

# Curriculum Vitae

## Prof. SAMIR K. BRAHMACHARI

Director General,  
Council of Scientific and Industrial Research.  
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**Born:** January, 1, 1952;

**Nationality:** Indian

### Current position

**Secretary**, Department of Scientific and Industrial Research, GOI

**Director General**, Council of Scientific and Industrial Research, New Delhi,

**Scientist, Former Director**, CSIR- Institute of Genomics and Integrative Biology, Delhi,

**Chief Mentor**, Open Source Drug Discovery Unit, CSIR, New Delhi.

### Academics

1972 Bachelor of Science in Chemistry (Hons), University of Calcutta.  
1974 Master of Science in Chemistry (Specialisation, Physical Chemistry), University of Calcutta.  
1978 PhD, Molecular Biophysics Unit, Indian Institute of Science, Bangalore.  
1978-1979 Post Doctoral Research, French Govt. Fellowship, Institute de Recherche en Biologie Moleculaire, CNRS, University of Paris VIII.  
1979-1981 Research Associate, Molecular Biophysics Unit, Indian Institute of Science, Bangalore.  
1981-1997 Lecturer/ Assistant/Associate Professor, Molecular Biophysics Unit and Associated Faculty, Centre for Genetic Engineering, Indian Institute of Science, Bangalore.  
1997-2001 Professor, Molecular Biophysics Unit, Indian Institute of Science, Bangalore.  
1997-2007 Director, CSIR-Institute of Genomics and Integrative Biology, Delhi.  
2003-Present Adjunct Professor, Bioinformatics Centre, University of Pune, Pune.  
2007-Present Director General, CSIR, New Delhi.

### Visiting Scientist

Nov 1979 Dept of Biochemistry, Memorial University of Newfoundland, Canada.  
June-Sept 1985 Department of Genetics and Development, Columbia University New York, USA.

### Visiting Professorship

May-June 1997 Max Plank Institute of Biophysical Chemistry, Goettingen, Germany.

### Honours & Awards

1968 National Science Talent Search Scholarship, NCERT India.  
1979 Young scientist medal, Indian National Science Academy.  
1981 Kani medal, National Cancer Research Centre, Tokyo, Japan.  
1990 Shanti Swarup Bhatnagar Award in Biological Sciences, CSIR, India.  
1998 C. R. Krishnamurthy Oration Award, Society of Biological Chemists, India.  
1999 FICCI Award 1998-99 in recognition of individual initiative in Life Sciences including Agriculture, Federation of Indian Chambers of Commerce and Industry.  
2000 Millennium Medal, Indian Science Congress.  
2002 Ranbaxy Research Award for the year 2001 in the field of "Medical Science – Medical Research", Ranbaxy Science Foundation.  
2003 Goyal Prize 2001; Life Sciences, Kurukshetra University.

- 2004 Prof. P.K. Bose Memorial Award, Indian Chemical Society.  
 2005 Dr. B.R. Ambedkar Centenary Award for Excellence in Biomedical Research, Indian Council of Medical Research.  
 2007 H. K. Firodia Awards For Excellence In Science and Technology, H.K. Firodia Memorial Foundation.  
 2007 Padma Bhushan Dr. R.A.Mashelkar Medal, Asian Paints.  
 2008 2005 VASVIK Award for Biological S&T, Vividhlaxi Audyogik Samshodhan Vikas Kendra.  
 2008 6th Biospectrum person of the year-2008, Biospectrum.  
 2008 Distinguished Alumni IISc, Alumni Association, Indian Institute of Science.  
 2009 SS Bhatnagar Memorial Award and Gold Medal, Indian Science Congress.  
 2009 The Jagadis Chandra Bose Medal 2007, Indian National Science Academy.  
 2009 2008 Shri Om Prakash Bhasin Award for S&T (Biotechnology), Shri O. P. B.Foundation for S&T.  
 2009 D.Sc. (Honoris causa), Vidyasagar University, India.  
 2010 D.Sc. (Honoris causa), Kalyani University, India.  
 2011 D.Sc. (Honoris causa), National Institute of Technology, Silchar, India.  
 2012 D.Sc. (Honoris causa), Amity University, Jaipur, India.

#### **Fellowships / Membership of Academic Bodies**

- 1991 Fellowship of the Indian Academy of Sciences.  
 1991 Elected member Human Genome Organization (HUGO).  
 1995 Fellowship of the Indian National Science Academy.  
 2000 Fellowship of the National Academy of Sciences.  
 2004-2011 Council Member, Human Genome Organization (HUGO).  
 2010 Fellowship of Indian National Academy of Engineering.

#### **Selected Lectures and Orations**

- 1988 **“Chromosoma Lecture”**, Institute of Molecular Biology, USSR Academy of Sciences, Moscow.  
 1989 Symposium speaker at **“6<sup>th</sup> Conversation in Biomolecular Stereodynamics”**, Albany, NY, USA.  
 1991 Invited plenary speaker, **“International Symposium on Synthetic Oligonucleotides: Problem and Frontiers of Practical Application”**, Shemyakin Institute, Moscow, USSR.  
 1993 Symposium speaker, **“8<sup>th</sup> Conversation in Biomolecular Stereodynamics”**, Albany, NY USA.  
 1996 Invited speaker, **“2<sup>nd</sup> Indo-Japan Workshop and ACT IV Meeting”** Japan.  
 1996 Invited speaker, **“Human Genome Treaty Symposium”**, Berlin, Germany.  
 2001 Invited speaker at an International Symposium on **“Ethics, Intellectual Property and Genomics”** at UNESCO Headquarters, Paris.  
 2001 **“Genome Research & Patenting in Developing Countries”** in symposium on Bioethics, Vienna, Austria.  
 2002 Rights & Issues relating to the **“Genetic Resources of the Developing Countries”**, Geneva.  
 2002 Invited lecture in Bioscience Asia meeting on **“Functional Genomics in Silico”**, Taiwan.  
 2002 Lecture during the **“India Day Celebrations”** at Royal Society, London.  
 2003 **“B. K. Bachhawat Oration”**, Jawaharlal Nehru University, New Delhi.  
 2004 Invited talk entitled **“Comparative Proteomics in silico for drug target identification”**, at 17<sup>th</sup> FAOBMB/IUBMB/A-IMBN Meeting, Bangkok, Thailand.  
 2005 BIGROC Lecture **“Conservation and Variation: A Balancing Act in the Genome”**at Weizmann Institute of Science, Rehovot, Israel.  
 2005 Invited lecture at the Asia Biotech Forum 2005 at Kuala Lumpur entitled **“Private-Public Partnership in Genomics & Bioinformatics: An Indian Perspective”**.  
 2005 Keynote address at the Workshop Health of Populations in the Mediterranean in the post genomic era entitled **“Predictive Medicine and Health Research in the Post Genomic Era”**, Tunisia.

- 2005 Invited talk at the HGM 2005, entitled **“Conservation and Variation: A Balancing Act in the Genome”**, Kyoto, Japan.
- 2005 Invited talk at the 14<sup>th</sup> Conversation Albany, NY, USA.
- 2005 Invited talk entitled **“Comparative Genomics and pathway modeling approaches towards Novel Drug Target Identification”** at International Symposium on Computational Biology & Bioinformatics (ISCBB2005) in Tokyo, Japan.
- 2006 Invited talk at the session Genomics in Asia during the 2006 International Conference on Genomics entitled **“Genome Variation & Disease Genomics: the Indian Initiative”**, Hangzhou, China.
- 2007 **“Indian Genome Variation Database from Complex Disease Perspective”** at McKusick-Nathans Institute of Genetic Medicine, Johns Hopkins University, Baltimore.
- 2008 Invited talk at the **Genesis Conference in London** entitled **“Can Open Source Drug Discovery Address Global Healthcare Challenges in Infectious Diseases?”**.
- 2009 **“Open Innovation: A Novel Approach to Collaborative Research for Global Good”** at Swedish parliament.
- 2010 **“Technology Based Applications for Development for the Benefit of the Masses, Perspective of Government of India”** at Washington DC, USA.
- 2010 **“Knowledge Creation and Open Innovation for Global Good”** at ASET Colloquium, TIFR, Mumbai.
- 2008 **“Human Genome Variome and Predictive Medicine: Hope & Reality”** on the occasion of the Foundation Day of Institute of Life Sciences, Hyderabad.
- 2010 Keynote address: **“Genome Sequencing to Drug Discovery: An Open Innovation Model for Global Collaboration”** at the HUGO-OECD Symposium on Genomics and Bio-economy, France.
- 2010 Plenary talk on **“Open Source Drug Discovery: A Solution for Infectious Diseases”** at the International Conference on Bioinformatics of Genome Regulation and Structure, Novosibirsk, Russia.
- 2010 **“Tale of Three Cities: A Molecular Journey”**, at Indian Chemical Society.
- 2010 **“Preparing for Leadership of Tomorrow”** a Convocation Address at North Bengal University.
- 2010 **“Positioning for Success: Leveraging the Power of Dreams, Commitment and Perseverance”** a Convocation Address at NIPER-Kolkata.
- 2010 **“Open Source Drug Discovery: A New Paradigm”** at TEDx.  
<http://tedxncr.com/speakers.html>
- 2010 **“Intellectual Property Protection vs. Investors Property Protection”**, Confederation of Indian Industry.
- 2011 **“Open Innovation: A Novel Approach to Collaborative Research for Global Good”** on 15<sup>th</sup> Prof. Y. Nayudamma Memorial Award Lecture at Chennai.
- 2011 BigRoc lecture entitled **“Open Source Drug Discovery”**, Weizmann Institute of Science, Rehovot, Israel.
- 2011 Keynote lecture at Cold Spring Harbor Asia conference on **Protein Structure Based Drug Design**, Suzhou, China.

#### **Editorial Work/International Responsibilities (Selected List)**

- Regional Editor (South Asian Countries) Journal Genomic Medicine, 2006 onwards.
- Council editor, The HUGO Journal, 2010-Present.
- PLoS ONE Academic Editor 2008 - 2010.
- Member of the Board of Advisors of Journal of Biomolecular Structure and Dynamics (JBSD), 2010.
- Member, FAOBMB council, 1995-2004.
- Member of India-European Commission S&T Steering Committee responsible for Genomics & Biotechnology for Health 2003-2007.
- Member, Planning Group of the Human Variome Project Melbourne, Australia, 2006.
- Chairman, 13<sup>th</sup> International Human Genome Meeting (HUGO), 2008, India.
- Member and Area Coordinator, INDO-RUSSIA ILTP Joint Council, 2003 – Present.

- Member of the international Advisory Panel on Biotechnology Development (BIO-IAP) of Malaysia for the period 2009-2011.
- Advisory Board member for Archon-X prize for genomics, X-Prize foundation, USA.

# Prof. Brahmachari's Contribution to S & T Leadership

## **Institution Transformation and Development of novel PPP models**

Relatively unknown the 'Centre for Biochemical Technology (CBT)' of CSIR underwent major transformation under the Directorship of Prof. Brahmachari to emerge as a leading institute of Genomics and Integrative Biology in the country. Its scientific productivity has grown several folds both in quality and quantity be it knowledge generation and development or knowledge extension. Today, it has acquired an impressive portfolio of 148 foreign and national patents, leading to value realization, IP asset creations, and now also attracting foreign and national collaborations, and global project funding. Prof. Brahmachari has created a legacy of young researchers who don't accept the phrase "things cannot be done in India".

Under resource limiting conditions, Prof. Brahmachari conceptualized and developed ahead of time novel Public-Private Partnership (PPP) models like 'Genomed' and 'TCGA', bringing together various pharmaceuticals, IT, life science companies and CSIR-IGIB to empower India with Genomic Technology. Using his skill of networking he carried forward the 'Indian Genome Variation' project and PAN Asia SNP project, bringing large number of Indian and Asian scientists to work together. OSDD today, is the largest network project ever conceived in the world for drug discovery.

He has also contributed widely in popularizing genomic science and its ethical implications at global forums through several national and international committees. As a member of the Expert Group on Human Rights and Biotechnology Commission of United Nations, he has addressed issues of unethical exploitation of genetic resources of the Third World and has championed the concept of Rights of patients in benefit sharing in the development of genomic medicine to become a global success.

## **Reinventing CSIR**

As Director General CSIR (37 laboratories, 5 units over 16,000 employees and over 10,000 research fellows and PhD scholars), which is the largest chain of industrial RandD labs, he conceived and is successfully leading the process of CSIR's transformation with his visionary policies, fast track decisions and attracting highly young talented leadership. He has played pivotal role in reforming India's S & T policies for betterment of society, and led CSIR to generate new products, services, processes and business models, to boost employment generation and inclusive growth of the economy.

Propagating that innovation is engine for growth and prosperity, many CSIR flagship programs have unfurled under his visionary leadership to address the concerns associated with the areas of health sector, higher S & T education and technological solutions.

Rendering the much needed, innovation to health and pharma sector, Prof. Brahmachari has piloted the Open Source Drug Discovery (OSDD), the motto of which is 'affordable health care for all'. This CSIR led team India consortium with global partnerships (over 5000 registered participants across 130 countries), provides a platform where the best minds can collaborate and collectively endeavor to solve the complex problems associated with discovering novel therapies for neglected tropical diseases like Tuberculosis, Malaria, Leshmaniasis, and so on. The acclaimed success of this philosophy has culminated into CSIR collaboration with organization like TB alliance ([www.tballiance.org/](http://www.tballiance.org/)) and Mayo clinic, USA ([www.mayoclinic.org/](http://www.mayoclinic.org/))

Breaking away from the conventional education system, Prof. Brahmachari efforts have been instrumental in leveraging the infrastructure and scientific strengths of CSIR, in the form of a self-sustaining organization- 'Academy of Scientific and Innovative Research' (AcSIR). The academy, meant for promoting inter-disciplinary and trans-disciplinary research that is ordinarily not offered in regular universities, seeks to increase the number of high quality PhD's in the country who can productively contribute to the growth of the nation.

Fructification of Post-Graduate Research Training Program in Engineering (PGRPE) under his guidance, gave the much needed hand to boost the engineering cluster of laboratories, infusing young and bright minds into research.

Prof. Brahmachari innovatively repositioned CSIR's physical Institutes to a connected network, to undertake CSIR-800 project for the economic benefit of 800 million Indian at the bottom of the pyramid through S & T interventions.

Prof. Brahmachari sustained effort in this direction led CSIR to foster a major strategic partnership with the National Innovation Council (NInC). The alliance will particularly focus on setting Cluster Innovation Centre to promote innovation at grass root level particularly the Medium, Small enterprises (MSMEs) sector. He also formulated the policy for Scientific Entrepreneurship. This national effort pioneered and led by CSIR/DSIR has helped government to give nod for researchers to have an equity stake in scientific enterprises and spin-offs while still being employed in their organizations. This policy decision is to enable Indian scientists like their peers in all developed counties, to enjoy the commercial benefits of their inventions and patents.

Further, to enhance the innovation capacity of CSIR, and pursue technology commercialization and entrepreneurship of processes, products and services, Prof Brahmachari laid the foundation of CSIR Tech Private Limited (CTPL). This independent company aids in the exploration of newer models of technology transfer to the markets, and leveraging of private investments.

Under his leadership CSIR achieved much recognition for innovation through patented technology, and the efficiency and effectiveness of research. CSIR bagged the much acclaimed Thomson and Reuters Innovation Award 2010 for being most innovative Hi-tech academic institution in the country.

## Prof. Brahmachari's Achievements in Scientific Research

Prof. Brahmachari, recognized as distinguished alumni from the school of Molecular Biophysics at Indian Institute of Science, received his early training in structural biology of proteins and polypeptides. He has more than 12 patents, 23 copyrights and 150 research publications to his credit. He has made outstanding contributions in understanding the role of repetitive DNA in genome function in health and disease. He visualized the integration of structural biology with genomics, molecular biology and information science forging towards integrative biology. Prof. Brahmachari made fundamental discoveries in demonstrating the structural flexibility of DNA and the role of repetitive sequences in DNA transactions much before the discovery of repeats association with genetic basis of several neurological disorders. His work on the structural flexibility of telomeric repeat sequences is one of his well cited pioneering contributions, which has led others to develop approaches for cancer therapeutics. He sought to understand the functional relevance of repetitive DNA in clinical context that resulted in extensive collaboration with a large number of clinicians and also in motivating young physicians to undertake research in genomic sciences. Through a combination of directed research, he seeded functional genomics research in India, moving away from the prestigious Indian Institute of Science, Bangalore, to found the CSIR- Institute of Genomics and Integrative Biology in Delhi.

Prof. Brahmachari has made major contributions in molecular analysis of genetic disorders associated with trinucleotide amplification and repetitive sequence instability. Using a combination of structural biology, computational genomics and population based polymorphism scanning, he and his group have provided a novel structural frame work for understanding the etiology of several neurological disorders. One of the outcomes of these efforts has been the demonstration that loss of triplet repeat interruption as the primary steps in ataxia SCA 2 which is followed by repeat expansion. In addition, he has made major contribution in identifying founder chromosomes of several Spino Cerebellar Ataxia and Huntington's Disease in India.

Repeat polymorphism in the genome and variation in coding sequences reflected in these diseases brought an insight into the balancing act of nature between variation and conservation. This eventually led to his conceptualization and execution of the Indian Genome Variation project.

Prof. Brahmachari has established the CSIR Indian Genome Variation Consortium Project for predictive and personalized medicine with a team of 150 researchers including scientists and students to provide the first comprehensive genetic map of the extremely diverse Indian population with different evolutionary history, comprising thousands of endogamous populations and hundreds of functioning languages. The execution of the project was strategically planned with the development of innovative cost-effective methods and suitable private-public partnerships. A major discovery has been that despite enormous diversity, the populations of India could cluster into 5 major groups. This has been enormously useful in designing a large number of studies that aim to identify predictive markers for complex diseases and pharmacogenomics studies. The basal data has also been useful in tracing migration history of populations; the most striking has been the sampling of Asian populations, identifying risk haplotype for carrier detection and also discovering signatures of selection for as in the case of high altitude adaptation. Under his leadership, the Institute (CSIR-IGIB) rose to the forefront of clinical genomics in India, addressing nationally important problems such as identifying risk markers for pulmonary edema in soldiers posted at high altitudes. In many diseases of relevance to the Indian people, such as asthma, diabetes, cardiovascular disease, and schizophrenia, he master-minded the development of translational research programs in concert with clinical institutions. This set the stage for inter-institutional collaborative research, which had been largely missing before.

Prof. Brahmachari leveraged the angle of personalised medicine towards pharmacogenomics with focus on affordable healthcare.

Parallel with the Indian Genome Variation Consortium project, a unique initiative called Ayurgenomics has been conceptualized and supported by Prof. Brahmachari. This project aims to integrate the principles of personalized medicine from Ayurveda, an ancient Indian medical system with modern genomics to bridge

the gap from genotype to phenotype. The first proof of concept that healthy individuals classified on the basis of constitution types described in Ayurveda exhibit differences at the biochemical and genomic level was provided by his group.

While variation was the key in genotype to disease phenotype, Prof. Brahmachari explored the importance of conservation in non-coding RNA. Prof. Brahmachari is one of the pioneers in proposing a role for microRNAs in host-pathogen interactions. He and his coworkers identified human microRNAs targeting HIV-1 and predicted its implications in disease progression and potential antiviral activity and validated experimentally. This paradigm of microRNAs and microRNA regulatory networks were proposed in host-pathogen interactions. He and his coworkers also developed a computational methodology to understand the impact of genomic variation in the 3'-untranslated regions of coding genes in the genome could have potential functional implications. Prof. Brahmachari organized a vibrant team of researchers with complementary expertise to understand non-coding RNA regulation from mechanistic to the therapeutic level.

In the context of gap in genomics to drug discovery Prof. Brahmachari believes that “when it comes to health, we need to have a balance between health as a right and health as a business”. Open Source Drug Discovery (OSDD) initiative was Prof. Brahmachari’s brainchild, and today it is being considered as perhaps CSIR’s boldest and most path breaking initiative in its sixty years plus history. The goal of the initiative is to enable open, collaborative scientific research that will make possible the discovery and development of new drugs. Its aim is to provide extremely affordable healthcare for the resource poor people across the world by creating ultra-low-cost drugs.

Despite the availability of Mycobacterium tuberculosis (Mtb) genome for almost a decade no promising drug has seen the light of the day, suggesting a gap in our understanding of M. tuberculosis biology. Prof. Brahmachari synergized crowd sourcing and social networking methods through an initiative 'Connect to Decode' (C2D) and developed an open collaborative web-based platform to generate the most comprehensive interactome of Mtb, the 'interactome pathway' (IPW), encompassing a total of 1434 proteins connected through 2575 functional

relationships. Prof. Brahmachari & associates further combine IPW network with STRING based network and use network analysis to report central proteins which may be assessed as potential drug targets for development of drugs with least possible side effects.

Considering his exceptional contribution, Prof. Brahmachari has been bestowed with the title of “Open source Guru” for conceptualizing and mentoring India’s first crowd – sourcing initiative – Open Source Drug Discovery (Science (2012) 335: 904-910) and has also been recently nominated as one of Fierce's Top 10 Biotech Techies ([www.fiercebiotechit.com](http://www.fiercebiotechit.com)) for his outstanding contribution to the field of genomics and open source drug discovery. As of now, Prof. Brahmachari’s OSDD model is going to be used primarily to develop extremely affordable drugs required by resource poor patients all around the world. However, OSDD has already demonstrated the power of galvanizing the collective imagination and creativity of ‘anyone, anytime, anywhere’ and especially the young, like never before. Therefore, Brahmachari’s successful OSDD raises the hope of achieving the illusive goal of ‘health for all’.

## Complete List of Prof. Brahmachari's Published Contributions to Scientific Research

### A. Polypeptides and Proteins

1. Polypeptide models of Collagen. I. Solution properties of (Gly-Pro-Sar) and (Gly-Sar-Pro)n. V. S. Ananthanaryanan, **Samir K. Brahmachari**, Rao, S. Rapaka and R. S. Bhatnagar. **Biopolymers (1976) 15(4): 707**
2. Polypeptide models of Collagen, II. Solution properties of (Pro-Gly-Phe) n. **Samir K. Brahmachari**, V.S. Ananthanaryanan, Rao, S. Rapaka and R.S. Bhatnager. **Biopolymers (1978) 17(9): 2096**
3. Structural investigations on Poly-4-hydroxy-L-proline I.Theoretical studies. M. Bansal, **Samir K. Brahmachari** and V. Sasisekharan. **Macromolecules (1979) 12: 19**
4. Structural investigations on Poly-4-hydroxy-L-proline. II. Physico-chemical and X-ray studies. **Samir K. Brahmachari**, M. Bansal, V.S.Ananthanaryanan, V. Sasisekharan. **Macromolecules (1978) 12: 23**
5. Conformational criteria for the enzymatic hydroxylation of proline in collagen. **Samir K. Brahmachari** and V.S.Ananthanaryanan. **Curr. Sci.(1978) 47: 107**
6.  $\beta$ -turns in nascent procollagen are sites of post translational enzymatic hydroxylation of proline. **Samir K. Brahmachari** and V.S.Ananthanaryanan. **Proc. Natl. Acad, Sci. USA, (1979) 76: 5119**
7. Vacuum Ultraviolet Circular dichroism spectrum of  $\beta$ -turn in solution. **Samir K. Brahmachari**, V.S.Ananthanaryanan, J. Brahms, S. Brahms, Rao, S. Rapaka and R.S. Bhatnagar. **Biochem. Biophys. Res. Comm. (1979) 86: 605**
8.  $\beta$ -turn conformation of N-acetyl-Pro-Gly-Phe-OH in crystal and solution and its relevance to collagen. V.S.Ananthanaryanan, **Samir K. Brahmachari** and M. Vijayan. **Federation Proc. (1980) 39: 1788**
9. Crystal structure and solution studies on N-acetyle-Pro-Gly- Phe-OH. **Samir K. Brahmachari**, V.S.Ananthanaryanan, T.N. Bhat, V. Sudhakar, M. Vijayan, Rao, S. Rapaka and R.S. Bhatnagar. **J.Amer. Chem. Soc. (1981) 103: 1703**
10. Proline containing  $\beta$ -turns in  $\alpha$ -peptides and proteins. I. Physico-chemical studies on N-acetyl-Pro-Gly-X-OH tri- peptides **Samir K. Brahmachari**, V.S.Ananthanaryanan, Rao, S. Rapaka and R.S.Bhatnagar. **Biopolymers (1982) 21: 1208.**
11. Proline containing  $\beta$ -turns in peptides and proteins. II. Analysis of globular protein data. V.S.Ananthanaryanan, **Samir K. Brahmachari** and N.Pattabiraman. Arch. Biochem. Biophysics (1984) 232: 482

## **B. DNA Structural Polymorphism and Chromatin Organisation**

12. Site and role of the N-terminal fragment of the nucleosomal core histones in their bind to deoxyribonucleic acid as determined by vibrational spectroscopy.  
M. couppez, Santiere, **Samir K. Brahmachari**, J. Brahms, J. Liquier and E. Taillandier.  
**Biochemistry (1980) 19: 3358**
13. B to Z transition in a DNA fibre: The question of handedness of the duplex.  
V. Sasisekharan and **Samir K. Brahmachari**.  
**Curr. Sci. (1981) 50: 10**
14. Conformational flexibility of DNA: A theoretical formalism and a few practical applications.  
V. Sasisekharan, Manju Bansal, **Samir K. Brahmachari** and Goutam Gupta.  
**Biomolecular stereodynamics, ed. R.H. Sarma, Adenine Press, N.Y. (1981) 1: 123**
15. Conformation of DNA in chromatin reconstituted from poly(dA-dT) and the core histones.  
S. Brahms, **Samir K. Brahmachari**, N. Angelier and J.G. Brahms.  
**Nucleic Acids Res. (1981) 9: 4879**
16. B to Z transition in DNA and its biological implications.  
**Samir K. Brahmachari**, Latha P. Kadalayil, Majumdar, K. and Parnaik, V.K.  
**Proceedings of INDO-FRG seminar, BARC, (1983) : 106**
17. Critical cation balance in B $\leftrightarrow$ Z transition; Role of Li<sup>+</sup>.  
Ramesh N. and **Samir K. Brahmachari**.  
**FEBS lett. (1983) 164: 33**
18. Temperature dependent Z $\Rightarrow$ B transitions in Poly (dG-dC).  
Latha P. Kadalayil, Majumdar, K. and **Samir K. Brahmachari**.  
**Curr. Sci, (1983) 52: 907**
19. X-ray diffraction studies on Mycobacterium Smegmatis DNA.  
Rajagopalan, M., **Samir K. Brahmachari**, V. Sasisekharan and Srivastava R.  
**Biopolymers (1983) 22(7): 1633**
20. Structural organization of the meiotic prophase chromatin in the rat testis.  
Rao B.J., **Samir K. Brahmachari** and Rao M.R.S.  
**J.Biol.Chem, (1983) 258:13478**
21. A novel structural transition in poly (dG-Me5dC) :Z $\leftrightarrow$ B $\leftrightarrow$ Z.  
Latha P.Kadalayil and **Samir K. Brahmachari**.  
**FEBS lett. (1985) 182:315**
22. Left handed DNA in synthetic and topologically constrained form V DNA and its implications in protein recognition.  
Shouche, Y.S., Latha P.Kadalayil, Ramesh N., Majumder K., Mandyan V.  
and **Samir K. Brahmachari**.  
**Proc. Int symp. Biomol. Struct Interactions, Suppl. J. Biosciences (1985) 8: 563**
23. Poly (dG-dC) in the Z-form inhibits E.Coli DNA polymerase I and AMV DNA polymerase activity.  
**Samir K. Brahmachari**, Ramesh N., M.R.Das and Veena K.Parnaik.  
**Biochemistry Int. (1985) 11: 281**

24. B to Z transitions in DNA and their biological implications.  
Latha P.Kadalayil and **Samir K. Brahmachari**.  
**J.Scientific & Industrial Res. (1986) 45: 521**
25. Sequence dependence and role of 5'-phosphate in B to Z transition.  
Majumder K., **Samir K. Brahmachari** and V.Sasisekharan.  
**FEBS lett. (1986) 198: 240**
26. Use of volatile buffer at ambient temperature:Versatile approach to the purification of self complementary synthetic deoxyribonucleotides by reverse phase high performance liquid chromatography.  
Majumder K.,Latha P.Kadalayil and **Samir K.Brahmachari**.  
**J.Chromatography (1986) 355: 328.**
27. Recognition of B and Z forms of DNA by *E.Coli* DNA polymerase.  
Ramesh N.,Shouche Y.S. and **Samir K. Brahmachari**.  
**J.Mol.Biol. (1986) 190: 635**
28. DNA structural variability as a factor in gene expression and evolution.  
Conrad M.,**Samir K. Brahmachari** and V. Sasisekharan.  
**Biosystems (1986) 19: 123**
29. Sequences that adopt non B-form conformation in form V DNA as probed by enzymatic methylation.  
**Samir K. Brahmachari**, Shouche Y.S., Charles R. Cantor and M.McClelland.  
**J.Mol.Biol. (1987) 193: 201**
30. Synthesis and purification of Oligodeoxyribonucleotides:A modified approach.  
Kumud Majumder, Latha P.Kadalayil and **Samir K. Brahmachari**.  
**Curr. Sci. (1987) 56: 693**
31. Torsional stress, Unusual DNA structures; and Eukaryotic gene expression.  
C. R. Cantor, S. Bandopadhaya, **Samir K. Brahmachari**, C.F. Hui, M.McClelland, R. Morse and C. L. Smith.  
**“Unusual DNA structure”**; Ed. R.D. Wells and S.C. Harvey. Springer-Verlag, New York, (1988)
32. Sequence specificity of Z-DNA formation in Oligonucleotides.  
Latha P.Kadalayil, Kumud Majumder, R. K. Mishra and **Samir K. Brahmachari**.  
**Biochemistry Int. (1988) 17: 121**
33. Interruption of (CG)<sub>n</sub> sequences by GG, TG nad CA need not prevent B to Z transition in solution.  
R.K.Mishra, Latha P. Kadalayil and **Samir K. Brahmachari**.  
**Nucleic Acids Res. (1988) 16: 4651**
34. Synthesis of novel polynucleotide: Potential R-L model.  
R.K.Mishra and **Samir K. Brahmachari**.  
**Curr. Sci. (1988) 57: 574**
35. Dynamic nature of B to Z transition: Role of DNA supercoiling and Z-DNA binding protein.  
N. Ramesh and **Samir K. Brahmachari**.  
**Ind. J. Biochem. Biophys. Silver Jubilee issue (1988) 25: 542**
36. Sequence criteria for Z-DNA formation: Studies on poly d(ACGT).  
Kumud Majumder, Rakesh K. Mishra, Manju Bansal and **Samir K. Brahmachari**.  
**Nucleic Acids Res. (1989) 17: 450**

37. Sequence specificity in supermimic induced structural changes in CG-oligomers.  
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Bhartiya D, Laddha SV, Mukhopadhyay A, Scaria V  
**Hum Mutat. (2011) 32(6): E2226-45**

## Patents

S. No.	Title	Inventors	Country (Publicatoin Date)	Filing Date	Grant Date	Patent No.
1.	Computational method for identifying adhesin and adhesin- like proteins of therapeutic potential	Sachdeva Gaurav, Kumar Kaushal, Preti Jain, <b>Brahmachari SK</b> , Ramachandran S	India	29-May-06		
			US	20-Jul-04	9-Sep-08	7424370
			WO	07-Feb-05		
			JP	7-Aug-06		
			EP	6-Sep-06		
			KR	6-Sep-06		
			CN	6-Oct-10		
			SG	7-Aug-06	2-Nov-10	124684
2.	A computer based method for identifying conserved invariant peptide motifs	<b>Brahmachari SK</b> , Dash D	BR (14-Jan-03)	30-Sep-02		
			CA (11-Oct-01)	07-Dec-01		
			CN	26-Nov-02	20-Jul-05	218305
			CZ (15-May-02)	04-Jan-02		
			EP (02-Jan-03)	31-Aug-00	12-Jan-05	1268512

			EP	26-Feb-02		
			HU (28-May-03)	30-Sep-02		
			India	16-Sep-02		
			IS	01-Jan-02	7-Apr-08	147435
			JP (30-Sep-03)	24-Jan-02		
			KO	14-Jan-02	23-Nov-07	780874
			RU	12-Jan-02	27-Mar-05	2249044
			US	30-Mar-00		
			WO (17-Feb-05)	31-Aug-00		
3.	A method for predicting an individual's bronchodilatory response to a beta agonist	Kukreti R, Pallav Bhatnagar, Rao CB, Ghosh B, <b>Brahmachari SK</b> , Randeep Guleria, Chinmoyee Das	India	10-Dec-04	9-Jun-11	248009
			US	28-Apr-04		
			WO	29-Apr-04		
			KR	28-Nov-06	23-Oct-09	10-0924371
			AU	2-Nov-06	7-Oct-10	2004319074
			CA	30-Oct-06		
			JP	30-Oct-06		

			EP	9-Nov-06		
			NZ	9-Nov-06		
			CN	30-Nov-06		
4.	Targets for human microRNAs in avian influenza virus (H5N1) genome	<b>Samir Kumar Brahmachari</b> , Manoj Hariharan, Vinod Scaria, Beena Pillai	India	31-Mar-06		
			US	29-Mar-07		
5.	Computational method for the identification of candidate proteins useful as anti-infectives	<b>Brahmachari SK</b> , Ramachandran S, Nandi T, Rao CB	US	30-Mar-01	22-Apr-08	7363166
6.	Novel allelic variant of cyp2c19 associated with drug metabolism	<b>Brahmachari SK</b> , Ravina Fernandes, Sharma Nitin, Suparna Martis, Kukreti R, Mukerji M,	India	15-Jul-04	22-Feb-11	246257
			US	22-Sep-05		
			WO	15-Jul-05		
			AU	5-Feb-07	26-Aug-10	2005264056
7.	Method of detection of allelic variants of SCA2 gene	<b>Brahmachari SK</b> , Choudhry Shweta, Mukerji Mitali, Jain Satish	US (23-Sep-03)	08-Nov-00	23-Sep-03	6623927
8.	Targets for human microRNAs in HIV-1 genome and a method thereof	<b>Brahmachari SK</b> , Pillai B, Manoj Hariharan	India	10-Oct-05		
			US	10-Oct-06	2-Apr-11	7825230
			WO	9-Oct-06		

			CA	10-Apr-08		
			AU	4-Nov-08		
			CH	30-Apr-08		
			EP	30-Apr-08		
9.	Novel primers for screening schizophrenia and a method thereof	<b>Brahmachari SK, Ranjana, Chitra, Salim Q, Jain S</b>	AU	27-Mar-03	6-Sep-07	2002247937
			BR	31-Mar-03		
			CA	27-Mar-03		
			EP	31-Mar-03	29-Apr-09	EP1485499
			IL	27-Mar-03	1-Sep-10	155123
			India	06-Aug-04	10-Feb-09	228704
			JP	28-Mar-03	21-Nov-08	4220906
			US	21-Mar-02	20-Jul-04	6764824
			WO	25-Mar-02		
			CN	25-Mar-02	28-May-08	ZL02802565.2
			RU	23-May-08	20-Nov-08	2338788
			KR	25-Sep-04	19-Aug-09	913985
10.	A computer based method	<b>Brahmachari SK, Dash D,</b>	India	30-Jun-05		

	for predicting protein coding dna sequences useful as drug targets	Ramakant Sharma, Jitendra Kumar Maheshwari	US (23-Jun-05)	05-Dec-03		
			IL	5-Jun-06		
			CA	20-Sep-06		
			CN	24-Jul-06	16-Dec-09	ZL2004800408 37.3
			JP	6-May-06	16-Apr-10	4495166
			EP	6-May-06	29-Sep-10	1690207
			WO	9-Jan-04		
11	A computer based method for identifying peptides useful as drug targets	<b>Brahmachari SK,</b> Dash D	US	30-Mar-00	2-Feb-10	7657378
12	A method to assess site-specific yield potential of crops	<b>Brahmachari SK,</b> Kumar Niti, Khan JA, Hariharan M, Bargaje R, Gunjan	IN	24-Aug-07		

## **Software and Database Copyrights Filed**

1. Software programme titled "PEPLIB- programme for finding common peptides in different genomes".  
Authors: Debasis Dash, **S.K. Brahmachari**. (CR-29/2000) filed on 05/02/2001.  
(Registration No. L-19609/2001, Registration Date 27-Sep-01)
2. Software programme titled "PL-HostFA". (CR-27/2001) filed on 21/12/2001.  
Authors: Debasis Dash, Mamta Khandelwal, **S.K. Brahmachari**.  
(Registration No. SW-886/2002, Registration Date 30-Sep-02)
3. Software programmed titled "PAT FIND". (CR-28/2001) filed on 21/12/2001.  
Authors: Debasis Dash, **S.K. Brahmachari**.  
(Registration No SW-887/2002, Registration Date 21-Dec-01)
4. Software programmed title "PEPLIMP- programme to stitch common peptides found in different genomes".  
Authors: Debasis Dash, **S.K. Brahmachari** (CR-30/2000) filed on 05/02/2001  
(Registration No L-19608/2001, Registration Date 27-Sep-01)
5. Software programme titled "PEPEXTRACT- programme to find proteins that contain specific pattern of amino-acids. Filed on 05/02/2001 (CR-31/2000).  
Authors: Debasis Dash, **S.K. Brahmachari**.  
(Registration No L-19607/2001, Registration Date 27-Sep-01)
6. Soft ware programme termed PEPSTICH filed on 05.02.2001. (CR 32 / 2000)  
Authors: Debasis Dash and **S.K. Brahamachari**.  
(Registration No L-19606/2001, Registration Date 27-Sep-01)
7. Software programme titled "Process.cgi- programme for finding common peptides in different genomes".  
Authors: Debasis Dash, **S.K. Brahmachari**. (CR-29/2001) filed on 21/12/2001.  
(Registration No SW-888/2002, Registration Date 30-Sep-02)
8. "Interconnections of pathways containing candidate genes for schizophrenia" CR 42/2002 filed on 14/11/2002  
Authors: C.B. Rao and **S.K. Brahmachari**.
9. "EXPOLDB databse" CR 43/2002, filed on 14/11/2002  
Authors: S. Ramachandran, Vineet Grover and **S.K. Brahmachari**  
(Registration No SW-1355/2003, Registration Date 28-Aug-03)
10. "Comprehensive peptide signatures database" (COPS DB). (CR-09/2003) filed on 27/02/2003  
Authors: Debasis Dash, Tulika Prakash and **S.K. Brahmachari**.
11. "Genedecipher" CR 28/2003 filed on 31-10-2003.  
  
Authors: S.K. Brahmachari, Debasis Dash, Ramakant Sharma, Jitendra Maheshwari  
Registration No SW-1799/2005, Registration Date 27-Apr-05)
12. STAMPSZ -Signal Transduction and metabolic pathway specific for schizophrenia. (CR-23/2004) filed on 04/10/2004  
Authors: Sambit Gaan, Simone Gupta, CB Rao and **S.K. Brahmachari**
13. "The immortal Coils" (50 years of Collagen Triple Helix: A Celebration of Science) (CR 28/2004) filed on 06/08/2004

Authors: **S.K. Brahmachari**

Registration No CF-381/2005, Registration Date 27-May-05)

14. "High Throughput – sequence, screening and SNP (HT-SSS), Joint copyright application (CSIR and Silicogene Informatics) (CR-31/2005.) filed on 19/12/2005  
Authors: Mitali Mukerji Debasis Dash, Dipayan Dasgupta, Siddharth Bisht, **S.K. Brahmachari**.
15. Program to stitch common peptides found in different genomes (RESULT.CGI) (CR-30/2001) filed on 21/12/2001  
Authors: Debasis Dash, **S.K. Brahmaachari**  
Registration No SW-889/2002, Registration Date 30-Sep-02)
16. Questionnaire for Prakriti Analysis (CR-39/2004) filed on 17/12/2004  
Authors: **S.K. Brahmachari**, Mitali Mukerji, Bhavana Prasher, Chandrika B-Rao, Sapna Negi, Shilpi Aggarwal  
Registration No SW-2284/2005, Registration Date 13-May-05)
17. Family pedigrees for the genomic studies of diabetes in Indian population (CR-18/2005) filed on 19/12/2005.  
Authors: **S.K. Brahmachari**, Somesh Sharma  
Registration No L-25921/2006, Registration Date 17-Feb-06)
18. Family pedigrees for the genomic studies of asthma in Indian population (CR-19/2005) filed on 19/12/2005.  
Authors: **S.K. Brahmachari**, Somesh Sharma  
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19. Family pedigrees for the genomic studies of schizophrenia in Indian population (CR-17/2005) filed on 19/12/2005.  
Authors: **S.K. Brahmachari**, Somesh Sharma, Ritushree Kukreti, S. Tripathi, Sanjeev Jain and S. Khubendran
20. MIRACLE: microRNA target prediction software incorporating RNA secondary structure. (CR-9/2006) filed on 18/05/2006  
Authors: Shiva Kumar, Vinod Scaria, Manoj Hariharan, Souvik Maiti, **S.K. Brahmachari**
21. MIDAS, A tool for de novo microRNA design. (CR-23/2006) filed on 30/10/2006  
Authors: **S.K. Brahmachari**, Souvik Maiti, Vinod Scaria, Manoj Hariharan, Shiva Kumar
22. VIRGO: Software for prediction of viral microRNA precursors. (CR-24/2006) filed on 30/10/2006  
Authors: **S.K. Brahmachari**, Vinod Scaria, Shiva Kumar, Faraz Alam Ansari
23. SVM based software for prediction of eukaryotic microRNA precursors (EumiR). (CR- 25/2006) filed on 27/11/2006  
Authors: **S.K. Brahmachari**, Vinod Scaria, Shiva Kumar, Faraz Alam Ansari