

KRUTI PATEL, PhD

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SUMMARY of QUALIFICATIONS

- Development of enzymatic assay for in vitro (in solution) and ex vivo (mammalian cell culture) systems.
- Strong interdisciplinary research background in HTP screening of small molecule, enzyme kinetics, analytical chemistry chromatographic separation techniques HPLC, UPLC, LC MS, Biacore Surface Plasmon resonance (SPR), ITC (Isothermal calorimetric), protein purification, SDS Page, Immunoassays Western blot, ELISA, UV-Vis spectroscopy and CD (circular dichroism), Vaccine development.
- Follow written scientific methods and experimental protocols, results, authors and reviews summary reports
- Skill to conduct due diligence for pharmaceutical technologies. BSL 2 and BSL 3 experience to handles hazardous materials
- Experience with regulatory submissions (CTD, NDA etc) using ICH and FDA guidelines.
- Successfully lead several collaborative research projects demonstrating strong interpersonal and presentation skills.

ACADAMIC AND RESEARCH EXPERIENCE

Research Associate at Institute of Advanced Sciences, Dartmouth, MA July 2017- Present

Ongoing projects:

1. Oral Vaccine development of Tenanus and botulinum Neurotoxins.
2. Peptide based inhibitor development for Botulinum neurotoxins.
3. Universal substrate peptide development for all the serotype of BoNT types A, B, C, E and tetanus toxin.

Research Associate at University of Massachusetts Dartmouth, MA, USA Nov 2014 - May 2017

Projects worked on:

1. Evaluated small molecular QSAR and docking into Botulinum light chain A using Schrödinger Maestro Glide and Pymol.
2. Developed assay for HTP screening of small molecule against Botulism. (DOD funded)
3. Studied Botulinum neurotoxin associated protein- protein interactions using surface Plasmon resonance (SPR).
4. Developed natural product separation and identification using HPLC, LC MS, UPLC method and in vitro assay development for Alzheimer's and antioxidants.

Research assistance at University of Massachusetts Dartmouth, MA, USA Feb 2008 - May 2014

1. Developed of HTP ex vitro enzyme inhibition and toxicity assay using mammalian cell lines against botulism
2. Developed of botulinum Neurotoxin detection platform using SPR. (NIH funded)
3. Developed of Enzyme kinetics, Inhibition constants IC_{50} , EC_{50} , and small molecule - protein interaction using ITC.
4. Studied *in silico* ADMET using ADMET predictor, GASTRO+, Pre ADMET software
5. Developed an eco friendly HILIC HPLC separation method to determine of renal biomarkers in human fluids
6. Performed Light chain A protein purification and structural changes upon inhibitor binding using CD, Fluorescence and UV vis spectroscopy methods. (includes protein purification)

Part time Lecturer at University of Massachusetts Dartmouth Sep 2015- Dec 2016
Subject: Freshman chemistry course, Analytical lab, organic chemistry lab, and Introduction to Applied Chemistry lab

Teaching Assistant at University of Massachusetts Dartmouth Sep2011- Dec2013
Subject: Introduction to Applied Chemistry lab
Conducted labs and helped students perform experiments
Taught the students in the laboratory, discussion sessions, graded homework and lab reports

Supervisor Regulatory Affairs, Cadila Pharmaceutical Ltd (ACS), India Feb 2006 – Jan 2007

1. Coordinated with various departments' heads and representatives and international managers for smooth execution of drug development process, product supply, quality control and assessment (QC and QA).
2. Involved in development and submission of the dossiers for international market as per ACTD requirement
3. Preparation of SOP, prepared technical reports according to cGMP, aCTD format using ICH and FDA guideline
4. Prepared and succeeded in European, South East Asia, Latin America, Russia and South Africa product registrations
5. Replied to queries and provided clarification on registration documents

EDUCATION

Ph. D, Chemistry and Biochemistry, University of Massachusetts, Dartmouth, MA, Aug 2014
M. S., Chemistry and Biochemistry, University of Massachusetts, North Dartmouth, MA, Dec 2011
M.Sc., Biochemistry, Saurashtra University, Rajkot, India, June 2005
B.Sc., B.Sc Biochemistry and biotechnology, Gujarat University India. May 2003

PATENT

Botulinum Neurotoxin inhibitors, K. Patel and BR Singh, 2016 (Filed in November EFS number 27605631)

PUBILICATIONS

1. Expression purification and comparative characterization of enzymatically deactivated recombinant botulinum neurotoxin type A. Weiping Yang, Paul Lindo, Stephen Riding, Showei Cai, Roshan Kukreja, Yu Zhou, Kruti Vasa, Bal Ram Singh. The Botulinum Journal Issue: Volume 1, Number 2/2008 Pages: 219-241,
2. The identification and biochemical characterization of drug like compounds that inhibit botulinum neurotoxin serotype A endopeptidase activity, Shuowei Cai, Paul Lindo, Jong-Beak Park, Kruti Vasa, Bal Ram, Toxicon Volume 55, Issue 4, 1 April 2010 pages:818-826
3. An eco-friendly hydrophilic interaction HPLC method for the determination of renal function biomarkers creatinine and uric acid, in human fluids. Si Zhou, Ruixiao Zuo, Zhuo Zhu, Di Wu, Kruti Vasa, Yiwei Deng and Yuegang Zuo. Analytical Methods 2013, volume 5, pages, 1307-1311,
4. Current strategies for designing antidotes against Botulinum Neurotoxins. Kruti Patel, Shuowei Cai, Bal Ram Singh Expert Opinion on Drug Discovery, 2014 Mar; 9(3):319-33

5. In vivo toxicity and immunological characterization of detoxified recombinant Botulinum neurotoxin type A. Easwaran Ravichandran, Kruti Patel, Pavithra Janardhanan, Stephen Riding, Shuowei Cai and Bal Ram Singh. *Pharmaceutical Research journal*, 2016 Mar;33(3):639-52 2015
6. A novel surface Plasmon resonance (SPR) biosensor for the rapid detection of botulinum neurotoxins. Kruti Patel, S. Helvi, P. Melman, J. Schwartz, S.Cai, B. Singh. *Biosensors*, 2017, 7 (3), 32
7. High Yield Expression and Purification of Catalytic-Translocation Domain Module of Botulinum Neurotoxin Type A. H.k. Dhaliwal, , Nagrajan Tirunavkarsu, Raj Kumar, Kruti Patel, Bal Ram Singh. *Protein journal*, 2017 Oct 13.
8. The implication of the botulinum neurotoxin type A endopeptidase C-terminus on substrate binding, enzyme activity, and maintaining a functionally disordered structure in solution. Thomas M. Feltrup, Kruti Patel, Raj Kumar, Shuowei Cai, and Bal Ram Singh (submitted to *Scientific reports*)
9. Role of Critical Elements in Botulinum Neurotoxin Complex in Toxin Routing Across Intestinal and Bronchial Barriers. Koyel Ghosal, Kruti Patel, Bal Ram Singh, Martha Hale. (submitted to *PLOS one*)
10. Natural inhibitors for the Botulinum Neurotoxin Type A. Kruti Patel, Shouwei Cai and Bal Ram Singh (under preparation - work will split into 2 papers)
11. Quinololinol as an Inhibitor for botulinum Neurotoxin A. Kruti Patel, Meglong, S. Patel, Scai, S. Rasapalli, B.R.Singh (under preparation)

INVITED SEMINAR /SYMPOSIUM SPEAKER

1. Natural product as an antidote of Botulinum Neurotoxin A. 12-14th August, 2015. Botulinum Research Symposium, New Bedford, MA
2. Evaluation of potential natural compound inhibitors of BoNT/A endopeptidase with in vitro, in silico and exvivo Assay and analysis, IBRCC 2015, Frederick, Maryland, USA.
3. Scope of research on Botulinum neurotoxin. 28th December 2015 K.B. Institute of Pharmaceutical Education and Research, Gandhinagar, Gujarat, India.
4. Natural Product Analog as an Antidote for Botulism. 10th January 2016 Delhi University, Delhi, India.
5. Development of an antidote for Botulism. 11th January 2016. Jawaharlal Nehru University, New Delhi, India.

SYMPOSIA / CONFERENCE/ WORKSHOPS/ POSTER PRESENTATION

1. Sigma xi 14th 2008: Endopeptidase Activity of Deactivated Recombinant Botulinum Neurotoxin Type A. Kruti P. Vasa, Roshan Kukreja, Shuowei Cai, and Bal Ram Singh
2. IBRCC2008, In vitro and in vivo evaluation on selectively mutated botulinum neurotoxin type A. E Ravichandran, R Kukreja, Kruti Vasa, W. Yang, P. Lindo, S.Cai, B. Singh
3. Botulinum research conference at Umass Dartmouth 2008: Screening of synthetic and naturally occurring compounds as inhibitors of endopeptidases (BoNTs) from *Clostridium botulinum*. Vijayendra Kumar, Kruti Vasa, Shashwat Malhotra, Paul Lindo, Shuowei Cai, Bal Ram Singh, Arthur C Watterson and Virinder S Parmar
4. Sigma xi 15th 2009: Novel Natural Inhibitor Compounds against Botulinum Neurotoxin Type A. Kruti Vasa, Virinder S Parmar, Shuowei Cai, Bal Ram Singh
5. IBRCC 2009 : Natural Compounds as potent Inhibitors against Botulinum Neurotoxin A. Kruti vasa, Virender Parmar, Shuowei Cai, Bal Ram Singh
6. Botulinum research center symposium and workshop, 2009, The Evaluation of Immunogenicity on recombinant double mutated botulinum Neurotoxin Sero type A. Easwaran Ravichandran, Roshan Kukreja, Kruti Vasa, Weiping Yang, Paul Lindo, Steve Riding, Shouwei Cai and Bal Ram Singh.

7. Novel Natural inhibitor compounds against botulinum Neurotoxin type A. Kruti vasa, Virinder Parmar, Shuowei Cai, Bal Ram Singh
8. Sigma Xi 17th 2011 : Natural small molecular compounds as a potent inhibitor against botulinum neurotoxin type A. Kruti P. Vasa, Virinder S. Parmar, Shuowei Cai, and Bal Ram Singh
9. Botulinum research center symposium and workshop, 2011, Natural small molecular compounds as a potent inhibitor against botulinum neurotoxin type A. Kruti vasa, Virinder Parmar, Shuowei Cai, Bal Ram Singh
10. Sigma Xi 18 2012: Multiplex detection of botulinum neurotoxin serotypes A and B using Immuno extraction. Kruti Vasa, Easwaran Ravichandran, Shuowei Cai, James Marks, Bal Ram Singh
11. Sigma Xi 19 2013: The Nitro derivative of psoralen- the synthetic inhibitor against botulinum neurotoxin type A. Kruti B. Patel, Virinder S. Parmar, Shuowei Cai, and Bal Ram Singh
12. NERCE / BEID 2012, Natural small molecular compounds as a potent inhibitor against botulinum neurotoxin type A. kruti B Patel, virinder S. Parmar, Shuowei Cai, and Bal Ram Singh
13. IBRCC 2013, Botulinum neurotoxin serotype A specific inhibition by Psoralen nitro benzene. Patel K B, Cai, Parmar V S, Singh B K and Singh B R
14. IBRCC 2013, Multiplex detection of botulinum neurotoxin serotype type A and B using Immuno extraction. Kruti Vasa, Ravichandran Easwaran, Shuowei Cai, Bal Ram Singh
15. IBRCC 2013, Insilico ADMET analysis of Botulinum endopeptidase inhibitors. Kruti Patel, Sirisha V. Mukkavalli, Cai S. and Bal Ram Singh
16. Botulinum research center symposium and workshop, 2013, The Nitro Derivative of Psoralen- The synthetic inhibitor against Botulinum Neurotoxin type A. Kruti Patel, Virinder Parmar, Shuowei Cai and Bal Ram Singh
17. Bioscience 2014, Identification of Natural Compounds as Inhibitors of Type A Botulinum Neurotoxin. Kruti Patel, Cai S, Parmar V S, Singh B K and Singh B R.
18. Bioscience Review 2014, Assessment of Currently Identified Inhibitors as Potent Drugs Against Botulinum Neurotoxins Through In Silico ADMET Analysis. Kruti Patel, Sirisha V. Mukkavalli, Cai S. and Bal Ram Singh
19. Sigma xi 18th 2014, Screening of the endopeptidase inhibitors of the endopeptidase inhibitors for bont/a using silico methods. Patel K B*, Mukkavalli SV, cai s, and singh BR
20. Sigma xi 18th 2014, detection of picogram level botulinum neurotoxin using surface plasmon resonance. Patel K.B., Halevi S., Cai S., and Singh B. R
21. Botulinum research symposium, 2014, Identification of natural compounds as inhibitor of type A Botulinum Neurotoxin. K Patel, S Cai, VS parmar, B K Singh, B R Singh
22. Botulinum research symposium, 2014, Assessment of currently identified inhibitors as potent drugs against botulinum neurotoxins through in silico ADMET analysis. K Patel, S Mukkavalli, S Cai, BR Singh
23. Botulinum research symposium, 2014, Quinolinol based analogs for the inhibition of BoNT. S Rasapalli, M Yu, K Patel, S patel, G Jarugumilli, BR Singh, S Cai, T J Opperman, T L Bowlin
24. IBRCC 2015, In vivo toxicity and immunological characterization of detoxified recombinant botulinum neurotoxin type A. Ravichandran E, Patel K, Janardhanan P, Riding S, Cai S, Singh B R
25. IBRCC 2015, Virtual screening and ADMET analysis of endopeptidase inhibitors. Patel K., Kumar R., Cai S and Singh B

26. BRC 2016, Design and synthesis of 8-quinolinol based Botulinum neurotoxin (BoNT) inhibitors. Menglong Yu, Kruti Patel, Showei Cai, Bal Ram Singh and Sivappa Raspalli
27. Sigma XI 20th 2016, Quantitative structure activity relationships (QSAR) and ADMET prediction of psoralen nitro benzene analogs. Kruti Patel, Shuowei Cai
28. Bioscience 2016, Virtual screening and admet analysis of endopeptidase inhibitors. Kumar R, Patel K, Cai S and Singh BR
29. IBRCC 2016, Quantitative structure activity relationships (QSAR) of psoralen nitro benzene analogs against Botulinum Neurotoxin type A. Kruti Patel, Shuowei Cai and Bal Ram Singh
30. BRC 2016, Quantitative structure activity relationships (QSAR) of psoralen nitro benzene analogs against BoNT/A. Kruti Patel, Shuowei Cai and Bal Ram Singh
31. NESACS 19TH 2017, Discovery of Natural Compounds as Inhibitors of Type A Botulinum Neurotoxin. Kruti Patel, S. Cai, V.S. Parmar, B K Singh and BR Singh
32. NESACS 19TH 2017, The implication of the botulinum neurotoxin type A endopeptidase C-terminus on substrate binding, enzyme activity, and maintaining a functionally flexible structure in solution. Thomas M. Feltrup, Kruti Patel, Raj Kumar, Shuowei Cai, and Bal Ram Singh
33. BRC 2017, A Novel Surface Plasmon Resonance Biosensor for the Rapid Detection of Botulinum Neurotoxins. Kruti Patel, Shmuel Halevi, Paul Melman, John Schwartz, Shuowei Cai and Bal Ram Singh
34. BRC 2017, Structure and function of quinoline based inhibitor for Botulinum Neurotoxin Type A Intoxication. Kruti B. Patel, Menglong Yu, Smruti Patel, Shivappa Rasapali, Shuowei Cai, Bal Ram Singh
35. BRC 2017, Virtual Screening of Natural Compounds Library against Botulinum Neurotoxin Type A for Potential Inhibitors. Timothy Lorgeree, Kruti Patel, Bal Ram Singh, Shuowei Cai
36. IBRCC 2017, Mode of action of quinoline based inhibitor for Botulinum Neurotoxin Type A Intoxication. Kruti B. Patel, Menglong Yu, Smruti Patel, Shivappa Rasapali, Shuowei Cai, Bal Ram Singh

AWARDS /ACHIEVEMENTS

1. Dissertation Writing Support Grant from University of Massachusetts Jan 2014
2. Graduate Student Senate Funding from University of Massachusetts May 2014
3. Graduate Student Travel Grant 2013 from University of Massachusetts Sep 2013
4. Participated in the one day International Symposium & National Conference on Bioactive Heterocycles & Drug Discovery Paradigm.

REWIED ARTICLES FOR SCEINTFIC JOURNALS

1. Elsevier journal "Biochemistry and biophysics reports
2. Bentham science publisher's "current enzyme inhibition" journal
3. Indian journal of medical research

AFFILIATIONS

1. Sigma XI upon invitation
2. Member of American Chemical Society (ACS)
3. American Society for Biochemistry and Molecular BIology (ASBMB) upon invitation
4. America Society for Pharmacology and Experimental Therapeutics (ASPET) upon invitation

MENTORING

Post doctoral, 2014-present at Umass Dartmouth, 4 graduate and 2 undergraduate students

During Ph.D., 2012 -2014, 2 graduate students