



Professor

Date of Birth: Sept. 22, 1951

Qualification: B.Sc. (hons.), MS.c, (Hons.), Ph.D., (IIT Delhi)

Areas of Interest:

Structural Biology, Molecular Biophysics, Biomolecular Interactions by NMR and molecular modelling.

Theses Guided:

- PhD - 7 Completed, 2 ongoing
- MPhil - 3
- MSc - 47

Academic Qualification:

- PhD Physics Dept., Indian Institute of Technology (IIT, Delhi), 1976.
- MSc Hons, School in Physics, Punjab University, Chandigarh, 1971, 75% marks, I Division, 6th rank in University.
- BSc Hons. School in Physics, Punjab University, Chandigarh, 1971, 75% marks I Division, 4th rank in University.

Positions Held:

- Post Doctoral Fellow, Centre de biophysique moléculaire, CNRS, France, June 1981-Sept. 1981
 - Guest Scientist Abteilung Physiologische Chemie, RWTH Aachen Technical University, West Germany, June 1984-Feb. 1985.
 - Lecturer, Deptt. Of Biophysics & Crystallography, University of Madras, Madras, Nov. 1977-April 1981.
 - CSIR Pool Officer, School of Environmental Sciences, Jawaharlal Nehru University, Delhi, Aug. 1976- Nov. 1977.
 - Been Member, Task Force on Bioinformatics and Human Resource Development, Department of Biotechnology (DBT), Govt. of India.
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Research Interest/Experience:

Biomolecular Structure- Conformation of antibiotic anticancerous drugs, oligopeptides and oligonucleotides, In vivo NMR, Protein-Nucleic Acid Interactions and Drug-Nucleic Acid Interactions by 2D-NMR techniques (use of software FELIX and simulation programs SPHINX - LINSHA), fluorescence spectroscopy, absorption spectroscopy, & theoretical potential energy calculations using classical potential functions, Molecular modeling to aim at drug designing using software INSIGHT II, DISCOVER, XPLOR, etc. on SGI platforms.

Major Research Projects:

- **Anticancer drug designing based on study of drug-DNA complexes by NMR spectroscopy**, CSIR sponsored about Rs. 8 lacs (1999-continuing).
 - **Molecular modeling of drug-DNA complexes**, BRNS (DAE) sponsored Rs.16.2 lacs (1999-continuing).
 - **Unusual DNA structures**, AICTE sponsored, Rs. 11.0 lacs (1995-98).
 - **Nucleic acid interactions with specific oligopeptides and drugs**, DST sponsored, Rs. 7.4 lacs (1988-92).
 - **Biomolecular interactions - An NMR, theoretical and other spectroscopic investigations of interaction of nucleic acids with oligopeptides and drugs**, DST sponsored, Rs 7.25 lacs (1984-88).
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Awards:

- National Science Talent Search Scholarship, NCERT, Govt. of India, 1967-76.
 - UGC, National Associate, 1979-84.
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Memberships:

- Life Member, Indian Biophysical Society.
 - Life Member, National Magnetic Resonance Society, India.
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Research Publications:

1. *Electron transport properties of thin copper films I*, Ritu Suri, A. P. Thakoor and K. L. Chopra, J. Appl. Phys. 46, 2574-2582 (1975).
2. *Electron transport properties of copper films II - thermo - electric power*, A. P. Thakoor, Ritu Suri and K. L. Chopra, J. Appl. Phys. 46, 2777-2783 (1975).
3. *Structural defect thermoelectric power of copper films*, A. P. Thakoor, Ritu Suri and K. L. Chopra, Appl. Phys. Lett. 26, 160-162 (1975).
4. *Effect of annealing on transport properties of copper films*, K. L. Chopra and Ritu Suri, Proc. III International Conference On Thin Films, Budapest, Hungary, (1975), Thin solid Films 36, 47-50 (1975).
5. *Anomalous large contributions of vacancies and dislocations to Hall coefficient and thermoelectric power of copper films*, K. L. chopra, Ritu Suri and A. P. Thankoor, Solid State Commun 16, 805-808(1976).
6. *Role of structural defects in electron transport properties of copper films*, K. L. Chopra, Ritu Suri ad A. P. Thakoor, J. Appl. Phys. 48, 538-546 (1977).
7. *Electron transport properties of dilute Cu-Alloy films*, K. L. Chopra, Ritu Suri and A. P. Thakoor, Phys. Rev. B 15, 4682-4691 (1977).
8. *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 (1986).
9. *Interaction of tryptophan containing oligopeptides with d-CGCG by proton NMR*, Ritu Barthwal, Anjna Agarwal, Shrikant Kukreti and Anwer Mujeeb, Physiol. Chem. Phys. & Med. NMR 19, 125-139 (1987).

10. ***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. & Med. NMR* 20, 145-159 (1988).
11. ***One dimensional and two dimensional proton NMR studies on actinomycin D***, Anwer Mujeeb and Ritu Barthwal, *International J. Mag. Res. Biol. And Medicine* 1, 1-7 (1991).
12. ***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, *J. Mol. Recognition* 4, 45-52(1991).
13. ***A 500 Mhzproton NMR study of binding of tripeptide Lys-Tyr-Lys with deoxy dinucleotide-d-CpG***, Ritu Barthwal, Shrikant Kukreti and Anwer Mujeeb, *Indian J. Biochem. Biophys.* 29, 394-401 (1992).
14. ***A 500 MHz proton NMR study of binding of the tripetide Lys-Tyr-Lys with tetradeoxynucleotides d-CpCpGpG and d-CpGpCpG***, Ritu Barthwal, Shrikant Kukreti, Anwer Mujeeb and Girjesh Govil, *MAGMA* 1, 145-157 (1993).
15. ***Theoretical studies on intercalation of actinomycin between base pairs of dinucleotide model systems***, Ritu Barthwal, Anwer Mujeeb, and Girjesh Govil, *J. Ind. Chem. Soc.* 70, 929-938(1993).
16. ***Interaction of daunomcin with deoxydinucleotide d-CpG by two dimensional NMR techniques***, Ritu Barthwal, Anwer Mjeeb and Girjeshj Govil, *Arch. Biochem Biophys.* 313, 189-205 (1994).
17. ***A 5000 MHz proton NMR study 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 mag. Res. Biol. And Medicine* 1, 17-22 (1994).
18. ***A 500 MHz proton NMR study of conformation of adriamycin***, Ritu Barthwal, Nandan Srivastava, Uma sharma and Girjesh Govil, *J. Mol. Structure* 327, 201-220 (194).
19. ***A 500 MHz proton NMR study of interaction of tetrapeptide Lys-Trp-Glys OtBu and tripeptide Lys-Tyr-Lys with deoxy dinucleotide d-GpC***, Ritu Barthwal, shrikant Kureti, Anwer Mujeeb and Girjesh Govil, *Quat mag. Res. Biol and Medicine* 3, 225-238 (1995).
20. ***A proton nuclear magnetic resonance investion of the conformation of daunomycin***, Ritu Barthwal, Anwer Mujeeb, Nandana Srivastava and Uma Sharma, *Chemico-Biol. Interactions* 100,125-139 (1996).
21. ***Theoretical studies on intercalation of daunomycin between base paris of dinucleotide model systems***, Ritu Barthwal, Anwer Mujeeb, Rahul Mitra and Girjesh Govil, *Communicated*.
22. ***Conformation of single-stranded deoxy prntanucleotide d(A)₅ by two dimensional NMR***, Ritu Barthwal and Anita Gupta, *In Preparation*.
23. ***Interaction of part of DNA binding loop of gene 5 protein Lys24-Pro-Tyr-Ser-Leu-Asn29 with deoxy pentanucleotide d(A)₅ by two dimensional***

- NMR*, Ritu Barthwal, A. Gupta, V.S. Chauhan and G. Govil, In Preparation.
24. *A proton NMR study of solution conformation of DNA hexamer d-(CGATCG)*, Ritu Barthwal, Nandana Srivastava, Uma Sharma and G. Govil, Communicated to Chemico-Biol. Interactions.
 25. *A proton NMR study of solution conformation of DNA hexamer d-(TGtgcg)*, Ritu Barthwal, Uma Sharma and Nandana Srivastava and G. Govil, In Preparation.
 26. *Interaction of anti cancerous drug adriamycin with deoxy hexanucleotide d-CGATCG by 2D NMR techniques*, Ritu Barthwal, Nandana Srivastava, Uma Sharma and G. Govil, Communicated to Chemico-Biol. Interactions.
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Conference/Symposium Papers:

1. *Interaction of d-CGCG with tryptophan containing tetrapeptide by proton NMR*, Ritu Barthwal, Gerard Lancelot and Claude Helene, presented at 6th Ampere International School on NMR in Biology at leibnitz, Austria, Sept. 1981.
2. *Interaction of tryptophan containing oligopeptide with self complementary deoxy oligonucleotides containing CpG sequence by two dimensional NMR techniques*, Ritu Barthwal, Anjna Agarwal and Girjesh Govil, Proc. XIIth International Conference On Magnetic Resonance in Biological Systems (ICMRBS) Todtmoos, Germany, p. 96, Sept. 1986.
3. *Proton magnetic resonance studies of the binding of tripeptide Lys-Trp-Lys to Poly A, Poly U and poly C*, Ritu Barthwal, Anjna Agarwal, Shrikant Kukreti and Anwer Mujeeb. Proceedings VIIIth Anniversary NMR Syposium at India Institute of Science, Bangalore, p.32, Nov. 1985.
4. *Peferential binding of tyrosyl residue to d-CpG site in tetradeoxynucleotides: A study by two dimensional NMR*, Ritu Barthwal, Girjesh Govil, Anwer Mujeeb and Shrikant Kukreti, Proceedings of XIIth International Conference on Magnetic Resonance in Biological Systems (ICMRBS) madison, Wisconsin, USA, p. 18-13, Aug. 1988.
5. *Conformation of daunomycin and its complexes with d-CpG by 2D NMR*, Ritu Barthwal, Girjesh Govil, Anwer Mujeeb and Shrikant Kukreti, Proceedings of XIIIth International Conference on Magnetic Resonance in Biological Ststems (ICMRBS), Madison, Wisconsin, USA, p. 18-8, Aug.1988.
6. *Two dimensilnal NMR studies of the binding of tripeptide Lys-Tyr-Lys to deoxy tetranucleotide d-GCGC*, Ritu Barthwal, Shrikant Kukreti, Anwer Mujeeb and Anita Gupta, Proceedings Joint IISc. SIF-TIFR NMR Facility Review Symposium, Bangalore, p. 23, Feb. 1989.

7. ***Interaction of deoxy tetranucleotide d-CCGG to tripeptide Lys-Tyr-Lys-A @D NMR study***, Ritu Barthwal, Anwer Mujeeb, Shrikant Kukreti and Anita Gupta, Proceedings Joit IISc. SIF-TIFR NMR facility Review Symposium, Bangalore, p. 24, Feb. 1989.
8. ***Interaction of model hexapeptide from Gene 5 protein to deoxy octanucleotide d-GACTGTC***, Ritu Barthwal, A. Gupta and G. Govil. Prpceedings of XIV International Conferenceon magnetic Resonance in Biological Systems (ICMRBS), University of Warwick, U.K., p. 11-4, Sept. 1990.
9. ***2D NMR studies on actinomycin D***. R. Barthwal, A. Mujeeb and A. Gupta, Proceedings of XIV International Conference on Magnetic Resonance in Biological Systems (ICMRBS), University of Warwick, UK, p.8-8, Sept.1990.
10. ***Theoretical studies on the stacking of aromatic amino acids with bases, base-pairs and between two base-pairs, CG and GC***, Ritu Barthwal, A. Gupta, U. Sharma and N. Srivastava, proceedings of National Symposium on Biophysics with special reference to Biomolecules at University of madras, India, p. 54, Feb. 1991.
11. ***2D NMR studies on binding of oligonucleotide d(A)₅ to DNA binding loop of gene 5 protein***, R. Barthwal, A. Gupta, U. Sharma, N. Srivastava and G. Govil, Proceedings of XV International Conference on magnetic Resonance in Biological Systems (ICMRBS), Jerusalem, Israel, Aug. 1992.
12. ***Interaction of hexapeptide Lys²⁴-Pro-Tyr-Ser-Leu-Asn²⁹ part of binding loop of gene 5 protein encoded by filamentous bacteriophage with deoxy pentanucleotide d(A)₅ by proton NMR***, R. Barthwal, Proceedings XVI International Conference on Magnetic Resonance in Biological Systems (ICMRBS), Velghoven, Netherlands, p. 173., Aug. 1994.
13. ***Conformation of daunomycin and adriamycin and their complexes with some deoxy oligonucleotides***, Ritu Barthwal, Uma Sharma and Nandana Srivastava, proceedings 16th International Congress in Biochemistry and Molecular Biology (IUBMB), Delhi, India, p. 112, Sept. 1994.
14. ***A 500 MHZ proton NMR study of conformation of adriamycin***, Ritu Barthwal and N. Srivastava, proceedings 12th European Experimental NMR Conference EENC 94, Finland, June 1995.
15. ***Structure of d-CGATCG complexed with adriamycin by NMR***, Ritu Barthwal, U. Sharma and N. Srivastava, Proceedings Natl. Symp. On Magnetic Resonance, National Chemical Lab. (NCL), pune, Feb. 1996.
16. ***Conformation of DNA hexamer d-TGATCA and its complex with anticancer drug daunomycin by NMR techniques***, Ritu Barthwal, Uma Sharma and Nandana Srivastava, Proceedings natl. Symp. On Moelecular and Cellular Biophsics, AIIMS and JNU, Delhi, p. 188, Feb. 1996.
17. ***Conformation of d-CGATCG and its complex with drug adriamycin***, Ritu Barthwal, Proceedings XVII International Conference on magnetic Resonance in Biological Systems (ICMRBS), keystone, Colorado, USA, p. 93, Aug. 1996.

18. ***Education and Research in Biotechnology - Indian Scenario***, Ritu Barthwal, Proceedings of Natl. Seminar on Biotechnology : New Trends and Prospects, Gunrukul Kangri University, hardwar, Dec. 1996.
19. ***Structure of adriamycin-d-(CGATCG)₂ complex based on distance constraints from NOESY spectra***, Proceedings, Natl, Symposium on Radiation and Molecular Biophysics, Bhabha Atomic Research Cepte, Mumbai, India, Jan. 1998.
20. ***Conformational Analysis of complex of anticancer drug daunomycin with-d-TGATCA***, Ritu Barthwal, Proceedings XVIII International Conference on Magnetic Resonance in Biological Systmes (ICMRBS), Tokyo, Japan, p.77 , Aug. 1998.
21. ***Proton Nuclear magnetic Resonance studies of daunomycin-d-(CGATCG)₂ complex in D₂O and H₂O***, Ritu Barthwal and Surabhi Sharma, Proceedings XVIII Intal. Conf on Magnetic Resonance in Biological Systms 9ICMRBS), Tokyo, Japan, p.78, Aug. 1998.
22. ***Interaction of anticancer drug adriamycin with deoxyoligonucleotide d-CGATCG by NMR techniques***, Ritu Barthwal, Proceeding XIII Intl Biophysics Congress, New Delhi, India, P-480, Sept. 1999.
23. ***Comparative study of solution structure of daunomycin, adriamycin and 4'-epiadriamycin by proton NMR***, Uma sharma, Nandana Srivastava, Ritu Barthwal and N.R. Jagannathan, Proceedings XIII Intl Biophysics Congress, New Delhi, India, P-134, Sept. 1999.