CURRICULUM VITAE
Pooran Chand, Ph.D.
CEO
Therachem Research Medilab (India), Pvt. Ltd.

Current Contact Information:

Home Address

196 Highland View Drive
Birmingham, AL 35242
USA
Cell phone: 205-427-0419
Email: pchand@therachemlab.com

Work Address:

E-969 Biotech Park
RIICO Industrial Area, Sitapura
Jaipur 302022 (Rajasthan), INDIA
Tel: 011-91-141-2770712 (India)
Fax: 011-91-141-2770714 (India)
Tel: 1-205-427-0419 (USA)
Website: www.therachem.net
Email: pchand@therachemlab.com

CURRICULUM VITAE
Pooran Chand, Ph.D.

THERACHEM
RESEARCH MEDILAB (INDIA)
PVT. LTD.

EDUCATION

1973: B.S. **Agra University**, Agra, India
1975: M.S. Organic Chemistry, **Agra University**, Agra, India
1979: Ph.D. Organic Chemistry, **Rajasthan University**, Jaipur, India
1980: Post-Doctoral Fellow, **Rajasthan University**, Jaipur, India with Professor K. C. Joshi

EMPLOYMENT

2008-Present: ***United Chem Resources***, Birmingham, AL, USA & ***Therachem Research Medilabs (India) Pvt. Ltd.***, Jaipur, India. **(**Both companies are same)
Chief Executive Officer

1991-2008: ***BioCryst Pharmaceuticals Inc., Birmingham, AL, USA***
2006-2008: Executive Director, Medicinal Chemistry
1999-2005: Director, Medicinal Chemistry
1991-1999: Various supervisory positions with increased responsibilities: Chemist I, Chemist II, Chemist III, Senior Research Chemist, Group Leader and Section Head.

1987-1989: ***E.H.R.T., Birmingham, AL, USA***
Assistant Director

1982-1986: ***Ballarpur Industries Ltd.,*** Karwar, Karnataka, India.
Research Scientist

ACADEMIC APPOINTMENTS

2009-Present Adjunct Professor ***University of Alabama***, Chemistry Department, University of Alabama, Tuscaloosa, AL, USA
2009: Adjunct Professor, ***University of Alabama***, Chemistry Department, at Birmingham, AL, USA
1987-1990: Post-Doctoral Fellow, ***Southern Research Institute***, Birmingham, AL, USA
1986-1987: Post-Doctoral Fellow, ***University of Alabama***, Birmingham, Alabama with Professor Koop Lammertsma.
1981: DANIDA Fellow at ***Neurochemical Institute***, Copenhagen, Denmark

CURRENT PROFESSIONAL AFFILIATIONS

- Member of The American Chemical Society (ACS)

CURRICULUM VITAE
Pooran Chand, Ph.D.

THERACHEM
RESEARCH MEDILAB (INDIA)
PVT. LTD.

RESEARCH EXPERIENCE

BioCryst Pharmaceuticals, Inc.b Birmingham, AL, USA:

Structure-based drug design: Targets are selected for which the enzyme structure is known or being solved in-house or by the collaborators. The design of the molecules is carried out by a group of crystallographers and chemists. Successfully completed four projects and initiated a fifth project.

1. **Neuraminidase Inhibitors (For Flu):** Designed, synthesized and brought the target molecule (BCX-1812, Peramivir) to the IND stage. Research included intensive work to design a charged, multi-substituted cyclopentane derivative as well as the synthesis of a large number of pro-drugs. Developed a **commercial 5 step synthesis** for the selected molecule (BCX-1812) which has **5 chiral centers**, that was used for its GMP synthesis for phase-I trials. The project was licensed to Johnson & Johnson before returning back to BioCryst. The drug failed in phase-III clinical trials when used orally. Development was continued using intravenous and intramuscular routes. Peramivir was approved for treatment of influenza in Japan under the commercial name RAPIACTA®.
2. **Tissue Factor/ Factor VIIa Inhibitors (For Cardiovascular diseases):** Designed, synthesized and brought the target molecule to the IND stage. More than 2000 fully characterized new compounds and a number of pro-drugs were synthesized under my supervision. Developed a practical synthesis to prepare the molecule in Kg quantities. The sourcing and synthesis of the cheap starting materials were done in India. The product has been synthesized under c-GMP conditions.
3. **PNP Inhibitors:** Was involved in the discovery and large scale synthesis of BCX-4208, which was collaborated with Roche Pharmaceuticals. New compounds have been discovered which are under preclinical evaluations.
4. **Paramyxovirus Inhibitors (For Paraflu):** Designed, discovered and synthesized the target carbohydrate-based molecule.
5. **Hepatitis C viral polymerase Inhibitors (For HCV):** The project is in the discovery stage. A number of lead molecules based upon nucleosides have been discovered and the refining is under way. One molecule has been selected for toxicology studies.

E.H.R.T., Birmingham, AL, USA:

This is a 'Drugs of Abuse' (amphetamines, barbiturates, cocaine, phencyclidine, morphine and THC) testing company. The methods used were radioactive assay and GC/MS for the identification of drugs and drug metabolites in urine. I managed the drug testing program and developed a synthesis lab for the preparation of radioactive (C-14) compounds.

Southern Research Institute, Birmingham, AL, USA:

This is a non-profit drug discovery institute, which has licensed 7 drugs for treatment of cancer to different companies. I worked on carbohydrates (mono-, di- and trisaccharides) and radiolabeled (C-14) compounds.

University of Alabama, Birmingham, AL, USA:

Conducted research aimed to study coal liquefaction and phosphorus-tungsten complexes.

THERACHEM
RESEARCH MEDILAB (INDIA)
PVT. LTD.

Ballarpur Industries Ltd. Karwar (India):

Developed the commercial processes for purifying technical grade phosphoric acid to food grade phosphoric acid; photographic grade KBr from Bromine and KOH and urea; Ethyl bromide from ethanol and bromine and developed some oil well chemicals.

Neurochemical Institute, Copenhagen, Denmark:

Carried out research on the toxicity of industrial chemicals on rat brain and liver enzymes.

Rajasthan University, Jaipur, India:

Research was focused on identification and synthesis of CNS active fluorine containing molecules, particularly indoles. The research encompassed other molecules including Aromatics (benzene, pyridine, naphthalene, benzodiazepine, pyrrole, etc.); carbohydrates (furanose, pyranose, acyclics, carbocyclics, nitrogen containing sugars, etc.), nucleosides of the same and nucleotides; peptides; radioactive molecules. More than **5000** new, fully characterized compounds resulting from this research were deposited into the library of BioCryst.

PUBLICATIONS:

1. Kotian, Pravin L.; Ghosh, Ajit; Lin, Tsu-Hsing; Wu, Minwan; Satish Kumar, V.; Babu, Yarlagadda S.; Chand, Pooran Synthetic approaches to imino sugar (2R,3R,4S)-2-(hydroxymethyl)-4-methylpyrrolidine-3,4-diol from naturally occurring sugar and amino acid. *Tetrahedron Letters* (**2011**), *52*(3), 365-368.

2. Bantia, Shanta; Parker, Cynthia; Upshaw, Ramanda; Cunningham, Amanda; Kotian, Pravin; Kilpatrick, J. Michael; Morris, Philip; Chand, Pooran; Babu, Yarlagadda S. Potent orally bioavailable purine nucleoside phosphorylase inhibitor BCX-4208 induces apoptosis in B- and T-lymphocytes-A novel treatment approach for autoimmune diseases, organ transplantation and hematologic malignancies. *International Immunopharmacology* (**2010**), *10*(7), 784-790.

3. Kotian, Pravin L.; Krishnan, Raman; Rowland, Scott; El-Kattan, Yahya; Saini, Surendra K.; Upshaw, Ramanda; Bantia, Shanta; Arnold, Shane; Babu, Y. Sudhakar; Chand, Pooran Design, parallel synthesis, and crystal structures of biphenyl antithrombotics as selective inhibitors of tissue factor FVIIa complex. Part 1: Exploration of S2 pocket pharmacophores. [*Erratum to document cited in CA151:147921*] *Bioorganic & Medicinal Chemistry* (**2010**), 18(1), 460.

4. Alymova, Irina V.; Watanabe, Makiko; Boyd, Kelli L.; Chand, Pooran; Babu, Y. Sudhakara; Portner, Allen Efficacy of the novel parainfluenza virus hemagglutinin-neuraminidase inhibitor BCX 2798 in mice - further evaluation. *Antiviral Therapy* (**2009**), *14*(7), 891-898

5. Kotian, Pravin L.; Krishnan, Raman; Rowland, Scott; El-Kattan, Yahya; Saini, Surendra K.; Upshaw, Ramanda; Bantia, Shanta; Arnold, Shane; Sudhakar Babu, Y.; Chand, Pooran Design, parallel synthesis, and crystal structures of biphenyl antithrombotics as selective inhibitors of tissue factor FVIIa complex. Part 1: Exploration of S2 pocket pharmacophores. *Bioorganic & Medicinal Chemistry* (**2009**), *17*(11), 3934-3958.

6. Alymova, Irina V.; Taylor, Garry; Mishin, Vasiliy P.; Watanabe, Makiko; Murti, K. Gopal; Boyd, Kelli; Chand, Pooran; Babu, Y. Sudhakara; Portner, Allen. Loss of the *N*-linked glycan at residue 173 of human parainfluenza virus type 1 hemagglutinin-neuraminidase exposes a second receptor-binding site. *Journal of Virology* (**2008**), *82*(17), 8400-8410.

7. Babu, Y. Sudhakara; Chand, Pooran; Kotian, Pravin L. Influenza neuraminidase inhibitors as antiviral agents. Annual Reports in Medicinal Chemistry (**2006**), *41*, 287-297.

8. Krishnan, Raman; Kotian, Pravin L.; Chand, Pooran; Bantia, Shanta; Rowland, Scott; Babu, Y. S. Probing the S2 site of factor VIIa to generate potent and selective inhibitors: the structure of BCX-3607 in complex with tissue factor-factor VIIa, *Acta Crystallographica, Section D: Biological Crystallography* (**2007**), *D63*(6), 689-697.

9. Arnold, C. Shane; Parker, Cynthia; Upshaw, Ramanda; Prydz, Hans; Chand, Pooran; Kotian, Pravin; Bantia, Shanta; Babu, Y. Sudhakar. The antithrombotic and anti-inflammatory effects of BCX-3607, a small molecule tissue factor/factor VIIa inhibitor, *Thrombosis Research* (**2006**), *117*(3), 343-349.

10. Chand, Pooran. Recent Advances in the Discovery and Synthesis of Neuraminidase Inhibitors. *Expert Opinion on Therapeutic Patents* (**2005**), *15*(8), 1009-1025.

11. Bantia, Shanta; Arnold, Shane, Parker, Cynthia; Upshaw, Ramanda; Chand, Pooran. Anti-influenza Virus Activity of Peramivir in mice with single intramuscular injection. *Antiviral Research* (**2006**), *69*(1), 39-45.

12. Kotian, Pravin L.; Kumar, V. Satish; Lin, Tsu-Hsing; El-Kattan, Yahya; Ghosh, Ajit; Wu, Minwan; Cheng, Xiaogang; Bantia, Shanta; Babu, Yarlagadda S.; Chand, Pooran. An Efficient Regioselective Synthesis of Acyclic N7- And N9-Adenine Nucleosides Via Alkylation Using Secondary Electrophile to Introduce Versatile Functional Groups At The C-1-Position Of Acyclic Moiety. *Nucleosides, Nucleotides & Nucleic Acids* (**2006**), *25*(2), 121-140.

13. Wu, Minwan; El-Kattan, Yahya; Lin, Tsu-Hsing; Ghosh, Ajit; Vadlakonda, Satish; Kotian, Pravin L.; Babu, Yarlagadda S.; Pooran Chand. Synthesis of 9-[1-(Substituted)-3-(Phosphonomethoxy) Propyl]Adenine Derivatives As Possible Antiviral Agents. *Nucleosides, Nucleotides & Nucleic Acids* (**2005**), *24*(10-12), 1543-1568.

14. Wu, Minwan; El-Kattan, Yahya; Lin, Tsu-Hsing; Ghosh, Ajit; Vadlakonda, Satish; Kotian, Pravin L.; Babu, Yarlagadda S.; Chand, Pooran. Synthesis of 9-[1-(Substituted)-2-(Phosphonomethoxy) Ethyl]Adenine Derivatives As Possible Antiviral Agents. *Nucleosides, Nucleotides & Nucleic Acids* (**2005**), *24*(10-12), 1569-1585.

15. Ghosh, Ajit; El-Kattan, Yahya; Wu, Minwan; Lin, Tsu-Hsing; Vadlakonda, Satish; Kotian, Pravin L.; Babu, Yarlagadda S.; Chand, Pooran. Synthesis Of 9-[1-(1-Hydroxyethyl)-3-(Phosphonomethoxy) Propyl]Adenine And Prodrug As Possible Antiviral Agents. *Nucleosides, Nucleotides & Nucleic Acids* (**2005**), *24*(10-12), 1587-1595.

16. El-Kattan, Yahya; Lin, Tsu-Hsing; Wu, Minwan; Kumar, V. Satish; Kotian, Pravin L.; Ghosh, Ajit; Babu, Yarlagadda S.; Chand, Pooran. Synthesis Of N6-Substituted 9-[3-(Phosphonomethoxy)Propyl]Adenine Derivatives As Possible Antiviral Agents. *Nucleosides,Nucleotides & Nucleic Acids* (**2005**), *24*(10-12), 1597-1611.

17. Kotian, Pravin L.; Pooran Chand. An Efficient Stereoselective Synthesis Of (3S,4R)-4-(Hydroxymethyl)Pyrrolidin-3-ol from (S)-Diethylmalate. *Tetrahedron Letters* (**2005**), *46*(19), 3327-3330.

18. Kotian, Pravin L.; Lin, Tsu-Hsing; El-Kattan, Yahya; Pooran Chand. A Practical Large-Scale Synthesis of (3*R*,4*R*)-4-(Hydroxymethyl)pyrrolidin-3-ol Via Asymmetric 1,3-Dipolar Cycloaddition. *Organic Process Research & Development* (**2005**), *2*, 193-197.

19. Arnold, C. Shane; Parker, Cynthia; Upshaw, Ramanda; Prydz, Hans; Chand, Pooran; Kotian, Pravin; Bantia, Shanta, Babu, Y. Sudhakar. The Antithrombotic and Anti-Inflammatory Effects of BCX-3607, A Small Molecule Tissue Factor/Factor VIIa Inhibitor. *Thrombosis Res.* (**2006**), *117*(3), 343-349.

18. Chand, Pooran; Kotian, Pravin L.; Morris, Philip E.; Bantia, Shanta; Walsh, David A.; Babu, Yarlagadda S. Synthesis and Inhibitory Activity of Benzoic Acid and Pyridine Derivatives on Influenza Neuraminidase. *Bioorganic & Medicinal Chemistry* (**2005**), *13*, 2665-2678.

19. Chand, Pooran; Bantia, Shanta; Kotian, Pravin L.; El-Kattan, Yahya; Lin, Tsu-Hsing; Babu, Yarlagadda S. Comparison of the anti-influenza virus activity of cyclopentane derivatives with oseltamivir and zanamivir in vivo. *Bioorganic & Medicinal Chemistry* (**2005**), *13*(12), 4071-4077.

20. Chand, Pooran; Babu, Y. Sudhakar; Bantia, Shanta; Rowland, Scott; Dehghani, Ali; Kotian, Pravin L.; Hutchison, Tracy L.; Ali, Shoukath; Brouillette, Wayne, El-Kattan, Yahya; Lin, Tsu-Hsing. Syntheses and Neuraminidase Inhibitory Activity of Multisubstituted Cyclopentane Amide Derivatives. *J. Med. Chem.* (**2004**), *47*, 1919-1929.

21. Alymova, Irina V.; Taylor, Garry; Takimoto, Toru, Lin, Tsu-Hsing; Chand, Pooran; Babu, Y. Sukhakara; Li, Chenghong; Xiong, Xiaoping; Portner, Allen. Efficacy of Novel Hemagglutinin-Neuraminidase Inhibitors BCX 2798 and BCX 2855 against Human Parainfluenza Viruses In Vitro and In Vivo. *Antimicrobial Agents and Chemotherapy* (**2004**), *48* (5), 1495-1502.

22. Sweet, Clive; Jakeman, Kenneth J.; Bush, Karen; Wagaman, Pamela C.; Mckown, Linda A.; Streeter, Anthony J.; Desai-Krieger, Daksha; Chand, Pooran, Babu, Yarlagadda S. Oral Administration of Cyclopentane Neuraminidase Inhibitors Protects Ferrets against Influenza Virus Infection. *Antimicrobial Agents and Chemotherapy* (**2002**), *46* (4), 996-1004.

23. Chand, Pooran; Kotian, Pravin L.; Dehghani, Ali; El-Kattan, Yahya; Lin, Tsu-Hsing; Hutchison, Tracy L.; Babu, Y. Sudhakar; Bantia, Shanta; Elliott, Arthur J.; Montgomery, John A. Systematic Structure-Based Design and Stereoselective Synthesis of Novel Multi-Substituted Cyclopentane Derivatives with Potent Anti-influenza Activity. *Journal of Medicinal Chemistry* (**2001**), *44*(25), 4379-4392.

23. Bantia, S.; Parker, C. D.; Ananth, S. L.; Horn, L. L.; Andries, K.; Chand, P.; Kotian, P. L.; Dehghani, A.; El-Kattan, Y.; Lin, T.; Hutchison, T. L.; Montgomery, J. A.; Kellog, D. L.; Babu, Y. S. Comparison of the anti-influenza virus activity of RWJ-270201 with those of oseltamivir and zanamivir. *Antimicrobial Agents and Chemotherapy* (**2001**), *45*(4), 1162-1167.

24. Babu, Y. Sudhakar; Chand, Pooran; Bantia, Shanta; Kotian, Pravin; Dehghani, Ali; El-Kattan, Yahya; Lin, Tsu-Hsing; Hutchison, Tracy L.; Elliott, Arthur J.; Parker, Cynthia D.; Ananth, Sandya L.; Horn, LaShun L.; Laver, Graeme W.; Montgomery, John A. Bcx-1812 (RWJ-270201):

discovery of a novel, highly potent, orally active, and selective influenza neuraminidase inhibitor through structure-based drug design. *Journal of Medicinal Chemistry* (**2000**), *43*(19), 3482-3486.

25. Atigadda, Venkatram R.; Brouillette, Wayne J.; Duarte, Franco; Babu, Yarlagadda S.; Bantia, Shanta; Chand, Pooran; Chu, Naiming; Montgomery, John A.; Walsh, David A.; Sudbeck, Elise; Finley, James; Air, Gillian M.; Luo, Ming; Laver, Graeme W. Hydrophobic benzoic acids as inhibitors of influenza neuraminidase. *Bioorganic & Medicinal Chemistry* (**1999**), *7*(11), 2487-2497.
26. Atigadda, Venkatram R.; Brouillette, Wayne J.; Duarte, Franco; Ali, Shoukath M.; Babu, Yarlagadda S.; Bantia, Shanta; Chand, Pooran; Chu, Naiming; Montgomery, John A.; Walsh, David A.; Sudbeck, Elise A.; Finley, James; Luo, Ming; Air, Gillian M.; Laver, Graeme W. Potent Inhibition of Influenza Sialidase by a Benzoic Acid Containing a 2-Pyrrolidinone Substituent. *Journal of Medicinal Chemistry* (**1999**), *42*(13), 2332-2343.
27. Chand, Pooran; Babu, Yarlagadda S.; Bantia, Shanta; Chu, Naiming; Cole, L. Brent; Kotian, Pravin L.; Laver, W. Graeme; Montgomery, John A.; Pathak, Ved P.; Petty, Sandra L.; Shrout, David P.; Walsh, David A.; Walsh, Gerald M. Design and Synthesis of Benzoic Acid Derivatives as Influenza Neuraminidase Inhibitors Using Structure-Based Drug Design. *Journal of Medicinal Chemistry* (**1997**), *40*(25), 4030-4052.
28. Sudbeck, E. A.; Jedrzejas, M. J.; Singh, S.; Brouillette, W. J.; Air, G. M.; Laver, W. G.; Babu, Y. S.; Bantia, S.; Chand, P.; Chu, N.; Montgomery, J. A.; Walsh, D. A.; Luo, M. Guanidinobenzoic acid inhibitors of influenza virus neuraminidase. *Journal of Molecular Biology* (**1997**), *267*(3), 584-594.
29. Niwas, Shri; Chand, Pooran; Pathak, Ved P.; Montgomery, John A. Structure-Based Design of Inhibitors of Purine Nucleoside Phosphorylase. 5. 9-Deazahypoxanthines. *J. Med. Chem.* (**1994**), *37*(15), 2477-80.
30. Hung, Jui-Te; Yang, Suh-Wan; Chand, Pooran; Gray, Gary M.; Lammertsma, Koop. Olefin Reactivities toward the Ph-P-W(CO)5 Phosphinidene. J. Am. Chem. Soc. (**1994**), *116*(24), 10966-71.
31. Hung, Jui Te; Chand, Pooran; Fronczek, Frank R.; Watkins, Stephen F.; Lammertsma, Koop. Addition of a terminal phosphinidene complex to norbornadiene. *Organometallics* (**1993**), *12*(4), 1401-5.
32. Lammertsma, Koop; Hung, Jui Te; Chand, Pooran; Gray, Gary M. Addition of a terminal phosphinidene complex to a conjugated diene. Thermal rearrangement of a vinylphosphirane to a 1,4 adduct. *J. Org. Chem.* (**1992**), *57*(24), 6557-60.
33. Langner, Jeffrey G.; Gan, B. K.; Liu, Ray H.; Baugh, L. Diane; Chand, Pooran; Weng, J. L.; Edwards, Cinnamon; Walia, Amrik S. Enzymic digestion, solid-phase extraction, and gas chromatography/mass spectrometry of derivatized intact oxazepam in urine. *Clin. Chem.* (Winston-Salem, N. C.) (**1991**), *37*(9), 1595-601.
34. Prasad, R. N.; Jindal, Mithlesh; Jain, Mamta; Chand, P.; Varshney, Ashima. Mixed ligand complexes of alkaline earth metals. Part-V. Magnesium(II) and calcium(II) complexes with 2-

hydroxypropiophenone and salicylaldehyde, 2-hydroxyacetophenone, pentane-2,4-dione or 1,3-diphenylpropane-1,3-dione. *J. Indian Chem. Soc*. (**1990**), *67*(2), 91-4.

35. Lammertsma, Koop; Chand, Pooran; Yang, Suh Wan; Hung, Jui Te. The reactivity of a terminal phosphinidene complex toward styrenes. *Organometallics* (**1988**), *7*(8), 1875-6.
36. Joshi, Krishna C.; Pathak, Vijai N.; Chand, Pooran. Mass spectral studies on heterocyclic compounds. Part-I. Fragmentation of some fluorine containing indole derivatives under electron impact. *J. Indian Chem. Soc.* (**1987**), *64*(2), 111-113.
37. Joshi, Krishna C.; Jain, Renuka; Chand, Pooran. Indoles with C-3 as spiro atom. *Heterocycles* (**1985**), *23*(4), 957-96.
38. Joshi, Krishna C.; Patni, R.; Chand, P.; Sharma, V.; Bhattacharya, S. K.; Rao, Y. V. Synthesis and central nervous system activities of certain fluorine-containing 3-substituted indol-2-ones. *Pharmazie* (**1984**), *39*(3), 153-5.
39. Joshi, Krishna; Chand, Pooran; Dandia, Anshu. Studies in spiroheterocycles: part II - reactions of fluorine containing indole-2,3-diones with 1,2-phenylenediamines and 2,3-diaminopyridine in different media. *Indian J. Chem., Sect. B* (**1984**), *23B*(8), 743-5.
40. Joshi, Krishna C.; Jain, Renuka; Chand, Pooran; Sharma, Vandana. Studies in spiroheterocycles: part I - reactions of fluorinated indole-2,3-diones with alkanediols and synthesis of a new spiro system. *Indian J. Chem., Sect. B* (**1984**), *23B*(4), 386-7.
41. Joshi, Krishna C.; Jain, Renuka; Chand, Pooran; Garg, Saroj. Studies in spiro heterocycles. Part III: Synthesis of fluorine containing spiro[3H-indole-3,2'-thiazolidine]-2,4'(1H)-diones as antifertility agents. *J. Indian Chem. Soc.* (**1983**), *60*(8), 760-1.
42. Chand, P.; Clausen, J. Effects of phenobarbital and sodium salicylate on cytochrome P-450 mixed function oxygenase and glutathione S-transferase activities in rat brain. *Chem.-Biol. Interact.* (**1982**), *40*(3), 357-63.
43. Chand, P.; Clausen, J. Triethyl lead toxicity in relation to brain glutathione and glutathione Stransferase. *Toxicol. Lett*. (**1982**), *12*(2-3), 181-4.
44. Chand, P.; Clausen, J. Effects of toluene on cytochrome P 450 mixed-function oxygenase and glutathione S-transferase activities in rat brain and liver. *Bull. Environ. Contam. Toxicol.* (**1982**), *28*(5), 542-5.
45. Joshi, Krishna C.; Chand, Pooran. Biologically active indole derivatives. *Pharmazie* (**1982**), *37*(1), 1-12.
46. Joshi, Krishna C.; Patni, R.; Chand, Pooran. A convenient synthesis and reactions of spiro[3H-indole-3,2'-thiazolidine]-2,4'(1H)-diones. *Heterocycles* (**1981**), *16*(9), 1555-9.
47. Joshi, Krishna C.; Chand, Pooran. Reactions of 3-hydrazino-5H-1, 2, 4-triazino [5, 6-b] indoles with trifluoroacetic anhydride, acetylacetone, hexafluoroacetylacetone and acetophenone. *Heterocycles* (**1981**), *16*(1), 43-7.
48. Joshi, Krishna C.; Chand, Pooran. A novel tetracyclic ring system. 10HTetrazolo [5',1':3,4] [1,2,4]triazino[5,6-b]indole. *J. Heterocycl. Chem.* (**1980**), *17*(8), 1783-4.

49. Joshi, Krishna C.; Pathak, Vijai N.; Chand, Pooran. Possible psychopharmacological agents. Part XI: Synthesis and CNS activity of some fluorine containing indole derivatives. *J. Indian Chem. Soc.* (**1980**), *57*(4), 423-5.

50. Joshi, K. C.; Pathak, V. N.; Chand, P. Possible psychopharmacological agents. X. Synthesis of some fluorine-containing indole-2,3-dione derivatives. *J. Prakt. Chem.* (**1980**), *322*(2), 314-20.

51. Joshi, Krishna C.; Pathak, Vijai N.; Arya, Pramila; Chand, Pooran. Possible psychopharmacological agents. Part 7: Synthesis and CNS activity of some fluorinated 2,4,7/8-trisubstituted-3H-1,5-benzodiazepinium monoperchlorates. *Pharmazie* (**1979**), *34*(11), 718-20.

52. Joshi, Krishna C.; Pathak, Vijai N.; Arya, Pramila; Chand, Pooran. Studies in potential organofluorine antibacterial agents. Part IV. Syntheses of some new fluorine containing indole derivatives and their antibacterial activity. *Agric. Biol. Chem.* (**1979**), *43*(1), 171-3.

53. Joshi, Krishna C.; Pathak, Vijai N.; Chand, Pooran. Possible psychopharmacological agents: Part VI. Synthesis of some 3-alkylaminomethyl-2-(4-fluorophenyl)indoles, 3-indolyl aminoalkylketones and bis[5-fluoro-2-(4-fluorophenyl)indol-3-yl]methanes. *Indian J. Chem., Sect. B* (**1978**), *16B*(10), 933-6.

54. Joshi, Krishna C.; Pathak, Vijai N.; Chand, Pooran. Possible psychopharmacological agents. Part V. Synthesis and CNS activity of some fluorine containing 3-indolylglyoxamides and tryptamines. *Agric. Biol. Chem.* (**1978**), *42*(9), 1723-6.

55. Joshi, Krishna C.; Pathak, Vijai N.; Chand, Pooran. Possible psychopharmacological agents. IV. Synthesis of some fluorine-containing indoles and related compounds. *J. Prakt. Chem.* (**1978**), *320*(4), 701-4.

ISSUED PATENTS

1. Babu; Yarlagadda S., Chand; Pooran, Ghosh; Ajit K., Kotian; Pravin L., Kumar; V. Satish. AZA nucleosides, preparation thereof and use as inhibitors of RNA viral polymerases, US patent: **US 7,560,434**, July **2009**
2. Babu; Yarlagadda S., Chand; Pooran, Wu; Minwan, Kotian; Pravin L., Kumar; V. Satish, Lin; Tsu-Hsing, El-Kattan; Yahya, Ghosh; Ajit K. Hepatitis C therapies, US patent: **US 7,514,410,** April **2009.**
3. Chand, Pooran; Wu, Minwan. Therapeutic Furopyrimidines and Thienopyrimidines. US Patent: **US 7,429,571,** September **2008**.
4. Babu, Yarlagadda S.; Chand, Pooran; El-Kattan, Yahya; Wu, Minwan. Nucleosides, preparation thereof and use as Inhibitors of RNA viral polymerases. US patent: **US 7,388,002**, June **2008**.
5. Chand; Pooran, El-Kattan; Yahya, Kotian; Pravin L. Process for the preparation of substituted pyrrolidine derivatives and intermediates, US patent: US **7,230,119**, June **2007**.
6. Babu, Yarlagadda S.; Rowland, Scott R.; Chand, Pooran. Compounds Useful for Inhibiting Paramyxovirus Neuraminidase. US patent: **US 7,045,535**, May **2006**.

7. Babu, Yarlagadda S.; Rowland, Scott R.; Chand, Pooran; Kotian, Pravin L.; El-Kattan, Yahya; Niwas, Shri. Biaryl compounds as serine protease inhibitors. US patent: **US 6,936,719**, August **2005**.
8. Chand, Pooran; Elliott, Arthur J. Preparation of substituted cyclopentane and cyclopentene compounds and certain intermediates. US Patent **US 6,7 72,316**, July **2004**.
9. Babu, Yarlagadda S.; Rowland, Scott R.; Chand, Pooran; Kotian, Pravin L.; El-Kattan, Yahya; Niwas, Shri. Biaryl compounds as serine protease inhibitors. **USP 6,699,994**, March **2004**.10. Babu, Yarlagadda S.; Chand, Pooran; Montgomery, John A. Substituted cyclopentane and cyclopentene compounds useful as neuraminidase inhibitors. US Patent: **US 6,562,861**, May **2003**.
11. Chand, Pooran; Kotian, Pravin L.; Babu, Yarlagadda S.; Montgomery; John A. Substituted pyrrolidine compounds useful as neuraminidase inhibitors. US Patent: **US 6,518,299**, February **2003**.
12. Chand, Pooran; Babu, Yarlagadda S.; Bantia, Shanta. Cyclopentane and cyclopentene compounds and use for detecting influenza virus. US Patent **US 6,503,745**, January **2003**.
13. Babu, Yarlagadda S.; Chand, Pooran; Montgomery, John A. Substituted cyclopentane compounds useful as neuraminidase inhibitors. US Patent: **US 6,410,594**, June **2002**.
14. Babu, Yarlagadda S.; Chand, Pooran; Walsh, David A. Substituted benzene derivatives useful as neuraminidase-inhibitors. US Patent: **US 5,602,277**, February **1997**.

RECENT PENDING PATENT APPLICATIONS

1. Babu; Yarlagadda S.; Chand; Pooran; Bantia; Shanta; Arnold; Shane; Kilpatrick; John Michael. Intramuscular antiviral treatments US Patent Application **US 20110015264 A1**, January **2011**.
2. Babu; Yarlagadda S.; Chand; Pooran. Tetrahydrofuro [3,4-d] dioxolane compounds for use in the treatment of viral infections and cancer, US Patent Application **US 20110002886 A1**, January **2011**.
3. Mitchell, Robert Allin; Trent, John Olaf; Chand, Pooran; Tapolsky, Gilles Hugues. Preparation of iodopyrimidine derivatives for use in the treatment of macrophage migration inhibitory factor (MIF)-implicated diseases, PCT Int. Appl. (**2011**), **WO 2011038234 A2** 20110331.
4. Babu; Yarlagadda S.; Chand; Pooran; Wu; Minwan; Kotian; Pravin L.; Kumar; V. Satish; Lin; Tsu-Hsing; El-Kattan; Yahya; Ghosh; Ajit K. Hepatitis C therapies, US Patent Application **US 20100143300 A1**, June **2010**.
5. Chand; Pooran; Wu; Minwan; Kotian; Pravin L.; Kumar; V. Satish; Lin; Tsu-Hsing. Methods for the preparation of 9-deazapurine derivatives, US Patent Application **US 20100093991 A1**, April **2010**.
6. Babu, Yarlagadda S.; Chand, Pooran; Kumar, V. Satish; Hu, Xingding. Antiviral and antitumor nucleoside analogs, PCT Int. Appl. (**2010**), **WO 2010036407 A2** 20100401.
7. Babu, Yarlagadda S.; Chand, Pooran; Kotian, Pravin L.; Kumar, V. Satish. Preparation of piperidine derivatives as immunosuppressant for the treatment of diseases associated with pathologic JAK3 activation, PCT Int. Appl. (**2010**), **WO 2010014930 A2** 20100204.

8. Babu, Yarlagadda S.; Chand, Pooran; Kumar, V. Satish; Kotian; Pravin L.; Wu; Minwan. Antiviral nucleoside analogs, US Patent Application **US 20100015094 A1**, January **2010**.
9. Chand, Pooran; Wu, Minwan; Kotian, Pravin L.; Kumar, V. Satish; Lin, Tsu-Hsing. Synthetic intermediates and processes for nucleosides, glycosides, and heterocycles, PCT Int. Appl. (**2010**), **WO 2010011748 A2** 20100128.
10. Kotian; Pravin L.; Sawant; Kailas B.; Chand; Pooran. Process for preparing nucleoside analogs, US Patent Application **US 20090247750 A1**, October **2009**.
11. Babu, Yarlagadda S.; Chand, Pooran; Kotian, Pravin; Wu, Minwan; Kumar, V. Satish**.** Antiviral therapeutic agents, US Patent Application **US 20090227524 A1**, September **2009**.
12. Babu, Yarlagadda S.; Chand, Pooran; Kotian, Pravin; Wu, Minwan; Kumar, V. Satish**.** Preparation of nucleoside and nucleotide analogs as antiviral and antitumor therapeutic agents, PCT Int. Appl. (**2009**), **WO 2009111653 A2** 20090911.

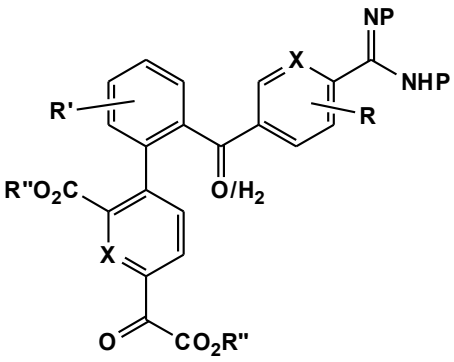
ABSTRACTS / PRESENTATIONS:

1. Chand, P; Ghosh, A. K.; Kotian, P. L.; Lin, T.H.; El-Kattan, Y.; Wu, M.; Sadlakonda, S.; Babu, Y. S., Synthesis of (2S,3S,4R,5R)-2-(4-amino-5H-pyrrolo[3,2-d]pyrimidin-7-yl)-5-(hydroxymethyl)-3-methylpyrrolidine-3,4-diol, an analog of potent HCV inhibitor. Collection Symposium Series (**2005**), *7* (Chemistry of Nucleic Acid Components), 329-332.
2. Chand, P; Kotian, P. L.; Dehghani, A.; El-Kattan, Y.; Lin, T.H.; Wu, M.; Rowland, S.; Raman, K.; Bantia, S.; Arnold, S.; Babu, Y. S. Discovery of Potent and Selective Biaryl Derivatives as Tissue factor/factor VIIa Inhibitors through Structure Based drug Design. 229th ACS National Meeting, San Diego, CA March 13-17 (**2005**), MEDI-252.
3. Atigadda, Venkatram R.; Babu, Y. S.; Bantia, S.; Chand, P.; Chu, N.; Montgomery, J. A.; Walsh, D. A.; Luo, M.; Brouillette, Wayne J. Potent aromatic inhibitors of influenza neuraminidase. 216th ACS National Meeting, Boston, MA August 23-27 (**1998**), MEDI-237.
4. Ali, Shoukath M.; Babu, Y. S.; Bantia, S.; Chand, P.; Chu, N.; Montgomery, J. A.; Luo, M.; Brouillette, W. J. New inhibitors of influenza virus neuraminidase. 216th ACS National Meeting, Boston, MA, August 23-27 (**1998**), MEDI-236.
5. Brouillette, W. J.; Atigadda, V. R.; Duarte, F. J.; Luo, M.; Montgomery, J. A.; Walsh, D. A.; Chand, P.; Bantia, S.; Chu, N.; Babu, Y. S. Structure-based benzoic acid inhibitors of influenza neuraminidase. 214th ACS National Meeting, Las Vegas, NV, September 7-11 (**1997**), MEDI-251.
6. Ali, Shoukath M.; Babu, Y. S.; Bantia, S.; Chand, P.; Chu, N.; Montgomery, J. A.; Walsh, D. A.; Luo, M.; Brouillette, W. J. Fluoro substituted aromatic inhibitors of influenza neuraminidase. 213th ACS National Meeting, San Francisco, CA April 13-17 (**1997**), MEDI-277.
7. Duarte, F. J.; Babu, Y. S.; Bantia, S.; Chand, P.; Chu, N.; Montgomery, J. A.; Walsh, D. A.; Luo, M.; Brouillette, Wayne J. Substituted benzoic acids as inhibitors of influenza neuraminidase. 213th ACS National Meeting, San Francisco, April 13-17 (**1997**), MEDI-276.

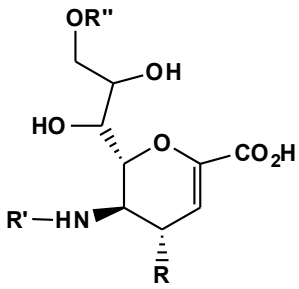
8. Atigadda, Venkatram R.; Babu, Y. S.; Bantia, S.; Chand, P.; Chu, N.; Montgomery, J. A.; Walsh, D. A.; Luo, M.; Brouillette, Wayne J. New aromatic inhibitors of influenza neuraminidase. 213th ACS National Meeting, San Francisco, April 13-17 (**1997**), MEDI-275.
9. Babu, Yarlagadda S.; Chand, Pooran; Walsh, David A. Terephthalic acid derivatives inhibitors of influenza neuraminidase. 211th ACS National Meeting, New Orleans, LA, March 24-28 (**1996**), ORGN-237.

EXAMPLES OF DISCOVERED MOLECULES

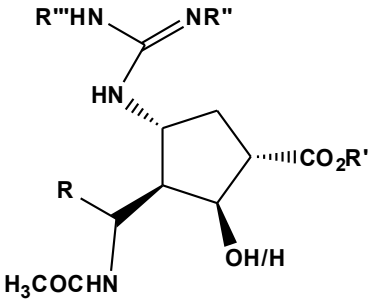
Examples of the many novel structures resulting from several discovery project; the molecules were designed, optimized for activity, selected and advanced to the development stage.



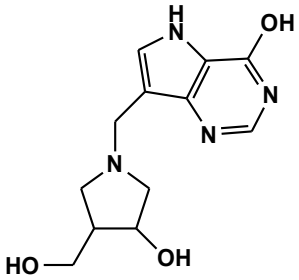
TF/FVIIa inhibitors

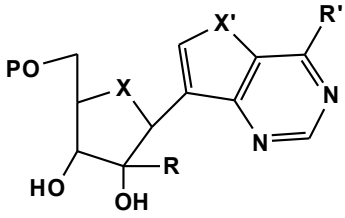


Sialic acid derivatives



Peramivir analogs





X = O, NH; X' = NH, O, S