

## **Dr. Nishant Chakravorty**

**MBBS, M. Med. Sci. & Tech. (IIT Kgp), PhD (Aus), MRSB (UK)**

**Member of Indian National Young Academy of Sciences (INYAS)**

**Associate Professor, School of Medical Science and Technology, Indian Institute of Technology Kharagpur**

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## **Academic qualifications**

PhD, Queensland University of Technology, Australia (2010-2014)

Master of Medical Science & Technology (MMST), IIT Kharagpur (2007-2010) (Recipient of Institute Silver Medal-best student in the order of merit)

Bachelor of Medicine & Bachelor of Surgery (MBBS), Patna Medical College, Patna, India (1999-2004)

## **Experience**

Associate Professor, IIT Kharagpur	(Nov 2021– to date)
Assistant Professor, IIT Kharagpur	(Jun 2017 – Nov 2021)
Assistant Professor on Tenure Track, IIT Kharagpur	(Apr 2015 – Jun 2017)
Clinical Specialist II, Philips India Limited	(Jun 2014 – Apr 2015)
Research intern, University of Toronto, Toronto, Canada	(Jun 2009 – Mar 2010)
Medical Officer, B. C. Roy Technology Hospital, IIT Kharagpur	(Jul 2007 – Apr 2009)
Research intern, Philips India Limited	(May 2008 – Jul 2008)
Clinical Attachment, Good Hope Hospital, Sutton Coldfield, United Kingdom	(Jun 2006 – Jul 2006)
Clinical intern, Patna Medical College Hospital, India	(Feb 2005 – Feb 2006)

## **Awards**

1. Selected for Interacademy Partnership-Young Physician Leaders (IAP-YPL) program (2021)
2. Outstanding Doctoral Thesis Award - Executive Dean's Commendation Award for 2014, Awarded by Science and Engineering Faculty, Queensland University of Technology, Brisbane, Australia (2015)
3. Outstanding Higher Degree Research Student, Awarded by Science and Engineering Faculty, Queensland University of Technology, Brisbane, Australia (2013)
4. Young Science Ambassador, Awarded by Australian Academy of Technological Sciences and Engineering (ATSE) (2013)
5. Institute Silver Medal from Indian Institute of Technology, Kharagpur for being adjudged the best student in the order of merit during MMST (2010)

## **Journal Publications**

(\*Corresponding author)

1. M. Mukherjee, M. Rahaman, S. K. Ray, P. C. Shukla, T. K. Dolai, **N. Chakravorty\***, "Revisiting Fetal Hemoglobin Inducers in Beta-hemoglobinopathies - A review of Natural Products, Conventional and Combinatorial therapy", *Molecular Biology Reports*, 2021 (accepted)

2. A. Hansda, D. Biswas, A. Bhatta, **N. Chakravorty**, G. Mukherjee, "Plasma therapy: A passive resistance against the deadliest", *Human Vaccines and Immunotherapeutics*, 2021 (accepted)
3. D. Basu, D. G. Adhya, R. Sinha & **N. Chakravorty\***, "Role of malonaldehyde as a surrogate biomarker for iron overload in the  $\beta$ -thalassemia patient: A systematic meta-analysis", *Advances in Redox Research*, 2021, 3: 100017. Doi: <https://doi.org/10.1016/j.arres.2021.100017>
4. M. Rahaman, M. Mukherjee & **N. Chakravorty\***, "Genetic disorders, genotyping techniques and the emerging role of Tetra-ARMS-PCR as a diagnostic tool", *Resonance – The Journal of Science Education*, 2021, 26: 1229-1240
5. S. Tripathy, D. K. Verma, M. Thakur, A. R. Patel, P. P. Srivastav, S. Singh, A. K. Gupta, M. L. Chávez-González, C. N. Aguilar, **N. Chakravorty**, H. K. Verma & G. L. Utama, "Curcumin Extraction, Isolation, Quantification and Its Application in Functional Foods: A Review with a Focus on Immune Enhancement Activities and Covid-19", *Frontiers in Nutrition*, 2021 (accepted)
6. M. Rahaman, J. Komanapalli, M. Mukherjee, P. K. Byram, S. Sahoo, **N. Chakravorty\***, "Decrypting the role of predicted SARS-CoV-2 miRNAs in COVID-19 pathogenesis: A bioinformatics approach". *Computers in Biology and Medicine*, 2021, 136:104669. doi: <https://10.1016/j.combiomed.2021.104669>.
7. A. Ghosh, S. Ghosh, R. Sinha, J. Dutta, J. Mukherjee, **N. Chakravorty\***, "Understanding the awareness, perception and practices of community healthcare workers for high risk antenatal cases: a survey conducted in India", *Clinical Epidemiology and Global Health*, 2021, 10, 100710, <https://doi.org/10.1016/j.cegh.2021.100710>
8. S. S. Das, S. Das, P. K. Byram, M. Rahaman, T. K. Dolai, A. Chatterjee, **N. Chakravorty\***, "MicroRNA expression patterns in HbE/ $\beta$ -thalassemia patients: The passwords to unlock fetal hemoglobin expression in  $\beta$ -hemoglobinopathies", *Blood Cells, Molecules, and Diseases*, 2021, 87, 102523, <https://doi.org/10.1016/j.bcmd.2020.102523>
9. A. Barik, S. K. Ray, P. K. Byram, R. Sinha, **N. Chakravorty\***, "Extensive early mineralization of pre-osteoblasts, inhibition of osteoclastogenesis and faster peri-implant bone healing in osteoporotic rat model: Principle effectiveness of bone-specific delivery of Tibolone as evaluated in vitro and in vivo", *Biomedical Materials*, 2020, 15, 064102, <https://doi.org/10.1088/1748-605X/abb12b>
10. P. K. Byram, K. C. Sunka, A. Barik, M. Kaushal, S. Dhara, **N Chakravorty\***, "Biomimetic silk fibroin and xanthan gum blended hydrogels for connective tissue regeneration", *International Journal of Biological Macromolecules*, 2020, 165: 874-882, <https://doi.org/10.1016/j.ijbiomac.2020.09.231>
11. S Ghosh, S Maulik, S Chatterjee, I Mallick, **N Chakravorty**, J Mukherjee, "Prediction of survival outcome based on clinical features and pretreatment 18FDG-PET/CT for HNSCC patients". *Computer Methods and Programs in Biomedicine*, 2020, 195 (105669) <https://doi.org/10.1016/j.cmpb.2020.105669>
12. S. S. Das and **N. Chakravorty\***, "Identification of deleterious SNPs and their effects on BCL11A, the master regulator of fetal hemoglobin expression". *Genomics*, 2020, 112, 397-403 <https://doi.org/10.1016/j.ygeno.2019.03.002>
13. S. S. Das, R. Sinha, **N. Chakravorty\***, "Integrative microRNA and gene expression analysis identifies new drug repurposing candidates for fetal hemoglobin induction in  $\beta$ -hemoglobinopathies" *Gene*, 2019, 706, 77-83. <https://doi.org/10.1016/j.gene.2019.04.077>
14. SS Das, A Mitra, **N. Chakravorty\***, "Diseases and their clinical heterogeneity–Are we ignoring the SNIpers and micRomaNagers? An illustration using Beta-thalassemia clinical spectrum and fetal hemoglobin levels". *Genomics*, 2019, 111, 67-75. <https://doi.org/10.1016/j.ygeno.2018.01.002>, 2019.
15. S. S. Das, P. Saha, **N. Chakravorty\***, "miRwayDB: a database for experimentally validated microRNA-pathway associations in pathophysiological conditions". *Database*, 2018, article ID bay023; doi: <https://doi.org/10.1093/database/bay023>, 2018.
16. A. Barik, S. Banerjee, S. Dhara, **N. Chakravorty\***, "A reductionist approach to extract robust molecular markers from microarray data series - Isolating markers to track osseointegration". *Journal of Biomedical Informatics*, 68, 104-11, 2017. <https://doi.org/10.1016/j.jbi.2017.03.005>
17. S. S. Das, M. James, S. Paul, **N. Chakravorty\***, "miRnalyze: an interactive database linking tool to unlock intuitive microRNA regulation of cell signaling pathways". *Database*, 2017, article ID bax015; doi: <https://doi.org/10.1093/database/bax015>, 2017

18. B De, K Bhandari, N Chakravorty, R Mukherjee, R Gundamaraju, R K Singla, P Katakam, S K Adiki, B Ghosh, A Mitra, "Computational pharmacokinetics and in vitro-in vivo correlation of anti-diabetic synergistic phyto-composite blend". *World Journal of Diabetes*, 6(11), 1179-85, 2015.
19. P. Han, M. Xu, J.Chang, N.Chakravorty, C. Wu, Y. Xiao, "Lithium release from  $\beta$ -tricalcium phosphate inducing cementogenic and osteogenic differentiation for both hPDLcs and hBMSCs". *Biomaterials Science*, 2, 1230-43, 2014.
20. J. Murciano-Calles, M. E. McLaughlin, A. Erijman, Y. Hooda, N. Chakravorty, J. C. Martinez, J. M. Shifman, S. S. Sidhu, "Alteration of the C-terminal ligand specificity of the Erbin PDZ domain by allosteric mutational effects". *Journal of Molecular Biology*, 426(21), 3500-8, 2014.
21. N. Chakravorty, S. Hamlet, A. Jaiprakash, R. Crawford, A. Oloyede, M. Alfarsi, Y. Xiao, S. Ivanovski, "Pro-osteogenic topographical cues promote early activation of osteoprogenitor differentiation via enhanced TGF $\beta$ , Wnt and Notch signaling". *Clinical and Oral Implants Research*, 25(4), 475-86, 2014.
22. N. Chakravorty, S. Ivanovski, I. Prasad, R. Crawford, A. Oloyede, Y. Xiao, "The microRNA expression signature on modified titanium implant surfaces influences genetic mechanisms leading to osteogenic differentiation". *Acta Biomaterialia*, 8(9), 3516-23, 2012
23. A. Ganesh, N. Chakravorty, R. Mukherjee, S. Goswami, K. Chaudhury, B. Chakravarty, "Comparison of oral hydrogestrone with progesterone gel and micronized progesterone for luteal support in 1,373 women undergoing in vitro fertilization: a randomized clinical study". *Fertility and Sterility*, 95(6), 1961-5, 2011.

## Books

1. N. Chakravorty and P. C. Shukha (Editors), "Regenerative Medicine- Emerging Techniques to Translation Approaches", *Springer Nature Publishers, Singapore, (in progress), 2022 (tentative)*.
2. N. Chakravorty (Editor), "Fetal Hemoglobin: The Panacea for Major  $\beta$ -Hemoglobinopathies, *Nova Science Publishers, Inc., Hauppauge, New York, 2020*.

## Book Chapters

1. P. K. Byram, L. Das, K. C. Sunka, G. Kulkarni, S. Dhara and N. Chakravorty\*, "Silk Fibroin-based Biomaterials in Biomedical Applications" In S. Jana & S. Jana (Eds), "Functional Biomaterials - Drug Delivery and Biomedical Applications", *Springer Singapore, 2021* (accepted)
2. P. K. Byram, L. Das, S. Dhara, N. Chakravorty\*, "Natural Polymeric Hydrogels in Chondral/ Osteochondral Tissue Engineering", In Wahab M A (Ed) Medical Applications of Plastics and Polymers, *Elsevier, 2021* (accepted)
3. A. Ghosh, S. Parui, D. Samanta, J. Mukhopadhyay, N. Chakravorty\*, Computer Aided Diagnosis: Approaches to automate hematological tests, In G. Dutta, A. Biswas, A. Chakrabarti (Eds), "Modern Techniques in Biosensors - Detection Methods and Commercial Aspects", *Springer Singapore, 111-134, 2021*
4. M. Rahaman, S. S. Das, S. K. Ray, R. Reshamwala, N. Chakravorty\*, "Hemoglobin: A Biochemical and Molecular Overview", In Chakravorty N. (Ed), "Fetal Hemoglobin: The Panacea for Major  $\beta$ -Hemoglobinopathies, *Nova Science Publishers, Inc., Hauppauge, New York, 1-26, 2020*
5. S. K. Ray, S. Sanyal, R. Sinha, N. Chakravorty\*, "An Introduction to Fetal Hemoglobin and Its Characteristics", In Chakravorty N. (Ed), "Fetal Hemoglobin: The Panacea for Major  $\beta$ -Hemoglobinopathies, *Nova Science Publishers, Inc., Hauppauge, New York, 61-82, 2020*
6. S. S. Das, N. Chakravorty\*, "Role of Cell Signaling Pathways in Fetal Hemoglobin Regulation in Beta-Hemoglobinopathies", In Chakravorty N. (Ed), "Fetal Hemoglobin: The Panacea for Major  $\beta$ -Hemoglobinopathies, *Nova Science Publishers, Inc., Hauppauge, New York, 119-142, 2020*
7. A. Barik and N. Chakravorty\*, "Targeted Drug Delivery from Titanium Implants: A Review of Challenges and Approaches", In: Pokorski M. (eds) Trends in Biomedical Research. Advances in Experimental Medicine and Biology, vol 1251. *Springer Nature Switzerland AG, 1-17, 2019*

8. S. S. Das and **N. Chakravorty\***, “MicroRNAs in Beta-Thalassemia: Pathogenesis, Diagnosis and Treatment”, In Berhardt, Leon V. (Ed) *Advances in Medicine and Biology*. Volume 142, *Nova Science Publishers, Inc., Hauppauge, New York*, 89-116, 2019
9. **N. Chakravorty**, A. Jaiprakash, S. Ivanovski , Y. Xiao, “Implant Surface Modifications and Osseointegration.” In Li, Qing & Mai, Yiu-Wing (Ed.) *Biomaterials for Implants and Scaffolds (Springer Series in Biomaterials Science and Engineering)*. *Springer Science+Business Media New York*, 107-131, 2017
10. Y. Zhou, **Nishant Chakravorty**, Y. Xiao & W. Gu. “Mesenchymal stem cells and nano-structured surfaces.” In: Turksen K. (eds) *Stem Cell Nanotechnology. Methods in Molecular Biology (Methods and Protocols)*, 1058. *Springer Protocols, Humana Press Inc., NJ*, 133-48, 2013
11. I. Prasadam, **N. Chakravorty**, R. Crawford, Y. Xiao, “Mesenchymal stem cell concepts in osteoarthritis therapy: Current status of theory, technology, and applications.” In Xiao, Yin (Ed.) *Mesenchymal Stem Cells*”. *Nova Science Publishers, Inc., Hauppauge, New York*, 163-176, 2012

## Conference Papers

1. A. Barik, I. Choudhury & **N. Chakravorty**. “Parameter Optimization of Injectable Polycaprolactone Microspheres Containing Curcumin Using Response Surface Methodology.” *40<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 17<sup>th</sup>-21<sup>st</sup> Jul., 2018, Hawaii Convention Center, Honolulu, Hawaii, USA
2. S. Parui, A. K. R. Bajiyya, D. Samanta & **N. Chakravorty**. “Emotion Recognition from EEG Signal Using XGBoost Algorithm.” *IEEE 16<sup>th</sup> India Council International Conference (INDICON)*, 13-15 Dec. 2019: 1-4 doi: 10.1109/INDICON47234.2019.9028978
3. S.S. Das, A. Mitra & **N. Chakravorty**. “Genetic polymorphisms in microRNA genes: Implications in fetal hemoglobin regulation.” *1<sup>st</sup> International Conference on Biotechnology and Biological Sciences, BIOSPECTRUM*, 25<sup>th</sup> – 26<sup>th</sup> Aug., 2017, University of Engineering & Management, Kolkata, India

## Patents (filed/granted)

1. Archita Ghosh, Jayanta Mukhopadhyay & **Nishant Chakravorty\***, "PORTABLE IMAGING DEVICE FOR PAPER STRIP BASED HEMOGLOBIN MEASUREMENT AND METHOD THEREOF", Indian Patent Application No. 202131016859 dated 10-April-2021

## Recent Conference/Congress/Seminars Authored and/or Presented

1. Association of HLA Haplotypes and Clinical Heterogeneity in HbE/Beta-thalassemia by M. Rahaman, M. Jain, G. Mukherjee, P. C. Shukla, P. Chakrabarti, T. K. Dolai, **N. Chakravorty\***. 61st Annual Conference of the Indian Society of Hematology & Blood Transfusion (HAEMATOCON Virtual 2020), online platform Nov 20-22, 2020
2. Assessment of awareness and perception of ASHA workers for high risk antenatal cases: a survey in West Bengal by Archita Ghosh, Suman Kumar Ray, Sayantani Ghosh, Joy Dutta, Rashmi Sinha, Jayanta Mukhopadhyay and **Nishant Chakravorty\***. at East Zone Yuva FOGSI 2019, 01st Nov to 03rd Nov 2019, State Convention Centre, Shillong, India
3. Analysis of miRNA, mRNA, and drug regulatory networks identify drug repurposing candidates to treat vascular occlusion in sickle cell disease by Das S. S., **Chakravorty N\***. Inbix 19: Indian Conference on Bioinformatics - (2019)
4. MicroRNA-mRNA interaction network indicates a major role of MAPK pathway in fetal hemoglobin reactivation in Beta-thalassemia by S.S. Das & **N. Chakravorty\***. *18<sup>th</sup> European Congress On Biotechnology*, 1<sup>st</sup> – 4<sup>th</sup> Jul., 2018, Geneva, Switzerland

5. An in-silico prediction model to identify the functional effect of nsSNPs in HBB gene and their associated role in Beta-thalassemia by Das S. S., **Chakravorty N.\*** Inbix'17: Indian Conference on Bioinformatics 2017 - (2017)
6. Analyzing microRNA mediated regulation of fetal hemoglobin in beta-thalassemia using miRnalyze, a novel bioinformatics tool by Das S. S., James M. , Paul S. , **Chakravorty N.\*** Scientific Devices, Technology Applications & Community Linkage - (2017)

## Major R&D projects

1. “MicroRNA based reprogramming of fetal hemoglobin in beta-thalassemia” – Funded by Department of Biotechnology (DBT). Grant amount: **INR 51.4955 Lakhs** (2020-2023) **as PI** (Co-PIs: Prof. Praphulla Chandra Shukla, SMST, IIT Kgp, Prof. Tuphan Kanti Dolai, NRS Medical College).
2. “A biomimetic ECM protein-based bioadhesive graft copolymer for implants - Targeting enhanced soft tissue integration and osseointegration” – Funded by Scheme for Transformational and Advanced Research in Sciences (STARS)(MHRD. Grant amount: **INR 49.49 Lakhs** (2020-2023) **as PI**.
3. “MHC haplotypes in HbE/ $\beta$  thalassemia: Correlating disease heterogeneity and blood transfusion requirements in West Bengal” – Funded by Department of Science & Technology and Biotechnology, Govt. of West Bengal. Grant amount: **INR 18.18 Lakhs** (2019 – 2022) **as PI** (Co-PIs – Prof. Praphulla Chandra Shukla, SMST, IIT Kgp, Prof. Gayatri Mukherjee, SMST, IIT Kgp, Prof. Tuphan Kanti Dolai, NRS Medical College, Prof. Prantar Chakraabarti, NRS Medical College).
4. “Development of a portable decision support tool for screening and referral of high risk antenatal cases at household level by community health workers” – Funded by MHRD and MOHFW as a part of IMPRINT India Healthcare. Grant amount: **INR 103.896 Lakhs** (2017-2022) **as PI** (Co-PIs – Prof. J Mukhopadhyay, CSE, IIT Kgp and Dr. A Mitra, SMST, IIT Kgp and Mr. Swadeep Singh, Vejovis Healthcare Solutions Pvt. Ltd. Mr. Swadeep Singh has left the project after its initiation.)
5. “Tibolone for osseointegration in osteoporosis”- Funded by Science and Engineering Research Board, Department of Science and Technology (DST), Govt. of India - Start Up Research Grant (Young Scientist), Grant amount: **INR 18.018 Lakhs** (2016-2019) **as PI**
6. “Beta-thalassemia and microRNAs”- Funded by Sponsored Research and Industrial Consultancy (SRIC), Indian Institute of Technology, Kharagpur, Grant amount: **INR 28 Lakhs** (2015-2019) **as PI**
7. “Role of Micro-RNAs in Improved Osteogenicity of Modified Titanium Implant Surfaces”. Funded by Australian Dental Research Foundation (2012-2013) (**As Co-PI**) (AUD 10,000)

## Teaching

1. Subjects taught:
  - a. Basic Human Anatomy, Physiology and Pathology
  - b. Basics of Medical Microbiology
  - c. Translational Health Research
  - d. Stem Cell Biology and Therapy
  - e. Infection and Immunity
2. GIAN course on “Stem Cells, Materials and Tissue Engineering - An Emerging Therapeutic Symphony in Regenerative Medicine” in December 2019 (International Faculty: Prof. Yin Xiao, Queensland University of Technology, Australia)

3. “Genetickle – Decoding Life” sponsored by Royal Society of Biology, UK and supported by Indian National Young Academy of Sciences (INYAS) and IIT Kharagpur on 06<sup>th</sup> Nov, 2021 – Expert lectures (Dr. Praphulla Chandra Shukla and Dr. Rashmi Sinha) and quiz competition for school kids

### **Supervision**

1. PhD students-supervision
  - a. Completed: Single guidance: 2
  - b. Ongoing: Single guidance: 4, Joint-guidance: 4
2. MS students under supervision: 2 (joint guidance) – Completed – 1; Under examination - 1
3. Masters students (completed): 3

### **Editorial Board Member**

1. Editorial Board Member, Molecular Biology Reports (SpringerNature Publishers) (2021 onwards)
2. Editorial Board Member (Review Editor), Frontiers in Medical Technology (Frontiers) (2021 onwards)
3. Editorial Board Member (Academic Editor), PLOS ONE (2021 onwards)

### **Other responsibilities**

1. Head, Regenerative Medicine Lab, School of Medical Science and Technology, IIT Kharagpur (2015 – to date)
2. Program Officer, National Service Scheme, IIT Kharagpur (2015 – to date)
3. Faculty Advisor for Masters in Medical Science and Technology program, School of Medical Science and Technology, IIT Kharagpur (2015 – to date)
4. Member of various departmental committees
5. Faculty Advisor for Illuminati2K16 – A healthcare hackathon for Vision – by Students of SMST

### **Membership**

1. Selected Member of Indian National Young Academy of Sciences (INYAS) – 2021-25
2. Annual Member of Royal Society of Biology, UK
3. Life Member, Indian Society of Hematology and Blood Transfusion
4. Life Member, Bengal Society of Haematology (BSH), India
5. Life Member, Eastern Haematology Group, India