




Title	Dr.	First Name	Vibha	Last Name	Tandon	Photograph
Designation	Associate Professor					
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Educational Qualifications						
Degree	Institution	Year				
Ph.D.	Department of Chemistry, University of Allahabad	1991	Synthesis of sequential Oligonucleotides using special Protecting Groups			
PG	T. D. College, Gorakhpur University	1986	Subjects: Organic Chemistry			
UG	T. D. College, Gorakhpur University	1984	Subjects: Chemistry, Zoology, Botany			
Career Profile						
Organization / Institution		Designation/ Award	Duration	Role		
Dept. of Chemistry, University of Delhi, Delhi		Associate Professor	2009- present	Teaching and Research		
Dr. B.R. Ambedkar Center for Biomedical Research, University of Delhi, Delhi		Research Scientist (Lecturer)	1998-2009	Teaching and Research		
Indian Institute of Technology Kanpur		Postdoctoral Fellow	1993 – 1996	Research		
Dept. of Chemistry, University of Allahabad		Research Associate	1991- 1993	Research		
Administrative Assignments						
<ul style="list-style-type: none"> • Full Time Teaching in Master's Program and Ph. D. course Work at Department of Chemistry from year 2009 –Till Date. • Conducting Practical Classes of Organic Group from 2009 –Till date. • Teaching: Courses in M.Sc.- Ph.D. Biomedical Sciences at Dr. B. R. Ambedkar Center for Biomedical Sciences (ACBR). Full time teaching of M.Sc. Biomedical Sciences Programme at University of Delhi since 1998 -2009. • Member of Course Committee Responsible for formulation of Courses at Masters Level, Undergraduate Level and as well as Four Year Undergraduate program from year 2011 – till date. 						

- IN charge of LC- MS Facility at ACBR and Department of Chemistry from year 2006 onwards.
- Conducted M.Sc. Organic Chemistry Practical independently for both semesters from last ten years.
- Formulated Courses for the New Special papers (New Drug Discovery) introduced for M.Sc. – Ph.D. Combined degree programme.
- Admission in charge for M.Sc.–Ph.D. Biomedical Sciences courses entrance examination for year 2001 & 2002. Coconvenor in 2003.
- Coordinator of Summer Undergraduate Programme at ACBR in 2001, 2002 and 2005.
- Syllabus formulation: Following courses were design for IV semester of M.Sc.-Ph.D. Combined Degree Program in Biomedical Sciences
Advanced Drug Synthesis (MC-1408)
Medicinal Chemistry and Molecular Pharmacology
- Coordinator of Fund for Improvement of S & T Infrastructure in Universities and Higher Educational Institutions (FIST) project Submitted for LC- MS Facility.
- Coordinator of the project submitted to Department of Science & Technology for Creation of National Facility for Biomedical Research using Nuclear Magnetic Resonance Spectroscopy (NMR Facility).
- Deputy Coordinator of Project Granted under Special Assistance Programme to University Grant Commission New Delhi.
- Coordinator of Project entitled New Drug Discovery in Biomedical Research submitted under Innovative Programme to University Grants Commission, New Delhi
- Syllabus formulation of B.Sc. Biomedical Science Course.
- Paper Setter for B. Tech. Examinations of Delhi College of Engineering, Delhi.
- Paper Setter for M.Sc. & B. Sc. Examinations of Bundelkhand University, Jhansi.
- Paper Setter for M. Sc. Examination of Guru Jambheshwar University, Hisar.

Areas of Interest / Specialization

Research Specialization:**Medicinal Chemistry, Oligonucleotide Therapeutics, Radiation Biology, Natural Products****Project 1 ;**

- **Development of a DNA MGBL as a Radioprotector: Molecular Events in the Modulation of Ionization Radiation Induced Genomic Instability in vitro and in vivo.**

One of the major research projects in my laboratory is development of Radioprotectors. Cancer radiotherapy relies on two essential components, killing cancer cells while sparing normal tissues. Further therapeutic benefits can be accrued by understanding and manipulating the biological response of the microenvironment to ionizing radiation to increase tumor sensitivity to radiation or to inhibit deleterious effects. Moreover, accidental exposure to ionizing radiation may also lead to hazardous effects in living organisms which includes a spectrum of lesions within the cells. The present project focuses on the study of molecular mechanism of action of DNA minor groove binding ligands. From our previous studies, it was found that bisubstitution of the phenyl ring of Hoechst 33342 lead to a decrease in the cytotoxicity and increase in radioprotective efficacy. Hence, it becomes imperative to study the molecular mechanism of action of these ligands. In order to elucidate the molecular mechanism of action of these ligands. Resultant of gene expression studies the MAPKinase pathway was found to be differentially regulated in response to ligand and radiation treatment. The pharmacokinetics and animal survival data had once again proved DMA can be developed as potent Radioprotector.

Project 2 :

- **DNA Topoisomerase I Inhibitors : Design Synthesis and characterization of novel benzimidazoles and an insight into mechanism of selective Inhibition of bacterial topoisomerase I by these molecules**

New antimicrobials are needed to combat drug resistance. One attractive strategy is to develop ligands that selectively target microbial DNA over host DNA. DNA minor groove binders already provide useful antimicrobial and anti tumor agents, however, their cytotoxicity in mammalian systems limits their applications. Recently, we reported bisubstituted analogues with impressive DNA affinity yet surprisingly low mammalian cytotoxicity. This suggests that DNA affinity and cytotoxicity are to an extent separable activity for DNA minor groove binders.

There is a need to develop new class of antimicrobials to combat the resistance of bacteria for the existing antimicrobials. Hence, we are trying to look into the mechanism of inhibition of bacterial Topoisomerase I by these analogues. After understanding the mechanism, these molecules can be further prune to get a more potent antibacterial drug. The determination of antimicrobial susceptibility of a clinical isolate is often crucial for the optimal antimicrobial therapy of infected patients. This need is only increasing with increasing resistance and the emergence of multi-drug resistant micro-organisms.

Recently, we reported bisubstituted analogues with better DNA affinity with lower mammalian cytotoxicity. This suggests that DNA affinity and cytotoxicity may, in part, be separable activities for DNA minor groove binders. Here we tested the antimicrobial activity of bisubstituted analogues of Hoechst 33342 and observed good antimicrobial effects against gram negative, gram-positive bacteria including the clinical samples for the same. The bisubstituted ligands preferentially inhibit bacterial topoisomerase I relative to mammalian topoisomerase in vitro, suggesting that topoisomerase poisoning underlies the antibacterial effects. Modification of Hoechst 33342 provided several potent ligands that selectively poison bacterial cellular processes while allowing mammalian cells to perform normally. This is in principle, of considerable interest as very few specific inhibitors of topoisomerase I are known till date.

Project 3 ;

- **ANTISENSE AND ANTIGENE APPROACH: Complementarity to a unique site on the mRNA and DNA to modulate or inhibit the different processes or gene expression of HIV-1**

Modulation of Dimerization and Translational Frameshifting processes of HIV-1 by PNA

The genome of retroviruses, including HIV-1, consists of two identical RNA strands that are linked together through noncovalent interaction involving nucleotides from the 5' untranslated region (5'-UTR). The 5'-UTR of HIV-1 RNA genome is highly conserved among virus isolates and contains several sequence and structure motifs that are involved in many replication steps. We have evaluated antisense design and efficacy of Peptide nucleic acids (PNA) targeted against the 5'-UTR RNA of HIV-1. We have synthesized PNA Oligomers, and subsequently studied their effect on dimerization of 5'-untranslated region of HIV-1 genomic RNA in presence of PNA as well as their effect on the template switching (recombination) efficiency between the HIV-1 RNA genome. We have also analyzed the effect of these PNAs on -1 translational frameshifting of mRNA of gag-pol gene of HIV-1 in presence of PNA.

Synthesis of Modified PNA and Molecular simulation of normal and modified Peptide Nucleic Acids along with evaluation of its Antisense effect against HIV-1

PNA oligonucleotides are not recognized by proteases or nucleases and this gives them an edge over other DNA mimic analogues and hence they show more stability in biological systems. Owing to the vast applications of PNA; the study of basic chemistry related to the improvement of basic conformation is a prerequisite. Therefore, synthesis of a generation of new PNA molecules is critical.

Considering the above facts, we have synthesised PNA having pyrazolo(3,4-d)pyrimidine as base analogue and characterized these molecules by UV melting, Circular Dichroism, Cellular uptake studies etc. We have observed by spectroscopy and melting experiments that the PNA-DNA complex formed using modified monomers are highly stable and have high melting temperature. In order to re-evaluate and understand the wet laboratory results we have started the simulation experiments and the above mentioned experiments are in progress. We have also studied the molecular dynamics of these modified PNA-DNA duplex using AMBER, as molecular dynamics (MD) provides a clear picture of the structure and flexibility of a molecule. Simultaneously, the biological evaluation of new PNA is also being done.

- **Identification and functional characterization of HIV-1 integrase interacting host cell protein and inhibition of HIV –1 Integrase gene expression by anti-Integrase DNAzyme**

In an attempt to search the HIV integrase interacting proteins we have developed an in-vitro system to identify host cell protein interaction. The Human T lymphocyte cell line, Jurkat was used for the host cell protein extraction. We have identified four proteins by co-immunoprecipitation followed by cross-linking and Peptide mass fingerprinting. Out of the identified proteins, one is Polypyrimidine tract binding protein associated splicing factor (PSF). The PSF protein has been reported to be DNA and RNA binding protein, required in the early spliceosome. PSF is also reported to be involved in homologous DNA pairing. It promotes invasion of ss DNA into ds DNA and produces D-loop. The PSF-NONO heterodimer may be involved in DNA unwinding, modulating the function of topoisomerase I and also in DNA non homologous and end joining (NHEJ) repair and recombination. It also interacts with the Ku80/XRCC5 dimer to establish a functional preligation complex, which are in turn responsible in HIV genome integration. Our laboratory is currently investigating the exact role of PSF in assisting the HIV Integrase in integration event. We are also trying to look into the protein-protein interaction through Mass spectroscopy and western blotting.

In addition to it three DNAzymes were designed to cleave the HIV-Integrase RNA by in-vitro transcription reaction and then we evaluated the efficiency as well as studied the conformational analysis of DNAzymes for in-vitro cleavage in the presence of different metal ions. The similar DNAzymes were transfected in cell culture and we observed considerably high degree of inhibition of integrase. ion and Characterization of biologically active components from Indian medicinal plants: Search for novel antidiabetic, antibacterial and anti-gonorrhoeal compounds.

Project 4 :

- **Isolation and Characterization of biologically active components from Indian medicinal plants: Search for novel antidiabetic, antibacterial and anti-gonorrhoeal compounds**

Diabetes mellitus is a common disease that develops in later years of life. Type II diabetes is a result of relative insulin ineffectiveness, or an insulin resistance, and in latter stages it is due to insulin deficiency. However, diabetes that occurs in individuals at a young age is usually juvenile diabetes and is due to insulin deficiency. It is known as type I diabetes. Another area of focus in my laboratory is the screening and isolation of medicinal plants to look for better measures for counteraction of diabetes mellitus, thereby leading to development of alternate strategies from natural products. This study comprises of the below mentioned objectives:

Isolation and characterization of the antidiabetic components from the crude extracts of *Ocimum sanctum* and *Annona squamosa* using conventional extraction, chromatographic and spectroscopic methods. Determination of the activity of these active components in alloxan diabetic rabbits and streptozotocin diabetic rats.

Study the effect of these drugs on different biochemical parameters like total cholesterol levels, serum protein levels, serum creatinine levels, serum alkaline phosphate levels, serum glutamate oxaloacetate transaminase and serum glutamate pyruvate & transaminase levels

- We have screened 21 medicinal plants against the MDR WHO strains obtained by Dr. Tapsell laboratory from Australia at WHO Center in Delhi and against a number of clinical strains. Quiet inter-estingly, all WHO strains and all the 24 clinical isolates were sensitive to the extracts of *O. sanctum* and *D. quercifolia*, and 22 clinical isolates were sensitive to the extracts of *A. squamosa*, though from the WHO strains all the 24 isolates were resistant to 2 or more antibiotics. Even the 3 CMRNG isolates were inhibited by the extracts of the 3 plants. It was observed from the above results that the multi-drug resistant isolates are highly sensitive to the plant extracts, and therefore, probably the mechanism of inhibition of *N. gonorrhoeae* by the plant extracts is different from antibiotics like penicillin, ciprofloxacin, tetracycline, and nalidixic acid. A new compound has been identified from *Ocimum sanctum* with Antigonorrheal Activity and further studies are underway .Two patents are filed.

Subjects Taught

- Courses Taught: Advances Organic Chemistry , Reaction Mechanism , Asymmetric Synthesis, Chemistry of Life Sciences, Nucleic Acids & Carbohydrates, Study of Reactive Intermediates.
- Medicinal Chemistry
- Advance Organic Chemistry (II Semester), Biochemistry I (II Semester), Spectroscopy (IR, NMR, UV, Raman Spectroscopy)
- Clinical Chemistry & Instrumentation Techniques (III Semester),
- Advance Organic Chemistry (II Semester),
- Biochemistry I (II Semester),
- Paper VIII- Course B: Chemistry of Life Processes(III semester)
- Paper XIV(ii)- Organic Chemistry (Special-V)
- **Course A:** Medicinal Chemistry(IV semester)
- Teaching: Courses Taught in M.Sc.- Ph.D. Biomedical Sciences at Dr. B. R. Ambedkar Center for Biomedical Sciences (ACBR). Full time teaching of M.Sc. Biomedical Sciences Programme at University of Delhi since 1998 -2009.
- Advance Organic Chemistry (II Semester), Biochemistry I (II Semester), Spectroscopy (IR, NMR, UV, Raman Spectroscopy) .Special Topics in Medicinal Chemistry (IV Semester) Convforenor, Principles of Medicinal chemistry (III Semester) Convenor, Clinical Chemistry & Instrumentation Techniques (III Semester), Advance Organic Chemistry (II Semester), Biochemistry I (II Semester), Principles of Medicinal chemistry (III Semester) Convenor, Facilitated in larger way the teaching of various courses for which I

was not coordinator, by pursuing and facilitating Visiting / Guest faculties to take the courses.

Research Guidance

List against each head (If applicable)

1. Supervision of awarded Doctoral Thesis

- Kohli, Sudha. 1999. DNA Finger Printing of Indian Rice Varieties. University of Delhi
- Tawar, Urmila. 2006. Molecular Recognition Studies between Minor Groove Binding Ligands and Nucleic Acids. University of Delhi
- Jain, Akash Kumar. 2006. Non-intercalating DNA Binding Ligands: Synthesis and Their Interaction with Double and Triple Helical DNA. University of Delhi
- Parkash, Braham. 2006. Modulation of Dimerization and Translational Frameshifting Processes of Human Immunodeficiency Virus Type-1 by Using Polyamide Nucleic Acids (PNA). University of Delhi
- Chhikara, Bhupinder Singh. 2006. Synthesis of Bifunctional Chelating Agents to Label Monoclonal Antibody and Peptides for Radioimmunodiagnosis of Cancer. University of Delhi.
- Shokeen, Poonam. 2008. Antidiabetic and Antibacterial Properties of Some Medicinal Plants. University of Delhi.
- Gupta, Meetu. (2009) Deciphering the Role of Serine and Threonine Kinases in Regulation of Cell Growth and Development of Mycobacterium Tuberculosis. University of Delhi
- Sharad K. Gupta. Synthesis of modified Peptide nucleic acid (PNA) and its cellular uptake. University of Delhi. (Submitted in 2009)
- Singh, Nirpendra. Identification and Functional Characterization of Integrase Interacting Human T-Cell Protein. University of Delhi. (Co- Supervisor)
- Singh, Manish. Synthesis of Biological Evaluation of the Bis benzimidazole. University of Delhi.
- Kaur, Navrinder. 2012 Gene Expression studies in response to a Benzimidazole analogue: Implications for the development of a Minor Groove Binding Ligand as a Radioprotector. University of Delhi.
- Bansal, Sandhya. A systematic study of Benzimidazole in search of selective Antimicrobial targeting Topoisomerase. University of Delhi.
- Ranjan, Atul. To elucidate the molecular mechanism of DNA binding molecule as Radiation modulator University of Delhi. (co –Supervisor)

2. Supervision of Doctoral Thesis, under progress

- Nimesh, Hemlata. Design, Synthesis & Biological Evaluation of benzimidazole ; Pharmacokinetic & Distribution of these compounds in Animals. University of Delhi.
- Sur, Souvik. Design, Synthesis & Characterization of modified Peptide nucleic acid (PNA) and its evaluation as an antisense. University of Delhi.

- Rastogi G. Synthesis and Biological evaluation of Novel Integrase inhibitors. University of Delhi.
- Tiwari V. To study radioprotecting effect of DNA binding ligand and elucidate their mechanism of action. University of Delhi.
- Sinha D. To study the mechanism of action of bisbenzimidazole with DNA topoisomerase I, both in human and *E. coli*. University of Delhi.

3. Supervision of awarded M.Sc. dissertations

- Vishnupriya P. 2013 Summer Fellow Selected by All Three National science Academies ; Bis-benzimidazoles; a novel class of selective *E. coli* topoisomerase IA inhibitor.
- Turkey Bulbul 2012 ; Synthesis of Bis - Benzimidazole Molecule and An Approach Towards its Pharmacokinetic Study in Mice .
- Tripathi Deepika 2012 ; Cloning ,expression , and Purification of AKT Gene .
- Gaur Sakshi 2011 ; Expression and Purification of *E.coli* Topoisomerase I and Its Domain.
- Bhargava Tarishi 2012; Cytotoxicity of DMA (Bisbenzimidazole derivative) and its Analogues .
- Pradhan Prashant 2011 ; Synthesis of Novel Bis –Benzimidazole Molecule as DNA Minor groove Binder.
- Singh Kailash 2011 ; Cloning of Integrase gene of HIV in the Expression vector of *E. coli*.
- Mahalle Sagar ; 2010
- Rawal Malvika. 2009. Identification and functional characterization of HIV-1 Integrase, interacting host cell proteins and inhibition of HIV-1 Integrase gene expression by Antisense.
- Nagpal Ginni. 2008. Synthesis of PNA- peptide conjugate against HIV-1 translational frameshifting signal.
- Udgata Atul. 2008. Modulation of cell-cycle proteins in irradiated cells by bisbenzimidazoles: A novel non-cytotoxic radioprotector.
- Kumar, Ravi 2007. Analysis of conformations of 5' untranslated region (UTR) of HIV-1 ex-vivo
- Singh, Saurabh. 2007. Synthesis and conjugation of penetratin (cell penetrating peptide) with antisense-polymide nucleic acid (PNA) to check for its anti-HIV activity
- Vinoy Krishna. 2007. Synthesis and biological evaluation of imidoyl thiourea analog as HIV-1 non-nucleoside reverse transcriptase inhibitors
- Tiwari, Garima. 2006. Synthesis of modified peptide nucleic acid (PNA) monomer: 4,6-diamino pyrazolo (3,4-d) pyrimidine
- Kamran, Neha 2006. Elucidation of radioprotective mechanism of DNA minor groove binding ligand DMA
- Swati, K.S., 2006. Study of the effect of the minor groove binding ligand on the DNA gyrase of *Staphylococcus aureus*

- Tiwari, Garima 2006. Synthesis and biological evaluation of imidoyl thiourea analogs as HIV-1 non-nucleoside reverse transcriptase inhibitors
- Sachin Gupta 2006. Role of divalent metal ion in Deoxyribozyme reaction and structure stabilization. C.C.S. University , Meerut.
- Bansal, Sandhya 2005. Differential toxicity of human and microbial topoisomerase I by new synthetic DNA binding ligands.
- Das, Tanusree 2005. DNAzymes and peptide nucleic acid as antisense tools.
- Tyagi, Ameetabh 2005. To study antioxidant activity of aqueous leaves extract of *Annona squamosa* on STZ induced diabetic rats and synthesis of novel DNA minor groove binding ligands. Bundelkhand University.
- Ranjan, Ravi 2004. Dimerization inhibition of HIV-1 genome by antisense oligonucleotides.
- Shrimal, Shiteshu 2004. Elucidation of radioprotective mechanism of DNA minor groove binding ligands Ranjan, Ravi 2004. Dimerization inhibition of HIV-1 genome by antisense oligonucleotides.
- Gupta, Sharad 2003. Inhibition of HIV-1 virus using antisense approach using PNA: a preliminary report.
- Jafri, Itrat F. 2002. Synthesis and properties of PNA-DNA chimeric oligomers as antisense for the inhibition of DIS site HIV-I genome.
- Nimesh, Surendra 2002. Synthesis and characterization of modified oligonucleotides using MALDI-TOF mass spectrometry.
- Dhawan, Gagan 2000. Synthesis and purification of photoresponsive oligonucleotides.
- Chauhan, Bhavna 2000. Design and synthesis of a sequence specific novel Hoechst analogue: Physico-chemical and biological studies.

Publications Profile

List against each head (If applicable) (as illustrated with examples)

1. Books/Monographs (Authored/Edited)

- a. Tandon, Vibha. 2005. *Molecular Modelling*. Shree Publishers and Distributors, Delhi.
- b. Tandon, Vibha, Tiwari Manisha. 2004. *Natural Products Volume1*. Isha Books, Delhi.
- c. Tandon, Vibha, Tiwari Manisha. 2004. *Natural Products Volume2*. Isha Books. Delhi.

2. Publication (last five years) - In Indexed/ Peer Reviewed Journals

1. Bi-and Tri- Substituted Phenyl Ring containing Bisbenzimidazoles Bind Differentially with DNA duplexes: A Biophysical and Molecular Simulation Study. Manish Singh, Souvik Sur, B. Jayaram, Vibha Tandon; *Mol. BioSyst.*, 2013, DOI:10.1039/C3MB70169G Just Accepted.
2. PNA containing 8-aza-7-deazaadenine influence structure stability and binding affinity of PNA•DNA duplex : Insights from Thermodynamics, Counter Ion, Hydration and Molecular Dynamics Analysis. Sharad K.

Gupta, Souvik Sur, Rajendra Prasad Ojha, Vibha Tandon; *Mol Biosyst.* 2013 Jul 4;9(7):1958-71.

3. 3,4-Dimethoxyphenyl bis-benzimidazole derivative, mitigates radiation induced DNA damage. Atul Ranjan, Navrinder Kaur, Vinod Tiwari, M.M.Chaturvedi, Yogendra Singh, Vibha Tandon *Radiat Res.* 2013 Jun;179(6):647-62.

4. Identification of SFPO of novel interacting Partner of HIV -1 integrase and its functional characterization. *BMC Infectious Disease*, Vol.12, 80, 2012.

5. Inhibition of 5'-UTR RNA conformational switching in HIV-1 using antisense PNAs; Brahm Parkash, Atul Ranjan, Vinod Tiwari, Sharad Kumar Gupta, Navrinder Kaur, Vibha Tandon. *PLoS One*, 2012 (11); e49310.

6. DMA, a Bisbenzimidazole, Offers Radioprotection by Promoting NFkappaB Transactivation through NIK/IKK in Human Glioma Cells Navrinder Kaur, Atul Ranjan, Vinod Tiwari, Ritu Aneja, Vibha Tandon. *PLoS One*, 7(6) (2012) e39426.

7. 3,4 dimethoxyphenyl bis-benzimidazole, a novel DNA topoisomerase inhibitor that preferentially targets Escherichia coli topoisomerase I. Sandhya Bansala, Devapriya Sinha, Manish Singha,, Bokun Cheng, Yuk-Ching Tse-Dinh, Vibha Tandon *J. of Antimicrob. Chemotherapy* 2012; 67: 2882–2891.

8. Inhibition of HIV-1 Integrase gene expression by 10-23 DNAzyme. Nirpendra Singh, Atul Ranjan, Souvik Sur, Ramesh Chandra And Vibha Tandon, *J. Biosci.* 37(3), July 2012, 1–10.

9. Synthesis and Biological Activity of Novel Inhibitors of Topoisomerase I; 2-Aryl-Substituted 2-Bis-1H-Benzimidazoles. Manish Singh, Vibha Tandon. *European J. of Medicinal Chem.*, 2011,46, 659-669.

10. Contribution of mutation in DNA gyrase and topoisomerase IV genes to Ciprofloxacin resistance in E. coli clinical isolates. Sandhya Bansal, Vibha Tandon. *International J. of Antimicrob. Agents*, 2011, 37 (3), 253-255

11. Insulinotropic effect of cinnamaldehyde on transcriptional regulation of pyruvate kinase, phosphoenolpyruvate carboxykinase, and Glut4 translocation in experimental diabetic rats: Prachi Anand, Murali K.Y. Vibha Tandon, P.S. Murthy, Ramesh Chandra. *Chemico Biologico Interactions*. 2010, 186, 72-81.

12. Old class but new dimethoxy analogue of benzimidazole: a bacterial topoisomerase I inhibitor. Sandhya Bansal, Urmila Tawar, Manish Singh, Abbas Nikraves, Liam Good, Vibha Tandon. *International J. of Antimicrob. Agents* 2010, 35: 186-190.

13. Evaluation of Electronic Effect of Phenyl Ring Substituents on the DNA Minor Groove Binding Properties of Novel Bis and Ter- benzimidazoles: Synthesis and Spectroscopic Studies of ligand –DNA interaction. Akash K. Jain, Sharad K. Gupta, Vibha Tandon. *Oligonucleotides*, 2009, 19(4): 329-340.

14. Benzimidazoles: A Minor Groove-Binding Ligand-Induced Stabilization of Triple Helix. Akash K. Jain, Sharad K. Gupta, Urmila Tawar, Sneha K. Dogra, Vibha Tandon. *Oligonucleotides*, March 2009, 19(1), 53-62.

15. Forkhead-associated Domain-containing Protein Rv0019c and Polyketide associated Protein PapA5, from Substrates of Serine/Threonine Protein Kinase PknB to Interacting Proteins of Myco-acterium tuberculosis. Meetu Gupta Andaleeb Sajid Gunjan Arora, Vibha Tandon and Yogendra Singh. *J. of Biol. Chem.* 2009,50: 34273-34734.

16. Evaluation of activity of sixteen medicinal plants against Neisseria gonorrhoeae: Poonam Shokeen, Manish

Singh, Manju Bala, Vibha Tandon*. International Journal of Antimicrobial Agents, 2009, 33: 86-91. Sexually Transmitted Diseases, 32, 106-111.

17. A Copper-Catalyzed Tandem Synthesis of Indolo- and Pyrrolo[2,1-a]isoquinolines; Akhilesh Kumar Verma,* Tanay Kesharwani, Jaspal Singh, Vibha Tandon and Richard C. Larock* Angew. Chem Int. Ed. 2008, 48, 1138-1143.

18. Antidiabetic activity of 50% ethanolic extract of Ricinus communis and its purified fractions; Poonam Shokeen, Prachi Anand, Y. Krishna Murali, Vibha Tandon* Food and Chemical Toxicology, 2008, 46(11): 3458-66.

19. Evaluation of activity of sixteen medicinal plants against Neisseria gonorrhoeae: Poonam Shokeen, Manish Singh, Manju Bala, Vibha Tandon*. International Journal of Antimicrobial Agents, 2009, 33: 86-91.

20. In-vivo evaluation of anti-oxidant and anti-lipidemic potential of Annona squamosa aqueous extract in Type 2 diabetic models Rajesh Gupta, Achyut Narayan Kesari, Sandhya Diwakar, Ameetabh Tyagi, Vibha Tandon, Geeta Watal; J. of Ethnopharm., 2008, 118, 21-25.

21. In-vitro activity of eugenol, an active component from Ocimum sanctum against multi resistant and susceptible strains of Neisseria gonorrhoeae Poonam Shokeen, Manju Bala, Vibha Tandon Internat. J. of Antimicrob. Agents 2008, Aug; 32(2): 174-9.

Conference Organization/ Presentations (in the last three years)

List against each head (If applicable)

1. Organization of Conference

- Convenor /Coordinator of Workshop /Conference jointly organized by Department of Chemistry and Three National Science Academies of India (INSA Delhi, IAS Bangalore, NASI Allahabad) entitled "Emerging Trends of Drug Development & Devices (ETDDD- 2013)" from 21st - 23rd January, 2013.

2. Participation as Paper/Poster Presenter

As Invited Talk

- Special Lecture on Development of Novel Bisbenzimidazoles as Antibacterial Agents, Preferentially Inhibiting Bacterial Topoisomerase I delivered on 9th April, 2013 at Division of Medicinal & Natural Product Chemistry, University of Iowa, Iowa, USA.
- Special Lecture on Coactivation of AKT/NFκB Triggered by DMA: A Bisbenzimidazole Provides Protection Against Ionizing Radiation-Induced Apoptosis delivered on 12th April at Department of Chemistry & Biochemistry, Florida International University, Miami, USA.
- Invited talk entitled; Bisbenzimidazole Mitigates Radiation Induced Damage Through activation of AKT/NFκB Signaling Pathways in Cells during Radiotherapy in a two days Symposium "Trends in Chemoprevention & Cancer" organized at University of Louisville, Kentucky, USA from 30th - 31st May, 2013.
- Special Lecture on Novel Bisbenzimidazole - DMA; A potential Radioprotector Mitigates DNA Damage in Radiotherapy" on 3rd July, 2013 at Centre for Diagnostics & therapeutics, Georgia State University, Atlanta, USA.
- Invited Talk entitled; 3,4 - dimethoxy Bisbenzimidazole (DMA); a radiomodulator prevents radiation induced apoptosis via activation of PI3K/Akt/IKK/ NFκB prosurvival pathway in mammalian cells in 3rd Biennial International Conference on Drug Discovery and Natural Products and Traditional

Medicines (DDNPTM -2012) organized by NIPER Chandigarh, 22nd to 24th November 2012.

- Invited talk on topic "Cytoprotector Bisbenzimidazole and its derivatives offer Radioprotection in cells during Radiotherapy in cancer treatment promoting NFκB transactivation through NIK/IKK in mammalian cells , Annual Convention of Chemist convened by Indian Chemical Society, on 5th November 2011 at Allahabad University.
- Invited talk on the topic "Effect of Metal Toxicity on Human Health" in a Workshop on Defining the role of Women Scientists and Teachers in Promotion and Application of Science & Technology organized by National Academy of Sciences, India(NASI) ,Allahabad.
- Invited talk on the topic "Cytoprotector Bisbenzimidazole and its derivatives offer Radioprotection in cells during Radiotherapy in cancer treatment promoting NFκB transactivation through NIK/IKK in mammalian cells : An underlying mechanism is Activation of MAPkinase and Wnt signalling pathway in irradiated Cells after treatment with Bisbenzimidazole in a conference" Chemical research society of India, North Zone Meeting , 2011 ,University of Jammu , Jammu , India
- Invited talk on the topic "Modulation of Hybridizing Properties of PNA with Modified Nucleic Acid Bases and their Biological Evaluation against HIV-1" in International conference on "Nucleic Acids in Disease & Disorder" December 7th to 9th, 2011 in Kusuma School of Biological Sciences, IIT Delhi.
- An invited talk in Rajkot in a International conference of Society of Chemists and Biochemists on 5th February 2011 on "A systematic study of benzimidazoles in search of selective antimicrobials targeting topoisomerase I : Development of E.coli. inhibitors."
- An invited talk in a international conference on Drug Discovery and Natural Products and traditional Medicine organized by NIPER. Chandigarh 22nd to 25th November, 2010 on "Molecular Investigations of the Antidiabetic Effects of Cinnamomum zeylenicum, Brassica nigra & Ricinus communis in Experimental Diabetes."
- A member of Indian Scientific delegation sent to Thailand and Indonesia from 17th to 24th October 2010 by DST under scientific cooperation between these countries and India.
- An invited talk in Training Program in Bioinformatics and Computational Biology at SCFBIO Facility of I.I.T. Delhi on 21st September, 2009.
- A member of Indian delegation sent to Pretoria, South Africa under Indo-South Africa from 28th February to 2nd March. A talk delivered on Different Approaches of HIV-1 inhibition.
- An invited talk in 2nd Indo-South Africa workshop in INMAS, Delhi on Inhibition of HIV-1 using Antisense Approach. 2009.
- A Poster cum Oral Presentation in "Albany 2007: Conversation 15 (Nucleic Acids Symposium) Identification and Functional Characterization of Cellular Proteins interacting with HIV-1 integrase and its Inhibition by Specific DNzyme from June 19th –June 23rd 2007 at University of Albany, NY, USA.
- Oral presentation entitled "Interactions between Mycobacterium tuberculosis Nucleoside-diphosphate kinase and DNA involves formation of a covalent protein-DNA complex" at "Fifth International Congress of the Genetics, Biochemistry and Physiology of NDP Kinase/NM23/AWD", Lexington, Kentucky, USA, Oct 13-15, 2003.
- Oral presentation entitled "Minor Groove Binding Ligands interactions with repetitive sequences and their role in nucleosome remodeling and gene expression" at annual conference of the Indian society of Developmental Biologists, February 17th -20th , 2002.
- A paper entitled " Design and synthesis of a sequence specific Novel Hoechst 33258analogue: Physico-chemical and biological studies" was accepted for poster presentation at 5th world conference on SCI, July 22-25, 2001.
- Invited talk on the Topic "Current Status of Oral and Implantable contraceptive agents" November 1998, Frontiers in Biomedical Research, Dr. B. R. Ambedkar Center of Biomedical Research, University of Delhi
- Invited talk on the topic "Differential regulation of protein expression in Benzimidazole treated Mammalian cells under ionizing radiation" in Translational Research in Molecular Oncology at Punjab University, Dec.2008.
- Invited talk entitled "Synthesis and Characterization of modified Peptide Nucleic Acid (PNA) having

pyrazolo (3,4-d) Pymiridine as base analogue and its Antisense effect at SERC Summer School in Modelling and Informatics in Drug Design at NIPER, Mohali, 14th July 2008.

- Invited talk entitled “Systematic investigation of twenty one medicinal plants or their Antigonorrhoeal activity (Sexually Transmitted Disease) in search of lead compound” at Drug Discoveries in Natural Products and Traditional Medicine, NIPER, Mohali in Nov 2008.
- Invited talk entitled “Elucidation and evaluation of mechanisms of action of novel Benzimidazoles as radioprotectors” at International Conference on Radiation Biology and Molecular Oncology, Jaipur, Rajasthan University on 13th Nov 2008.
- Invited talk entitled “Evaluation of twenty one medicinal plants for antigonorrhoeal activity leading to structural identification of a single active compound against Neisseria gonorrhoea” at New Bioactive molecule in pharmaceutical research contribution of natural products Indo-US conference IICT, Hyderabad 13-14 Nov 2006.
- Invited talk on the topic “Cytoprotector Bisbenzimidazole and its derivatives offer Radioprotection in cells during Radiotherapy in cancer treatment promoting NFκB transactivation through NIK/IKK in mammalian cells : An underlying mechanism is Activation of MAPkinase and Wnt signalling pathway in irradiated Cells after treatment with Bisbenzimidazole in a conference” Chemical research society of India, North Zone Meeting , 2011 ,University of Jammu , Jammu , India
- Invited talk on the topic “Modulation of Hybridizing Properties of PNA with Modified Nucleic Acid Bases and their Biological Evaluation against HIV-1” in International conference on “Nucleic Acids in Disease & Disorder” December 7th to 9th, 2011 in Kusuma School of Biological Sciences, IIT Delhi.
- An invited talk in Rajkot in a International conference of Society of Chemists and Biochemists on 5th February 2011 on “A systematic study of benzimidazoles in search of selective antimicrobials targeting topoisomerase I : Development of *E.coli*. inhibitors.”
- An invited talk in a international conference on Drug Discovery and Natural Products and traditional Medicine organized by NIPER. Chandigarh 22nd to 25th November, 2010 on “Molecular Investigations of the Antidiabetic Effects of Cinnamomum zeylenicum, Brassica nigra & Ricinus communis in Experimental Diabetes.”
- A member of Indian Scientific delegation sent to Thailand and Indonesia from 17th to 24th October 2010 by DST under scientific cooperation between these countries and India.
- An invited talk in Training Program in Bioinformatics and Computational Biology at SCFBIO Facility of I.I.T. Delhi on 21st September, 2009.
- An invited talk in 2nd Indo-South Africa workshop in INMAS, Delhi on Inhibition of HIV-1 using Antisense Approach. 2009.
- An invited talk in Training Program in Bioinformatics and Computational Biology at SCFBIO Facility of I.I.T. Delhi on 21st September, 2009.
- An invited talk in 2nd Indo-South Africa workshop in INMAS, Delhi on Inhibition of HIV-1 using Antisense Approach.

As Poster Presenter

- A Poster presentation in Oligonucleotides Therapeutics 4, held in Harvard Medical School, Boston, 15th -19th October, 2008.
- A Poster cum Oral Presentation in “Albany 2007: Conversation 15 (Nucleic Acids Symposium).
- An Oral presentation entitled “Interactions between Mycobacterium tuberculosis Nucleoside-diphosphate kinase and DNA involves formation of a covalent protein-DNA complex” at Fifth International Congress of the Genetics, Biochemistry and Physiology of NDP Kinase/NM23/AWD, Lexington, Kentucky, USA, Oct 13-15,2003.
- A paper entitled “ Minor Groove Binding Ligands interactions with Repetitive Sequences and their Role in Nucleosome Remodeling and Gene Expression” was presented at annual conference of the Indian society of Developmental Biologists, February 17-20, 2002.
- A paper entitled “ Design and synthesis of a sequence specific Novel Hoechst 33258 analogue : Physico-chemical and biological studies” was accepted for poster presentation at 5th World

Conference on SCI, July 22-25, 2001.

- National Symposium of Green Chemistry, Department of Chemistry, University of Delhi, January, 1999.
- Current Status of Oral and Implantable contraceptive agents, November 1998, Dr. B. R. Ambedkar Center of Biomedical Research, University of Delhi
- Frontiers in Biomedical Research, March 31- April 2, 1998
- ISAS Seminar on "Hyphenated Techniques for Chemical Analysis", April 25, 1998, University of Delhi.
- Presented a Poster entitled "A study to establish the target molecules/proteins of novel Radioprotector bisbenzimidazoles in mammalian cells" at International conference on cancer prevention, diagnosis and treatment (ICCPDT 2012) at University of Rajasthan, Jaipur. January 2012.
- Presented a Poster entitled "To study the effect of benzimidazole analogues (DNA minor groove binding ligands) on the protein expression of mammalian cell lines under Ionizing radiation" at The Indian Proteomics Conference (IPCON 2011) organised by Proteomics Society India in April 2011 at Delhi.
- Presented a Poster on the topic "Inhibition of HIV -1 Integrase gene expression by 10-23 DNAzyme" in International conference on "Nucleic Acids in Disease & Disorder" December 7th to 9th, 2011 in Kusuma School of Biological Sciences, IIT Delhi, Delhi
- Presented a Poster entitled "Validation and Testing of Novel Bis-Benzimidazole Derivatives as Modulators of Radiation Response in Human Cells" at Golden Jubilee Chemistry Conference Molecules, Supramolecules and Materials (MSM) . Indian Institute of Technology Kanpur Date: 1-3 October, 2010.
- Presented a Poster Modulation of Translational Frameshifting of Gag And Pol Protein Of Hiv-1 In An Ex Vivo System Using Peptide Nucleic Acid (PNA) in Trends in Drug Discovery and Development (T3D-2010), at Department of Chemistry, Delhi University. January 2010.
- Presented a Poster on the topic "Modulation of Hybridizing Properties of PNA with modified Base" in "7th Indo-Italian Workshop on Chemistry and Biology of Antioxidants" organized by Department Of Chemistry, University of Delhi, Delhi and Embassy of Italy in November 2010.
- Poster presentation entitled "Forgotten molecules for a new century: Benzimidazoles against Gram negative and Gram positive bacteria emphasizing clinical strains of Acinetobacter baumannii and E. coli." at "International Symposium on Trends in Drug Discovery and Development" being organized on 5-8 January 2010 by the Department of Chemistry, University of Delhi.
- Poster presentation entitled "Identification and functional Characterization of HIV-1 Integrase interacting host cell Protein and inhibition of HIV-1 Integrase gene expression by anti integrase DNAzyme" in Oligonucleotides Therapeutics 4, held in Harvard Medical School, Boston, 15th -19th October, 2008..
- Poster presented on ISAS Seminar on "Hyphenated Techniques for Chemical Analysis", April 25, 1998, University of Delhi.
- Poster presented entitled "Differential Inhibition by DNA minor Groove Binding Ligands" in International Conference" at "Topo 2008 – DNA Topoisomerases in Biology and Medicine" at Norwich U.K, July 20th-24th 2008.
- Poster presented entitled "To study the effect of Benzimidazole analogues (DNA minor groove binding ligands) on the protein expression of U87, a glioblastoma cell line under ionizing radiation" in Human Genome Meeting at CCMB, Hyderabad 2008.

Research Projects (Major Grants/Research Collaboration)

Grants Completed

1. Project Title: Antisense Oligonucleotides as Chemotherapeutic Agents: Physico –Chemical and Biological Studies (PI) Funding Agency: DST. Amount: 8 Lakhs. Duration: 2001-03.

2. Project Title: Synthesis of Oxandrolone, Funding Agency: Hikma Pharmaceuticals, Jordan. Amount: \$ 15000. Duration: 2002 –2003.
3. Project Title: Inhibition of HIV-1 replication: Design, Synthesis and Characterization of Small Molecule Libraries.(Co–PI) Funding Agency: UGC; Amount: 9.5 Lakhs. Duration: 2004-2007.
4. Project Title: Structure Activity Relationship Studies of Marine Natural Products – Apratoxins, (PI) Funding Agency: UGC; Amount: 4.6 Lakhs, Duration: 2004-2007.
5. Project Title: “Drug target validation and antiinfective Development for HIV/AIDS and associated infections” Funding Agency: Swedish International Development Cooperation Agency (SIDA) under the Asian-Swedish Research Partnership Programme; Amount: Total 324 000 SEK. Duration: 2005 -2007.
6. Project Title: Nutritional & Hypoglycemic effect of Fruit Pulp & Leaves of *Annona squamosa*. Funding Agency: ICMR; Amount: 4.76 Lakhs, Duration: 2002 –2005.
7. Project Title: Identification and Characterization of Antidiabetic compounds from *Annona squamosa* and *Ocimum sanctum*. Funding Agency: ICMR; Amount: 11.50 Lakhs, Duration: 2005-2008.
8. Project Title: Synthesis and Characterization of DNA Minor Groove Binding Ligands for Biological Applications. Funding Agency: INMAS, DRDO; Amount: 11.20 Lakhs, Duration: 2005-2008.
9. Project Title: Investigation of the Characteristics of the Biologically Active Systems Using the Probes showing Proton Transfer & Electron Transfer Behaviours: Synthesis and Photophysics Funding Agency: DST; Amount: 25 Lakhs. Duration: 2005-2008.
10. Project Title: Radioprotectors against Radiation Induced Damage in Normal cells during Radiotherapy in Cancer: Development and Molecular Mechanism Study – Funding Agency: DST, Amount: Rs. 23 Lakhs, Duration: 2005-2009.
11. Project Title: Investigating the Molecular Mechanism of Action of Non-toxic Radioprotectors. Funding Agency: DBT; Amount: 41.50 Lakhs + Overhead, Duration: 2005-2009.
12. Project Title: DNA Topoisomerase I- Design, Synthesis and characterization of novel benzimidazoles and an insight into mechanism of selective inhibition of bacterial Topoisomerase I by these molecules. Funding Agency: CSIR; Amount 25 Lakhs, Duration: 2009 -2012
13. Project Title: Synthesis and characterization of modified peptide nucleic acid having pyrazolo (3, 4-d) pyrimidine as base analogues and its antisense effect (PNA) on dimerization and translational frameshifting of HIV-1. Funding Agency: UGC, Amount: 11.65 Lakhs, Duration: 2009 -2012.
14. Project Title: Design & Synthesis of New class of DNA intercalating agent under purse scheme. Funding Agency: Delhi University, Amount; 28.7 lakhs, Duration; 2009 -2012. (Co –Investigator).

Running Projects

15. Project Title: Development of Bisbenzimidazole as E. coli. Topoisomerase inhibitor: Funded by Council of

Scientific & Industrial Research, Tenure of project : 2012 -15.

16. International Collaborative Project: Indo South Africa INT/SAFR/P(2/2011) -03/10-2011) Design Synthesis and Evaluation of 1,2-dihydroisoquinolines as HIV Integrase Inhibitors. Tenure of Project; 2011-13. Funded By Department of Science & Technology, India. & South Africa jointly. PIs are from: University of Delhi and Johannesburg Medical School.
17. Project Title: International collaborative Project : Indo German Project ; Validation and Testing of DNA binding ligands as Radiomodulator in Human Cells. Tenure of Project: PIs from University of Delhi & Essen Medical School, University of Duisburg, Essen, Germany.
18. Project Title: Design & Synthesis of a Library of Heterocyclic Compounds and Their Biological Evaluation as Antibacterial Agents with Special References to Topoisomerase Inhibitors. Funded by: UGC, Project ; 2013-15.

Details of Contractual Research/ Industrial Linkage

Synthesis of Oxandrolone by a new cost effective route (HIKMA Pharmaceutical, Jordan funded pro-ject)- since July 2001 (US\$ 30,000).

Oxandrolone is an anabolic steroid. Anabolic steroids are natural or synthetic versions of testosterone, a hormone that is produced naturally in males and to a lesser extent, in females. Anabolic steroids are used in combination with appropriate diet and moderate exercise to promote build up or gain of protein in the body to form lean body mass (including muscle tissue). A technology has been developed and transferred to Hikma Pharmaceuticals, Jordan for a pilot scale production of Oxandrolone.

Identification and Characterization of Antidiabetic compounds from some Indian Medicinal plants (DIAKRON, USA) since 2001-2003. (US \$15,000)

Isolated Antidiabetic Active constituents from the Seeds of Fenu Greek, identified Structure of active components and determined ED50 as well as LD50 and performed long term as well as short term toxicity in two animal species rabbit and Swiss Albino Mice.

Honors/ awards/ distinctions/fellowships/membership of national and international level committees

- Fulbright Senior Research fellowship awarded for the year 2012 -13 to visit Georgia State University, Atlanta USA.
- Awarded INSA visiting fellowship for the year 2011-12 , to visit with Prof. George Iliakis, Institute of radiation Biology and Oncology at Essen Germany under bilateral exchange program of Indian National Science Academy (INSA)
- DAAD fellow under Indo German exchange program of DST –DAAD to visit and collaborate with Prof. George Iliakis, Institute of radiation Biology and Oncology at Essen Germany, 2010 -2011.
- Member of Indian National Academy of Sciences , Allahabad from the year 2011.
- Awarded Royal Society fellowship for visit to Prof. Michael J. Gait's laboratory at Cambridge University,
- Cambridge, U.K. under the Bilateral Exchange Program of INSA with Royal Society, U.K (2007-2008).
- Invited as a participant to XI NOST Symposium October 2005 at Goa.
- Awarded fellowship for the three months visit to Prof. Stephen Neidle's laboratory at University of London, U.K. under the Bilateral Exchange Program of INSA with Royal Society, U.K (2004-2005).
- Presented a paper in Albany 2007, 15th Conversation held at State University of New York. New York, USA from June 19-23 2007.

Association With Professional Bodies

1. *Editing;*
2. *Reviewing : Reviewer for the Journal of American Chemical Society.
Reviewer for the Journal of Medicinal Chemistry
Reviewer for the Journal of Medicinal Chemistry
Reviewer for the European Journal of Chemistry*
3. *Advisory; Member Organizing committee of 32nd Annual Convention of Indian Association for Cancer research (ICAR) Organized by Dr. B. R. Ambedkar Center for Biomedical Research entitled " Emerging trends in Cancer Research: Road to Prevention & Cure & International Symposium on : Infection & Cancer from 13th to 16th February 2013.*
4. *Committees and Boards Appointed member of Subject Expert Committee - Chemical Sciences of Women Scientist Scheme (WOS –A) for three years from 2013 -16.
A member of the committee of University of Delhi, which was coordinating the visit of UGC Plan Committee in Delhi University.*
5. *Memberships*
 - Member- Indian Science Congress Association, Calcutta
 - Member- Indian Chemical Society, Calcutta
 - Member- Institution of Chemists, India
 - Member- Asian Federation of Clinical Pharmacologists
 - Member- Indian Society of Analytical Scientists
 - Member- Society of Biological Chemists, India
 - Member- Chemical Research Society, India
 - Member- Society of Clinical Biochemists., India
 - Member -Indian Association for Cancer Research, India
 - Member of National Academy of Sciences India ,Allahabad.
6. *Office Bearer ;*
 - Convenor /Coordinator of Workshop /Conference jointly organized by Department of Chemistry and Three National Science Academies of India (INSA Delhi , IAS Bangalore, NASI Allahabad) entitled "Emerging Trends of Drug Development & Devices (ETDDD- 2013) from 21st - 23rd January.

Major Accomplishments

- Developed new process of Synthesis of Oxandrolone and handed over the technology to Pharmaceutical Company.
- After examining twenty medicinal plants we could isolate an active constituent from *Annona squamosa* (Custard apple) having hypoglycemic activity a detailed investigation of those active principles are in progress on the Diabetic animal models developed in the center.
- Two molecules designed and synthesized in my laboratory are evaluated and found to be noncytotoxic and potent Radioprotectors. The Genotoxicity work is in progress to bring them to clinical trial.
- The synthesis of PNA monomer followed by successful oligomerization was done in my laboratory and their transfection in mammalian cell is being studied.
- Designed and synthesized a few new catalysts of transition metals.
- Using shift base and porphyrin nucleus as ligands developed new methodologies for the synthesis of many synthons, which are useful in synthesis of various drugs.
- Developed three new industrial methods by working on the interaction of Cobalt Complexes with molecular oxygen and their reactivity towards organic substances.
- Worked as a leader in one collaborative project of Ranbaxy Research Lab (NDDR Division) with I.I.T. Kanpur on endothelins and cardiovascular drugs.

- Developed two new synthetic routes Functionalization of Hydrocarbons viz; Carbon-Sulphur bond formation, selective chlorination and chlorosulfonation of hydrocarbon.
- An efficient and operationally simple method of Oxidation of sulphides to sulphoxides and sulphones.. Kanpur on endothelins and cardiovascular drugs.
- Developed two new synthetic routes Functionalization of Hydrocarbons viz; Carbon-Sulphur bond formation, selective chlorination and chlorosulfonation of hydrocarbon.
- An efficient and operationally simple method of Oxidation of sulphides to sulphoxides and sulphones.

Signature of Faculty Member

Signature of Head of Department

- You are also requested to also give your complete resume as a DOC or PDF file to be attached as a link on your faculty page.