Resume

**NAME**  Dr. (Mrs.) Ritu Barthwal

**PRESENT POSITION** Professor

(since 09 April 1996; HAG Pay Scale since 18 Aug 2009)

Department of Biotechnology  
Indian Institute of Technology (IIT) Roorkee

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# academic qualificationS

1. Ph.D., Physics Department, Indian Institute of Technology (IIT) Delhi, 1976.
2. M.Sc. Hons. School in Physics, Punjab University Chandigarh, 1972, 75% marks, I Division, 6th Rank.
3. B.Sc. Hons. School in Physics, Punjab University Chandigarh, 1971, 75% marks, I Division, 4th Rank.

**AWARDS**

1. National Science Talent Search Scholarship (NSTS), NCERT, Govt. of India, 1967‑76.
2. UGC National Associate, 1979‑84.

**POSITIONS HELD / HONOURS**

* Faculty member, IIT Roorkee/Univ. of Roorkee (Lecturer since 06.04.1981, Reader since 01.01.1986).
* Head of the Department of Biotechnology, IIT Roorkee, 1988 - 1991, 1994 - 1997 and 2008 - 2011.
* Coordinator, Nuclear Magnetic Resonance (NMR) Facility, IIT Roorkee, 2006 - 2016.
* Lecturer, Dept. Biophysics & Crystallography, University of Madras, Madras, Nov 1977 – Apr 1981
* CSIR Scientists, School of Environmental Sci., Jawaharlal Nehru Univ. JNU Delhi, Aug 1976 ‑ Nov 1977.
* Guest Scientist, Abteilung Physiologische Chemie, Aachen Technical University (RWTH) Germany, June 1984 ‑ Feb 1985.
* Post doctoral fellow, Centre de Biophysique Moleculaire, CNRS Orleans, France, June ‑ Sept 1981.
* Member, Board of Governors, Maulana Azad National Institute of Technology (MANIT) Bhopal, MHRD Instt., 2012 - 2015.
* Member TEQUIP-II, University Inst. of Engineering &Tech., Panjab University Chandigarh, 2012 - 2016.
* Member, Joint National Committee for Pure and Applied Biophysics (International Union of Pure and Applied Biophysics, IUPAB) and Crystallography (Intl. Union of Crystallography, IUCr) under International Council of Scientific Union (ICSU), Indian National Science Academy (INSA), 2004 - 2008.
* Member, Management Advisory Committee (MAC), National High field NMR Facility, TIFR Mumbai, 2003-2009 and Member, Program Advisory Committee (PAC), National High field NMR Facility, TIFR Mumbai, 1997 - 2002
* Member, Task Force on Bioinformatics (1994-1997), Task Force on Human Resource Development (1997-2000 and 2003-2006), Task Force on BIO-CARE Women Scientists 2011-2014, Task Force on Star College Scheme for funding 2011-2014, Group leader in Task Force on BIO-CARE Women Scientists 2016, Department of Biotechnology (DBT), Ministry of Science and Technology, Govt. of India
* Expert Committee Member in NMR, “Intensification of Research in High Priority Areas (IRHPA)” Scheme, Department of Science and Technology (DST), Govt. of India, 2007, 2008.
* Member, Expert Committee in Biotech/Biochem. Engg. For award of Commonwealth Scholarships U.K., 2004-05, 2008-09, 2012 MHRD, Govt.of India.
* Member, Expert Committee in Biotechnology for Italian Govt. Scholarships, 2006-07, MHRD-UGC.
* Member, Expert Committee in Biotechnology for National Overseas Scholarship, Ministry of Social Justice and Empowerment, Govt. of India, 2005 - 2008.
* Member, Expert Committee in Biotechnology for National Doctoral Fellowship, AICTE, 2004 - 2005.
* Subject Expert for funding projects by MHRD and AICTE (under MODROBS/R&DP/TAPTEC schemes); DBT, DST and UGC
* Appointed Expert for Model Curriculum Development for undergraduates (B.Tech. Biotechnology) by AICTE, 2003.
* Visited USA, Japan, Germany, Russia, Austria, China, Australia and Switzerland to attend International Conferences/Workshops.
* Reviewer in Intl Journals Chem Bio Chem, Journal of Biomolecular Structure & Dynamics, Biochimica et Biophysica Acta (BBA General Subjects), Bioorganic and Medicinal Chemistry, Journal of Photochemistry and Photobiology B: Biology, etc.
* Member, National Organizing Committee, 7th Asian Biophysics Association symposium and Annual Meeting of Indian Biophysical Society, Dept NMR & MRI Facility , AIIMS, Delhi, 30 Jan-02 Feb. 2011
* Member Organizing Committee, National Symposium on Biophysics, All India Institute of Medical Sciences (AIIMS), New Delhi held on 13-15 Feb 2007
* Member, National Advisory Board for the International Conference on Magnetic Resonance in Biological Systems (XXI ICMRBS), Hyderabad held on 16-21 January 2005.
* Member, Executive Committee, Indian Biophysical Society (IBS), 2006 for 3 years and Life Member, IBS
* Member, Executive Committee, National Magnetic Resonance Society (NMRS) of india, 2006 for 3 years and Life Member, NMRS.
* Life Member, DNA Society of India.
* Organizing Secretary, National Symposium in Biophysics (NSB), IIT Roorkee, 21-23 February 2003.
* Organizing Secretary, International Workshop on Educational and Capacity Building in Biophysics (ECBB): Needs of the Asian African Regions, IIT Roorkee, 24-25 February 2003.
* Chief Vigilance Officer (CVO), Indian Institute of Technology (IIT) Roorkee 2002 – 2007.
* Presiding Officer, Internal Complaints Committee (ICC) for Sexual harassment of women at work place under Prevention, Prohibition and Redressal Act 2013 (Extra Ordinary Gazette of India Part II dated 23 April 2013) and Earlier Chairman of Committee for Prevention of Sexual Harassment at Work Place, IIT Roorkee, 2012-2016.
* Chairman, Institutional Biosafety Committee (IBSC), appointed by DBT, Govt. of India at IIT Roorkee, 2012-2016.
* Chairman, Institute Purchase Committee IPC (July 2013- March 2015)
* Chairman, Panel of Screening/Selection Committees for Recruitment of project Staff under Sponsored Research & Consultancy projects (2011- Dec. 2014)
* Warden, Sarojini Bhawan (Girls Hostel), IIT Roorkee, 1981 – 1984.

**THESIS GUIDANCE, PUBLICATIONS, ETC.**

Ph. D - 22 awarded, Submitted - 1, Ongoing - 2

Research publications - over 60 (Journals and International Conferences)

**RESEARCH INTEREST / EXPERIENCE**

44 years at IIT Roorkee, Univ. of Madras, JNU, IIT Delhi, Aachen Tech (RWTH) Germany & CNRS France

Biomolecular Structure-Conformation-Interactions; Anticancer drugs; Flavonoids; oligopeptides and oligonucleotides; Human telomere DNA; In vivo NMR; Drug‑DNA Interactions; Protein‑DNA Interactions; by Nuclear Magnetic Resonance (NMR -DQF-COSY, TOCSY, NOESY, HSQC, ROESY, DOSY), fluorescence, absorption and Circular Dichroism spectroscopy; Isothermal Titration Calorimetry (ITC), Diffrential Scanning Calorimetry (DSC), Surface Plasmon Resonance (SPR), Energy calculations using molecular mechanics force fields and molecular dynamics; Molecular modeling for drug-designing, using software INSIGHT II, DISCOVER, MOE, AMBER, etc; Therapeutic agents from plant sources having anti cancer & anti diabetic properties - In vivo studies, Characterization of active components by HPLC, ESI-MS; Cell based Assays (MTT, TRAP, Topoisomerase), etc. aiming at structure- function relationship

**TEACHING EXPERIENCE**

40 Years at IIT Roorkee/ Univ. of Roorkee; Univ. of Madras; JNU New Delhi.

Taught courses: Molecular Biophysics, Structural Biology, Biological Spectroscopy, Biochemistry, Biomolecular Interactions, Biomolecular Assemblies and Interactions, Biological NMR (Nuclear Magnetic Resonance), Computer Programming (Fortran), Solid State Physics, Electronics - to students at undergraduate, postgraduate and doctoral level.

**MAJOR RESEARCH PROJECTS**

1. NMR structural and biophysical studies on binding of anthraquinone derivatives (amino-, amido, and sulphonamide derivatives) with guanine-quadruplex DNA, P.I., 2016- by DBT, Govt. of India.
2. Flavonoids and their interactions with a human telomeric G-quadruplex sequence for anticancer therapy.” Sponsored by Dept. of Science and Technology (DST) Govt. of India Rs. 27.4 lakhs, P.I., Nov 2010-2014.
3. Search for therapeutic agents of herbal origin to target diabetes and cancer, sponsored by Ministry of Environment and Forests, Govt. of India, P.I., 2007 - 2010
4. Molecular Modeling of drug-DNA complexes, P.I. Prof. Lalit Awasthi, NIT Hamirpur Co-Investigator Prof Ritu Barthwal IIT Roorkee, sponsored by Ministry of Human Resource & Development (MHRD), Govt. of India, 2004 - 2009
5. Molecular modeling of drug-DNA complexes, sponsored by Dept. Atomic Energy (DAE)-Board of Research in Nuclear Sciences (BRNS), Govt. of India, P.I., 1999 - 2003.
6. Design of anticancer drugs based on drug-DNA interactions and molecular modeling, sponsored by Centre for Development of Advanced Computing (CDAC) Pune, P.I., 2001 - 03
7. Anticancer drug designing based on study of drug-DNA complexes by NMR spectroscopy, sponsored by Council of Scientific and Industrial Research (CSIR), Govt. of India, P.I., 1999 - 2002
8. Unusual DNA structures, R& D in Biotechnology, sponsored by All India Council of Technical education (AICTE), P.I., 1995 - 1999.
9. Nucleic acid interactions with specific oligo-peptides and drugs, sponsored by Department of Science & Technology (DST), Govt. of India, P.I., 1988 ‑ 1992.
10. Bio-molecular interactions ‑ An NMR, theoretical and other spectroscopic investigations of interaction of nucleic acids with oligo-peptides and drugs, sponsored by Department of Science & Technology (DST), Govt. of India, P.I., 1984 ‑ 1988.

**PARTICIPATION IN INTERNATIONAL CONFERENCE / WORKSHOP**

* Invited talk-19th SUNYA Conversation- Intl Conference on Biomolecular structure-conformation, SUNY, Albany N.Y. USA, 9 - 13 June 2015
* Invited Talk - 9th Asian Biophysics Association Symposium, Shangyu, Hangzhou, China, 9-13 May 2015
* Invited talk- International Indo-Russian (ILTP – DST) Workshop “High Performance Computing in Science and Engineering”, 16 - 20 June 2003, Moscow, Russia
* Oral Presentation- XXI International Conference on Magnetic Resonance in Biological Systems (ICMRBS), Hyderabad, India, 16 - 21 January 2005.
* Workshop on Bruker Avance 1D & 2D NMR and Maintenance Courses, Bruker Biospin, Fallanden, Switzerland, 18 - 29 September 2006.
* 17th SUNYA Conversation- Intl Conference on Biomolecular structure-conformation, SUNY, Albany N.Y. USA 9-13 June 2013
* 7th Asian Biophysics Association Symposium, New Delhi, India, 30 Jan. - 02 Feb. 2011
* XXIV International Conference on Magnetic Resonance in Biological Systems (ICMRBS), Cairns, Australia, Aug 2010.
* 16th International Biophysics Congress (IUPAB), Long Beach, California, USA, 02-06 February 2008.
* XIII International Biophysics Congress (IUPAB), New Delhi, India, 19-24 September 1999.
* XVIIIth International Conference on Magnetic Resonance in Biological Systems (ICMRBS), Tokyo, Japan, 23-28 August 1998.
* XVII International Conference on Magnetic Resonance in Biological Systems (ICMRBS), Keystone, Colorado, USA, 18-23 August 1996.
* 16th International Congress in Biochemistry and Molecular Biology (IUBMB), New Delhi, India, 19-22, September 1994
* XII International Conference on Magnetic Resonance in Biological Systems (ICMRBS), Todtmoos, Germany, 08-12 September 1986.
* 6th Ampere International School on Nuclear Magnetic Resonance in Biology, Leibnitz, Austria, September 1981.
* International Conference on Biophysics, Fort Aguada Beach Resort, Goa, India, December 1980.

**LIST OF SOME PUBLICATIONS**

1. NMR based structural studies decipher stacking of the alkaloid coralyne to terminal guanines at two different sites in parallel G-quadruplex DNA, [d(TTGGGGT)]4 and [d(TTAGGGT)]4, Kumar Padmapriya and Ritu Barthwal.Biochimica et Biophysica Acta (BBA) - General Subjects, 1861 (2016) In Press.
2. Nuclear magnetic resonance studies reveal stabilization of parallel G-quadruplex DNA [d(T2G4T)]4 upon binding to protoberberine alkaloid coralyne, Kumar Padmapriya and Ritu Barthwal. Bioorganic and Medicinal Chemistry letters, 26, 4915-4918 (2016)
3. Binding of the alkaloid coralyne to parallel G-quadruplex DNA [d(TTGGGGT)]4 studiedby multi-spectroscopic techniques, Kumar Padmapriya and Ritu Barthwal. Biophysical Chemistry, 219, 49-58 (2016) .
4. Molecular recognition of parallel quadruplex d-(TTGGGGT)4 by mitoxantrone: binding with 1:4 stoichiometry leads to telomerase inhibition, Tarikere Palakshan Pradeep, Sweta Tripathi and Ritu Barthwal. (Royal Society of Chemistry) RSC Advances, 6, 71652-71666 (2016).
5. NMR structure of dual site binding of mitoxantrone dimer to opposite grooves of parallel stranded G-quadruplex d-(TTGGGGT)4, Tarikere Palakshan Pradeep and Ritu Barthwal. Biochimie, 128-129, 59-69 (2016).
6. A 4:1 stoichiometric binding and stabilization of mitoxantrone-parallel stranded G-quadruplex complex established by spectroscopy techniques, Tarikere Palakshan Pradeep and Ritu Barthwal. J. Photochemistry & Photobiology B: Biology, 162, 106-114 (2016).
7. Molecular recognition of parallel DNA quadruplex d-(TTAGGGT)4 by mitoxantrone: Binding with 1:2 stoichiometry leading to thermal stabilization and telomerase inhibition. Sweta Tripathi, Tarikere Palakshan Pradeep and Ritu Barthwal. Chem Bio Chem. 17, 554-560 (2016).
8. Moon, Utkarsh Ravindra, Debabrata Sircar, Ritu Barthwal, Sukanta Kumar Sen, Till Beuerle, Ludger Beerhues, and Adinpunya Mitra. "Shoot cultures of Hoppea fastigiata (Griseb.) CB Clarke as potential source of neuroprotective xanthones." Journal of Natural Medicines (2015): 1-12. Online
9. NMR based structure of anticancer drug mitoxantrone stacked with terminal base pair of DNA hexamer sequence d-(ATCGAT)2, Shilpa Dogra, Pamita Awasthi, Sweta Tripathi, T P Pradeep, Maya S Nair and Ritu Barthwal, J. Biomol. Struct. Dynamics, 32 (2014) 1164-1183.
10. Multispectroscopic methods reveal different modes of interaction of anticancer drug mitoxantrone with Poly (dG-dC).Poly(dG-dC) and Poly(dA-dT).Poly(dA-dT), Pamita Awasthi, Shilpa Dogra, and Ritu Barthwal, J. Photochemistry & Photobiology B : Biology 127, 78-87 (2013).
11. Interaction of anticancer drug Mitoxantrone with DNA hexamer sequence d-(CTCGAG)2 by Absorption, Fluorescence and Circular Dichroism Spectroscopy, Shilpa Dogra, Pamita Awasthi, Maya Nair and Ritu Barthwal, J. Photochemistry & Photobiology B : Biology 123, 48-54 (2013).
12. Comparative Molecular Modeling Study of Binding of Mitoxantrone with d-(ATCGAT)2 and d-(CTCGAG)2 Hexamer DNA Sequences, Shilpa Dogra, Pamita Awasthiand Ritu Barthwal, International Journal of Current Research and Review, Manuscript code IJCRRNOV1230, ISSN: 2231-2196 (Print), ISSN: 0975-5241(Online) 2013.
13. Interaction of Mitoxantrone and its Analogs with Methylated and Non-methylated CpG Islands in Tetrameric DNA Sequences: A Molecular Modeling Study, Pamita Awasthi, Shilpa Dogra, Lalit K. Awasthi and Ritu Barthwal, International Journal of Drug Design and Discovery 4, 1056-1064 (2013).
14. A Qualitative and Quantitative Assay to Study DNA/Drug Interaction Based on Sequence Selective Inhibition of Restriction Endonucleases, Syed A Hassan, Lata Chauhan, Ritu Barthwal and Aparna Dixit,Tropical Journal of Pharmaceutical Research 11, 721-727 (2012).
15. Aqueous Bark Extract of *Cinnamomum Zeylanicum*: A Potential Therapeutic Agent for Streptozotocin-Induced Type 1 Diabetes Mellitus (T1DM) Rats, Syed A Hassan, Ritu Barthwal, Maya S Nair and Syed S Haque, Tropical Journal of Pharmaceutical Research 11, 429-435 (2012).
16. DNA Binding studies of Vinca Alkaloids : experimental and Computational Evidence, Prateek Pandya, Surendra P Gupta, Kumud Pandav, Ritu Barthwal, B. Jayaram and Surat Kumar, Natural Product Communications, 7, No. 3, 305-309 (2012).
17. Methylene Linker Assisted DNA Binding of Vinblastine and Simpler analogs: purine – Pyrimidine Specificity of Indole Derivatives, Surendra prakash Gupta, Kumud Pandav, prateek Pandya, G. Suresh Kumar, Ritu Barthwal and Surat Kumar, Chemistry and Biology Interface 1, No. 2, 297-309 (2011).
18. Modeling of HIV-1 TAR RNA-Ligand Complexes. Mitrasinovic PM, Tomar JS, Nair MS, Barthwal R. Medicinal Chemistry 7, 301-308 (2011).
19. Molecular modeling study of interaction of anthracenedione class of drug mitoxantrone and its analogs with DNA tetrameric sequences. Pamita Awasthi , Shilpa Dogra , Lalit Kumar Awasthi, Ritu Barthwal Advances in Experimental Medicine and Biology 696, 385-400 (2011) Chapter 39, Springer Verlag .
20. Solution studies on the complex of 4’-epiadriamycin-d-(CGATCG)2 followed by time-resolved fluorescence measurement, diffusion ordered spectroscopy and restrained molecular dynamics simulations. Prashansa Agrawal, Sudhir Kumar Barthwal, Girjesh Goviland Ritu Barthwal Bioorganic & Medicinal Chemistry 17, 2793–2811 (2009).
21. Studies on the complex of Adriamycin-d-(TGATCA)2 by Proton Nuclear Magnetic Resonance Spectroscopy, Time-resolved Fluorescence Measurement and Restrained Molecular Dynamics Simulations. Prashansa Agrawal, Sudhir Kumar Barthwal, Girjesh Goviland Ritu Barthwal. Journal of Molecular Structure 932, 67-83 (2009).
22. Studies on Self-aggregation of Anthracycline Drugs by Restrained Molecular Dynamics approach using Nuclear Magnetic Resonance Spectroscopy supported by Absorption, Fluorescence, Diffusion Ordered Spectroscopy and Mass Spectrometry. Prashansa Agrawal, Sudhir Kumar Barthwal and Ritu Barthwal. European Journal of Medicinal Chemistry, 44, 1437-1451 (2009).
23. Studies on drug-DNA complexes adriamycin – d (TGATCA)2 and 4’-epiadriamycin-d-(CGATCG)2 by phopsphorus-31 nuclear magnetic resonance spectroscopy. Prashansa Agrawal, Girjesh Govil and Ritu Barthwal. Magnetic Resonance in Chemistry, 47, 390–397 (2009).
24. Structural elucidation of 4’-epiadriamycin by nuclear magnetic resonance spectroscopy and comparison with adriamycin and daunomycin using quantum mechanical and restrained molecular dynamics. Ritu Barthwal, Prashansa Agrawal, A.N. Tripathi, Uma Sharma, N.R. Jagannathan and Girjesh Govil. Archives of Biochemistry and Biophysics, 474, 48-64 (2008).
25. Quantum chemical and nuclear magnetic resonance spectral studies on molecular properties and electronic structure of palmatine molecule. A.N. Tripathi, Kushuma Bisht, P.P. Thankanchan and Ritu Barthwal. Journal of Molecular Structure, 878, 139-148 (2008).
26. Quantum chemical and nuclear magnetic resonance spectral studies on molecular properties and electronic structure of berberine and berberrubine. A.N. Tripathi, Lata Chauhan, P.P. Thankanchan and Ritu Barthwal. Magnetic Resonance in Chemistry 45, 647-655 (2007).
27. Structure of daunomycin complexed to deoxyhexanucleotide d-TGATCA by two dimensional nuclear magnetic resonance spectroscopy. Ritu Barthwal, Uma Sharma, Nandana Srivastava, Monica, Pamita Awasthi, Manpreet Kaur, S.K. Barthwal and Girjesh Govil, European Journal of Medicinal Chemistry 41, 27-39 ( 2006).
28. Restrained molecular dynamics study of adriamycin complexed to deoxyhexanucleotide d-CGATCG. Monica, S. K. Barthwal, Ritu Barthwal and Girjesh Govil, Archives of Biochemistry & Biophysics 439, 12-24 (2005).
29. Structure of DNA hexamer sequence d-TGATCA by two dimensional nuclear magnetic resonance spectroscopy and restrained molecular dynamics. Ritu Barthwal, Pamita Awasthi,, Monica, Uma Sharma, , Nandana Srivastava, Manpreet Kaur, S.K. Barthwal and Girjesh Govil, Journal of Structural Biology 148, 34-50 (2004).
30. Structure of DNA hexamer sequence d-CGATCG by two dimensional nuclear magnetic resonance spectroscopy and restrained molecular dynamics. Ritu Barthwal, Monica, Pamita Awasthi,, Nandana Srivastava, Uma Sharma, Manpreet Kaur and Girjesh Govil, Journal of Biomolecular Structure & Dynamics 21, 817-839 (2003).
31. A 500 MHz proton NMR study of interaction of tetrapeptide Lys-Trp-Gly-Lys OtBu and tripeptide Lys-Tyr-Lys with deoxy dinucleotide d-GpC. Ritu Barthwal, Shrikant Kukreti, Anwer Mujeeb and Girjesh Govil, Quart. Magnetic Resonance in Biology and Medicine 3, 225-238 (1995).
32. A proton nuclear magnetic resonance investigation of the conformation of daunomycin. Ritu Barthwal, Anwer Mujeeb, Nandana Srivastava and Uma Sharma, Chemico-Biol. Interactions 100, 125-139 (1995).
33. A 500 MHz proton NMR study of conformation of Adriamycin. Ritu Barthwal, Nandana Srivastava, Uma Sharma and Girjesh Govil, Journal of Molecular Structure 327, 201-220 (1994).
34. A 500 MHz proton NMR studies of interaction of tetrapeptide Lys‑Trp‑Gly‑Lys OtBu with deoxy dinucleotide d‑CpG. Ritu Barthwal, Girjesh Govil, Satish Kumar Singh, Shrikant Kukreti and Anwer Mujeeb, Quart. Magnetic Resonance in Biology and Medicine 1, 17-22 (1994).
35. Interaction of daunomycin with deoxydinucleotide d‑CpG by two dimensional NMR techniques. Ritu Barthwal, Anwer Mujeeb and Girjesh Govil, Archives of Biochemistry & Biophysics 313, 189-205 (1994).
36. Theoretical studies on intercalation of actinomycin between base pairs of dinucleotide model systems. Ritu Barthwal, Anwer Mujeeb, and Girjesh Govil, Journal of Indian Chemical Society 70, 929-938 (1993).
37. A 500 MHz proton NMR study of binding of the tripeptide Lys‑Tyr‑Lys with tetradeoxynucleotides d‑CpCpGpG and d-CpGpCpG, Ritu Barthwal, Shrikant Kukreti, Anwer Mujeeb and Girjesh Govil, MAGMA 1, 145-157 (1993).
38. A 500 MHz proton NMR study of binding of tripeptide Lys‑Tyr‑Lys with deoxy dinucleotide d‑CpG. Ritu Barthwal, Shrikant Kukreti and Anwer Mujeeb, Indian Journal of Biochemistry & Biophysics 29, 394‑401 (1992).
39. A 500 MHz proton NMR study of stacking interactions: Binding of tripeptide Lys‑Tyr‑Lys to tetradeoxynucleotide d‑GpCpGpC. R. Barthwal, A. Mujeeb, S. Kukreti, A. Gupta and G. Govil, Journal of Molecular Recognition 4, 45‑52 (1991).
40. One dimensional and two dimensional proton NMR studies on actinomycin D. Anwer Mujeeb and Ritu Barthwal, Intl. Journal of Magnetic. Resonance in Biology and Medicine 1, 1‑7 (1991).
41. Proton magnetic resonance studies of the binding of oligopeptides containing tryptophan to polyribonucleotides Poly A, Poly U and Poly C. Ritu Barthwal, Gerard Lancelot, Anjna Agarwal, Anwer Mujeeb and Shrikant Kukreti, Physiol. Chem. Phys. & Medical NMR 20, 145‑159 (1988).
42. Interaction of tryptophan containing oligopeptides with d‑CGCG by proton NMR. Ritu Barthwal, Anjna Agarwal, Shrikant Kukreti and Anwer Mujeeb, Physiol. Chem. Phys. & Medical NMR 19, 125‑139 (1987).
43. In vitro proton T1 and T2 studies on rat liver: Analysis of multi exponential relaxation processes. R.Barthwal, M.Hohn-Berlage and K.Gersonde, Magnetic Resonance in Medicine 3, 863-875 (!986)