Dobrusin EM, Hamby JM, Showalter HDH, Thompson AM, Winters RT, Wu Z. Naphthyridinones for Inhibiting Protein Tyrosine Kinase and Cell Cycle Kinase Mediated Cellular Proliferation. US 6,150,359 (2000).

20. Boehm TI, Hodges JC, Showalter HDH. Process for Preparation of Aromatic and Heteroaromatic Molecules. US 6,180,718 (2001).

21. Boschelli DH, Denny WA, Doherty AM, Hamby JM, Khatana SS, Kramer JB, Palmer, BM, Showalter HDH. Benzimidazoles for Inhibiting Protein Tyrosine Kinase Mediated Cellular Proliferation. US 6,218,388 (2001).

22. Showalter HDH, Winters RT, Rewcastle GW, Denny WA. Process for Preparing 4,6-Disubstituted Pyrido[3,4-*d*]pyrimidines. US 6,313,292 (2001).

23. Bridges AJ, Denny WA, Dobrusin EM, Doherty AM, Fry DW, McNamara DJ, Showalter HDH, Smaill JB, Zhou, H. Irreversible Inhibitors of Tyrosine Kinases. US 6,344,459 (2002).

24. Bridges AJ, Denny WA, Fry D, Kraker A, Meyer R, Rewcastle GW, Thompson AM, Showalter HDH. Tricyclic Compounds Capable of Inhibiting Tyrosine Kinases of the Epidermal Growth Factor Receptor Family. US 6,596,726 (2003).

25. Bridges AJ, Denny WA, Dobrusin EM, Doherty AM, Fry DW, McNamara DJ, Showalter HDH, Smaill JB, Zhou, H. Irreversible Inhibitors of Tyrosine Kinases. US 6,602,863 (2003).

26. Kramer JB, Showalter HDH. Preparation of Pyridotriazines and Pyridopyridazines as Cyclin-dependent and/or Tyrosine Kinase Inhibitors for Treatment of Cell Proliferative and Immunological Disorders. US 6,683,183 (2004).

27. Ellsworth EL, Hutchings KM, Nguyen D, Singh R, Showalter HDH. Antibacterial Agents. US 6,864,259 (2005).

28. Bird P, Ellsworth EL, Nguyen DQ, Sanchez JP, Showalter HDH, Singh R, Stier MA, Tran TP, Watson BM, Yip J. 3-Aminoquinazolin-2,4-dione Antibacterial Agents. US 7,094,780 (2006).

29. Denny, WA, Rewcastle GW, Dobrusin EM, Kramer JB, NcNamara DJ, Showalter HDH, Toogood PL. Pteridinones as Kinase Inhibitors. US 7,169,778 (2007).

30. Dobrusin EM, Hamby JM, Kramer JB, Schroeder MC, Showalter HDH, Toogood P, Trumpp-Kallmeyer SA. Bicyclic Pyrimidines and Bicyclic 3,4-Dihydropyrimidines as Inhibitors of Cellular Proliferation. US 7,501,425 (2009).

31. Bird P, Ellsworth EL, Nguyen DQ, Sanchez JP, Showalter HDH, Singh R, Stier MA, Tran TP, Watson BM, Yip J. 3-Aminoquinazolin-2,4-dione Antibacterial Agents. US 7,582,627 (2009).

32. Bridges AJ, Denny WA, Dobrusin EM, Doherty AM, Fry DW, McNamara DJ, Showalter HDH, Smaill JB, Zhou, H. Pyrimido[5,4-*d*]pyrimidines as Irreversible Inhibitors of Tyrosine Kinases. US 7,786,131 (2010).

33. Teitelbaum, DH; Showalter, H; Larsen, S; Lucas, P; Koga, H. Compositions and methods for the treatment and prevention of inflammatory bowel diseases. US Patent 8,293,776 (2012).

34. Donato NJ, Wobus C, Showalter HD, Talpaz M, Perry JW, Sorenson RJ, O'Riordan MXD, Jin Y. Deubiquitinase Inhibitors and Methods for Use of the Same. US Patent 8,809,377 (2014).

35. Saltiel AR, Showalter HD, Larsen S. Deuterated Amlexanox. US Patent 8,946,424 (2015).

36. Saltiel AR, Showalter HD, Larsen S. Deuterated Amlexanox. US Patent 9,365,581 (2016).

37. Nikolovska-Coleska Z, Abulwerdi F, Showalter H, Lei M, Stuckey J, Mady A. Small Molecule Inhibitors of MCL-1 and Uses Thereof. US Patent 9,394,303 (2016).

38. Nikolovska-Coleska Z, Showalter HD, Liao C, Abulwerdi F. Small Molecule Inhibitors of Mcl-1 and the Uses thereof. US Patent 9,486,422 (2016).

39. Donato NJ, Talpaz M, Peterson L, Young M, Showalter HD, Wobus C, O'Riordan MXD, Ermann M. Deubiquitinase Inhibitors and Methods for Use of the Same. US Patent 9,868,736 (2018).

40. Saltiel AR, Showalter HD, Larsen S. Deuterated Amlexanox. US Patent 9,944,652 (2018).

41. Showalter HD, Saltiel AR, Tesmer, JJ, Gan, X. Amlexanox Analogs. US Patent 10,590,142 (2019).

42. Saltiel AR, Showalter HD, Larsen S. Deuterated Amlexanox. US Patent 10,590,142 (2020).

Pending/Non-converted Applications

43. Ellsworth EL, Kerschen JA, Powell, SA, Sanchez, JP, Showalter HDH, Stier MA, Tran TP. Antibacterial Agents for Quinolone-resistant Bacteria. US Patent Application 2003/0114666 (2003).

44. Showalter HDH, Turbiak AJ, Fearon ER, Bommer GT. Pyrimidotriazinediones and Pyrimidopyrimidinediones and Methods of Using the Same. US Patent Application 2011/0166144 (2011).

45. Garcia GA, Gill SK, Kirchhoff PD, Nawarathne I, Showalter HD, Xu H. Antimicrobial Compounds. PCT Int. Appl. WO 2013086415 (2013).

46. Varani J, Showalter H, White A, Johnson KJ. Dimethyl-nonatetraenyl-trimethyl-cyclohexyl Compounds and Uses Thereof. US Patent Application 2018/0339961 (2018).

47. Garcia G, Showalter H, Rajeswaran W, Lee P, Franzblau S, Murakami K. Rifamycin Analogs. International Application Number PCT/US2022/012980 (2022).