Prof. Gopal C Kundu

S. S. Bhatnagar Awardee (CSIR)
National Bioscience Awardee (DBT)
Ph.D, FNASc, FMASc, FASc, FNA, FRSC

Administrative Responsibility

Director R&D, KIIT Deemed to be University
Professor of Biotechnology, School of Biotechnology
Professor of Medicine and Molecular Research, KIMS
Bhubaneswar 751024, India
Mobile: 9422506548

Useful links:

- **Profile id: https://biotech.kiit.ac.in/profiles/gopal-c-kundu/**
- **ORCID id: 0000-0003-3534-4033**
- **https://www.facebook.com/groups/6026639240713364/**
- **https://in.linkedin.com/in/gopal-kundu-36426077**
- **https://scholar.google.com/citations?hl=en&user=SUf2tXYAAAAJ&view_op=list_works&sortby=pubdate**
- **https://twitter.com/kundu09065527**

Lab webpage: Prof. G C Kundu's Lab (google.com)

Profile

Profile: Prof. Gopal C. Kundu has obtained his Ph.D. degree in Chemistry from Bose Institute, Kolkata, India (1989). He did his post-doctoral work at The Cleveland Clinic Foundation, University of Colorado at Boulder, University of Wyoming and The National Institutes of Health, USA in the area of cardiovascular research, inflammatory diseases and reproductive biology from 1989 to 1998. He then joined as Scientist-D (equivalent to Assistant Professor) at National Centre for Cell Science (NCCS) in 1998 and then promoted to Scientist-E, -F (equivalent to Associate Professor) and –G (equivalent to Professor) from 1998 to 2019. Prof. Kundu also served as Dean, Acting Director and Director (i/c) at National Centre for Cell Science, Pune, India from 2018-2019. Currently, Prof. Kundu is Director, R&D of KIIT Deemed to be University (KIIT DU), Bhubaneswar, India. Prof. Kundu holds additional charge as Professor of Biotechnology, School of Biotechnology (KIIT DU) and Professor of Medicine and Molecular Research, Kalinga Institute of Medical Science (KIMS), KIIT DU, Bhubaneswar, India. His area of research at NCCS and KIIT University are tumor biology, cancer stem cells, tumor-stroma interaction, angiogenesis, cancer therapeutics, biomarker development and nanomedicine. He has published 121 papers including Nature Medicine, Science, PNAS (USA), Cancer Research, J. of Invest. Dermatology, J. of Biol. Chem, Trends in Cell Biol., Oncogene, Nanomedicine (London), Molecular Cancer, Nanoscale, Carcinogenesis, EMBO Reports, Advanced Functional Materials, BMC Cancer, Communication Biology, FRBM etc and one US patent and filed five Indian Patients. His total citations are 9, 560, h-index of 55 and i-10 index of 101.

Prof Kundu has received several awards including Fellows Award for Research Excellence from NIH, USA in 1997; National Bioscience Award from Department of Biotechnology, Ministry of Science & Technology, Govt. of India in 2003; Shanti Swarup Bhatnagar Prize (highest honor in Science by Govt. of India) from Council of Scientific and Industrial Research (CSIR), Ministry of Science & Technology, Govt. of India in 2004; International Award in Oncology from Greece in 2007; International Young Investigator Award from Mayo Clinic, USA in 2012, Platinum Jubilee Award, 99th Indian Science Congress, India in 2012 and 7th National Grassroots Innovation Award from Rashtrapati Bhavan (House of President, Govt. of India), India in 2013. Prof Kundu has received NASI Platinum Jubilee Senior Scientist Fellowship in 2020 (not availed). He has been selected to receive the Shri R.J. Kinariwala Research Award for Life Time Research Achievement in Cancer Research form Gujarat Cancer Research Institute (GCRI), India in 2020. The International Journal of Oncology, Greece has published his lifetime work as an Autobiography & Career Achievements as Editorial Academy Member in the Cover page of this journal in May, 2021.

Prof. Kundu has been elected as a Fellow of Indian National Science Academy. He is Fellow of National Academy of Sciences and Indian Academy of Sciences. He is also selected as a Fellow of Royal Society of Chemistry (FRSC). He is Associate Editor of Molecular Cancer (IF: 37.3) and the only member from India. He serves as Editorial Board Member of Current Molecular Medicine, Current Chemical Biology, International Journal of Oncology, Molecular Medicine Reports, American Journal of Cancer Research, Frontiers in Medicine, World Academy of Sciences Journal, Frontiers in Cell & Development Biology: Cancer Biology and Associate Editor of Journal of Cancer Metastasis and Treatment (JCMT). Prof. Kundu is served as Adjunct Visiting Professor at Curtin University, Perth, Australia (2015-2019). He has awarded by Prof. (Dr.) Achyuta Samanta, Founder of KIIT and KISS in 2022 for undertaking highest number of research projects at KIIT University, funded by Govt. of India and the Indo-German, ICMR international program.

Prof Kundu has contributed significantly to the understanding of tumor microenvironment heterogeneity, development of novel molecular targets and target based therapy and the molecular mechanism by which both tumor and stromal derived osteopontin (OPN) regulates tumor growth and metastatic potential of breast and other cancers. Prof. Kundu has been prolific over the past two decades, publishing in leading cancer journals. He is recognized internationally as evidenced from his high citations. He is involved in accelerating multiple interdisciplinary research across various schools of KIIT DU including KSBT, SAS, SOT, KIMS and KIDS etc.

Academics:

DEGREE	UNIVERSITY/INSTITUTION
M.Sc.	Calcutta University, India (Chemistry) (1981-1983)
Ph.D.	Bose Institute, Calcutta University, India (Chemistry) (1984-1988)

Work Experience:

POSITION	UNIVERSITY/ORGANISATION	PERIOD
Post-doctoral Fellow	The Cleveland Clinic Foundation, Cleveland, Ohio, USA	1988-1990
Research Associate	University of Colorado, Colorado, USA	1990-1992

Senior Research Associate	University of Wyoming, Laramie, Wyoming, USA	1992-1993
Senior IRTA Fellow	The National Institutes of Health, Bethesda, Maryland, USA	1993-1998
Scientist-D	National Centre for Cell Science, Pune	1998-2002
Scientist-E	National Centre for Cell Science, Pune	2002-2007
Scientist-F	National Centre for Cell Science, Pune	2007-2012
Scientist-G	National Centre for Cell Science, Pune	2012-2019
Director (i/c)	National Centre for Cell Science, Pune	2018-2019
Dean, Academics and Acting Director	National Centre for Cell Science, Pune	2019-2019
Director R&D	KIIT Deemed to be University, Institute of Eminence, Bhubaneswar	2019-till date

Awards & Recognition:

Details:

- ***Shanti Swarup Bhatnagar Prize*** in Biological Sciences, Council of Scientific and Industrial Research (CSIR), New Delhi, Govt. of India, 2004
- ***National Bioscience Award for Career Development***, Dept. of Biotechnology (DBT), New Delhi, Govt. of India, 2003-2004
- ***International Young Investigator Award***, 5th Mayo Clinic Angiogenesis Symposium, USA, 2012
- ***International Award for an outstanding achievement in Oncology*****,** Greece, 2007
- ***Platinum Jubilee Award Lecture***, 99th Indian Science Congress Association, KIIT, Bhubaneswar, 2012
- ***Fellows Award for Research Excellence (FARE)*** from The National Institute of Health of Health (NIH), Bethesda, Maryland, USA, (1997)
- ***7th National Grassroots Innovation Award-2013***, Rashtrapati Bhavan, New Delhi, 2013
- Adjunct Visiting Professor, Curtin University, Perth, Australia (2017-2020)
- Selected NASI Senior Scientist Platinum Jubilee Fellowship, 2020
- Selected for Shri R.J. Kinariwala Research Award for lifetime Research Achievement in Cancer Research from Gujarat Cancer Research Institute, India, 2020
- The International Journal of Oncology, Greece published the lifetime work of Dr. Gopal C. Kundu as an Autobiography & Career Achievements as Editorial Academy Member of this Journal on its Cover Page in May, 2021

Membership of Professional Associations / Societies:

- **Fellow of Indian National Science Academy** (2023)
- **Fellow of Royal Society of Chemistry** (2023)
- **Fellow of the National Academy of Sciences**, India (2003)

- **Fellow of the Indian Academy of Sciences** (2006)
- **Fellow of Maharashtra Academy of Science**
- **Editorial Board Member of Current Molecular Medicine**, USA (2006)
- **Member of American Society for Biochemistry and Molecular Biology**, USA (2006)
- **Editorial Board Member of Molecular Medicine Reports**, Greece (2007)
- **Senior Editorial Board Member of American Journal of Cancer Research** (2011)
- **Associate Editor, J. of Cancer Metastasis and Treatment** (2015-)
- **Editorial Board Member, World Academy of Sciences**, Greece
- **Editorial Board Member, Current Chemical Biology**, USA
- **Associate Editor, Molecular Cancer (IF: 37.3)** (2015-till date)
- **Member of Molecular Immunology Forum (MIF)**
- **Member of New York Academy of Sciences**, USA (2000-2001)
- **Member of Guha Research Conference (GRC)** (2003)

Selected Publications (2019-2023)

1. Deepti Tomar, Amit S. Yadav, Dhiraj Kumar, Garima Bhadauriya, **Kundu, GC:** Non-coding RNAs as potential therapeutic targets in breast cancer. **Biochim Biophys Acta Gene Regul Mech.** 2019 Apr 29:194378. doi: 10.1016/j.bbagrm.2019.04.005. **(IF: 6.3)**
2. Sneha Mahalunkar, Amit Singh Yadav, Mahadeo Gorain, Vinay Pawar, Ranveig Braathen, Siegfried Weiss, Bjarne Bogen , Suresh W. Gosavi and **Gopal C. Kundu**. Functional Design of pH Responsive Folate Targeted Polymer Coated Gold Nanoparticles for Drug Delivery in Breast Cancer. **Int J Nanomedicine.** 2019 Oct 15; 14:8285-8302. doi: 10.2147/IJN.S215142. eCollection 2019. **(IF:7.033)**
3. Ashwini Wali, Mahadeo Gorain, Satish Inamdar, **Gopal Kundu**, and Manohar Badiger: In Vivo Wound Healing Performance of Halloysite Clay and Gentamicin-Incorporated Cellulose Ether-PVA Electrospun Nanofiber Mats. **ACS Applied Bio Materials, (in press), 2019 (IF:0.746)**
4. Romen Meitei Lourembam, Amit Singh Yadav, **Gopal C. Kundu** & Pranab Behari Mazumder: Curcuma zedoaria (christm.) roscoe inhibits proliferation of MDA-MB231 cells via caspase-cascade apoptosis. **Oriental Pharmacy and Experimental Medicine. 19**, 235–241(2019) **(IF:2.0)**
5. Ravindra Taware, Khushman Taunk, Totakura V. S. Kumar, Jorge A. M. Pereir, José S. Câmara, H. A. Nagarajaram, **Gopal C. Kundu,** Srikanth Rapole. Extracellular volatilomic alterations induced by hypoxia in breast cancer cells. **Metabolomics**. 2020 Jan 24;16(2):21. doi: 10.1007/s11306-020-1635-x. **(IF: 4.747)**
6. Amit S. Yadav, N Naga Venkata Radharani, Mahadeo Gorain, Anuradha Bulbule, Dattatrya Shetti, Gaurab Roy, Thejus Baby and **Gopal C. Kundu**: RGD functionalized chitosan nanoparticle mediated targeted delivery of raloxifene selectively suppresses angiogenesis and tumor growth in breast cancer: **Nanoscale**. 2020 May 21;12(19):10664-10684. doi: 10.1039/c9nr10673a. Epub 2020 May 6. **(IF: 6.9)**

7. Rajendra Prasad, Nishant K. Jain, Amit S. Yadav, Deepak S. Chauhan, Janhavi Devrukhkar, Mukesh K. Kumawat, Shweta Shinde, Mahadeo Gorain, Avnesh S. Thakor, **Gopal C. Kundu,** João Conde, Rohit Srivastava: Stepwise Assembly of Multimode Liposomal Nanotheranostic Agent for Targeted *In Vivo* Bioimaging and Near Infrared Light Mediated Cancer Therapy. **Communications Biology,** 2020Jun 5;3(1):284. doi:10.1038/s42003-020-1016-z**. (IF:6.548)**
8. Ipsita G Kundu, NNV Radharani, Amit S Yadav, Srinivas Patnaik, **Gopal C Kundu:** SARS-CoV-2: Origin, pathogenesis and Therapeutic Interventions. **Coronaviruses, 2020.**
doi : 10.2174/2666796701999201209144207
9. Shalini Nath, Susmita Mondal, Ramesh Butti, Vinoth Prasanna Gunasekaran, **Gopal C. Kundu**, Uttara Chatterjee, Aniket Halder, Chitra Mandal:. Desialylation of Sonic-Hedgehog by Neu2 Inhibits Its Association With Patched1 Reducing Stemness Properties in Pancreatic Cancer Sphere Cells**. Cells,** 2020 Jun 21;9(6):E1512. doi: 10.3390/cells9061512. **(IF: 6.0)**
10. Sonika Chibh, Bibhav Katoch, Avneet Kaur, Farheen Khanam, Amit Singh Yadav, Manish Singh, **Gopal C. Kundu,** Bhanu Prakash, Jiban Jyoti Panda: Continuous Flow Fabrication of Fmoc-Cysteine Based Nanobowl Infused Core-Shell Like Structures for pH Switchable on Demand Anti-Cancer Drug Delivery. **Biomater Sci**, 2021 Feb 9;9(3):942-959. doi: 10.1039/d0bm01386b.PMID: 33559658 **(IF: 6.6)**
11. Shreetama Bandyopadhayaya, Mikhail G. Akimov, Ranjeet Verma, Ankit Sharma, Divya Sharma, **Gopal C. Kundu,** Natalia M. Gretskaya, Vladimir V. Bezuglov, and Chandi C Mandal. N-arachidonoyl dopamine inhibits epithelial-mesenchymal transition of breast cancer cells through ERK signaling and decreasing the cellular cholesterol. **Journal of Biochemical and Molecular Toxicology, 2020,** DOI: 10.1002/jbt.22693 **(IF: 3.568)**
12. Mahalunkar S, **Kundu GC**, Gosavi SW. Folated curcumin-gold nanoformulations: A nanotherapeutic strategy for breast cancer therapy. **Journal of Vacuum Science & Technology B (in press),** 2020. **(IF:1.4)**
13. Prasad R, Jain NK, Yadav AS, Jadhav M, Radharani NNV, Gorain M, **Kundu GC**, Conde J, Srivastava R. Ultrahigh Penetration and Retention of Graphene Quantum Dot Mesoporous Silica Nanohybrids for Image Guided Tumor Regression. **ACS Appl Bio Mater**. 2021 Feb 15;4(2):1693-1703. doi: 10.1021/acsabm.0c01478. Epub 2021 Jan 8. PMID: 35014516, 2021 **(IF: 0.746)**
14. NNV Radharani, Ipsita G Kundu, Amit S Yadav and **Gopal C Kundu.** Oxidative Stress: A Key Regulator of Breast Cancer Progression and Drug Resistance. **A Handbook of Oxidative Stress in Cancer** (Springer Nature), 2021.
15. Ramesh Butti, VinothPrasanna Gunasekaran, Ramakrishna Nimma, Gautam Kundu, Deepti Tomar, Anuradha Bulbule, Dhiraj Kumar, Anupama Mane, Satyajith Gill, Tushar Patil, Georg F. Weber, **Gopal C. Kundu**: Tumor-derived Osteopontin Drives the Resident Fibroblast to Myofibroblast Differentiation through Twist1 to Promote Breast Cancer Progression. **Oncogene**, 2021 Mar;40 (11):2002-2017. doi: 10.1038/s41388-021-01663-2. Epub 2021 Feb 18.PMID: 33603163 **(IF: 8.756)**

16. Arpankumar Choksi, Apoorva Parulekar, Richa Pant, Vibhuti Kumar Shah, Ramakrishna Nimma, Priyanka Firmal, Smriti Singh, **Gopal C. Kundu**, Sanjeev Shukla and Samit Chattopadhyay: Nuclear matrix binding protein SMAR1 inhibits Warburg effect via regulation of *PKM* alternative splicing by HDAC6 mediated deacetylation of PTBP1 in breast cancer cells. **Cancer Metab**. 2021 Apr 16;9(1):16. doi: 10.1186/s40170-021-00252-x.PMID: 33863392 **(IF: 5.469)**
17. Butti Ramesh, Kumar TVS, Nimma Ramakrishna, Banerjee, Pinaki, Kundu, Ipsita G and **Kundu Gopal C:** Osteopontin Signaling in Shaping Tumor Microenvironment conductive to Malignant Progression. **Adv Exp Med Biol.** 2021;1329:419-441. doi: 10.1007/978-3-030-73119-9_20. **(IF: 3.65)**
18. Suvranil Ghosh, Naibedya Dutta, Pinaki Banerjee, Rahul L Gajbhiye, Hossainoor Rahaman Sareng, Prachi Kapse, Srabani Pal, Lyudmila Burdelya, Narayan C Mandal, Velyutham Ravichandiran, Ashish Bhattacharjee, **Gopal C Kundu**, Katerina Gurova, Andrei V Gudkov, and Mahadeb Pal: Ethyl acetate fraction of *Bergenia ligulata* sensitizes prostate cancer cells through monoamine oxidase A-mediated ROS generation and impairment of antioxidant defense response. **Free Radical Biology and Medicine** 2021 Jun 5;172:136-151. doi: 10.1016/j.freeradbiomed.2021.05.037. **(IF: 8.1)**
19. Georg F Weber, Gulimerouzi Fnu, Palak Agrawal, **Gopal C Kundu:** Structural Constraint of Osteopontin Facilitates Efficient Binding to CD44. **Biomolecules** 2021 May 30;11(6):813. doi: 10.3390/biom11060813. **(IF: 6.064)**
20. Ghuwalewala, Sangeeta ; Ghatak, Dishari; Das, Sumit; Das, Pijiush; Butti, Ramesh; Gorain, Mahadeo; **Kundu, Gopal**; Roychoudhury, Susanta. MiR-146a-dependent regulation of CD24/AKT/β-catenin axis drives cancer stem cell phenotype in oral squamous cell carcinoma. **Frontiers in Oncology** (**in press**), 2021. **(IF: 6.24)**
21. Ashwin Porwal , Gopal C Kundu , Gajanan Bhagwat, Ramesh Butti: Polyherbal formulation Anoac H suppresses the expression of RANTES and VEGF for the management of bleeding hemorrhoids and fistula. **Molecular Med Reports**. 2021 Oct;24(4):736. doi: 10.3892/mmr.2021.12376. Epub 2021 Aug 20. **(IF: 3.423)**
22. Ashwin Porwal, **Gopal C. Kundu**, Gajanan Bhagwat, Ramesh Butti: Herbal medicine AnoSpray suppresses proinflammatory cytokines COX-2 and RANTES in the management of hemorrhoids, acute anal fissures and perineal wounds. **Expt. Ther. Med, 2021 (IF: 2.75)**
23. A. Parulekar, A. Choksi, N. Taye, TVS Kumar, P. Firmal, **Gopal C Kundu**, Samit Chattopadhyay: SMAR1 Suppresses the Cancer Stem Cell Population via hTERT Repression in Colorectal Cancer Cells. **Int J Biochem Cell Biol.** 2021 Sep 20;141:106085. doi: 10.1016/j.biocel.2021.106085 **(IF: 5.65)**
24. Anivind Kaur Bindra, Sivaramapanicker Sreejith, Rajendra Prasad, Mahadeo Gorain, Rijil Thomas, Deblin Jana, Mui Hoon Nai, **Gopal C. Kundu**, Rohit Srivastava, Chwee Teck Lim, Yanli Zhao. A Plasmonic Supramolecular Nanohybrid as a Contrast Agent for Site-Selective Computed Tomography Imaging of Tumor. **Advanced Functional Materials.** First published: 02 December 2021, doi.org/10.1002/adfm.202110575 **(IF 19.92)**

25. NNV Radharani, Amit S. Yadav, Ramakrishna Nimma, TV Santosh Kumar, AnuradhaBulbule, Venkatesh Chanukuppa, Dhiraj Kumar,Srinivas Patnaik, Srikanth Rapaole, **Gopal C. Kundu (2022)**: Tumor-associated macrophage derived IL-6 enriches cancer stem cell population and promotes breast tumor progression via Stat-3 pathway. **Cancer Cell Int**. 2022; 22: 122. Published online 2022 Mar 17. doi: 10.1186/s12935-022-02527-9. **(IF: 6.436)**

26. Sumit Das, Shehnaz Bano, Prachi Kapse, and **Gopal C. Kundu (2022):** CRISPR Based Therapeutics: A New Paradigm in Cancer Precision Medicine. **Molecular Cancer, 2022, 21 (85),** doi.org/10.1186/s12943-022-01552-6. **(IF: 37.3)**

27. Chaitali Surve; Ananya Banerjee; Anupriya S; Rajasree Chakraborty; Dhiraj Kumar; Ramesh Butti; Mahadeo Gorain; Sabyasachi Parida; **Gopal C Kundu**; Supriya Shidhaye et al. **Nanomedicine, 2022**, DOI: 1 95600.2217/nnm-2021-0446 **(IF: 6.096)**

28. Ramesh Butti, Prachi Kapse, Garima Bhadhurya[1], Amit S. Yadav, Suhail Ahmed, Rohan Chaubal, Pallavi Parab, Rasika Kadam, Amit Dutt, Sudeep Gupta, **Gopal C Kundu**: A Novel Patient-derived Orthotopic Xenograft (PDOX) for Hormone-resistant Breast Cancer. **Oncology Reports**, **2023** May; 49(5):99. doi: 10.3892/or.2023.8536. Epub 2023 Mar 31 **(IF: 3.096)**

29. Tandrima Mitra, Soumya S Mahapatra, Barnalee Mishra, Venketesh K Panda, Diksha Malhotra, Anusuya Roy Chowdhury, and **Gopal C Kundu**· Hypoxia and its Biological Implications for Cancer Therapy. **Springer Nature,** Book Chapter, **2023**

30. Banerjee P, Kapse P, Siddique S, Kundu M, Choudhari J, Mohanty V, Malhotra D, Gosavi SW, Gacche RN, **Kundu GC**. Therapeutic implications of cancer stem cells in prostate cancer. **Cancer Biol Med**. 2023 Jun 5;20(6):401–20. doi: 10.20892/j.issn.2095-3941.2022.0714. PMID: 37282627; PMCID: PMC10291985.

31. Ramesh Butti and **Gopal C Kundu.** The molecular dialogue between the tumor cells and fibroblasts. **Oncotarget, 2023** May 19;14:462-463. doi: 10.18632/oncotarget.28405

32. Murlidhar A Betallu , Shaileshkumar R Bhalara , Kailash B Sapnar , Vijay B Tadke, Keerti Meena , Ananya Srivastava , **Gopal C Kundu** , Mahadeo Gorain . Hybrid Inorganic Complexes as Cancer Therapeutic Agents: In-vitro Validation. **Nanotheranostics**. 2023 Mar 11;7(3):270-280. doi: 10.7150/ntno.81557. eCollection 2023.

33. Jasoda Choudhari , Ramakrishna Nimma , Snehal K Nimal , Santosh Kumar Totakura Venkata , **Gopal C Kundu**, Rajesh N Gacche. Prosopis juliflora (Sw.) DC phytochemicals induce apoptosis and inhibit cell proliferation signaling pathways, EMT, migration, invasion, angiogenesis and stem cell markers in melanoma cell lines. **J Ethnopharmacol**. 2023 Aug 10;312:116472. doi: 10.1016/j.jep.2023.116472. Epub 2023 Apr 14

34. N P Syamprasad, Siddhi Jain, Bishal Rajdev, Samir Ranjan Panda, Jagadeesh Kumar Gangasani , Veerabhadra Swamy Challa, Jayathirtha Rao Vaidya , **Gopal C Kundu**, V G M Naidu. AKR1B1 inhibition using NARI-29-an Epalrestat analogue-alleviates Doxorubicin-induced cardiotoxicity via

modulating Calcium/CaMKII/MuRF-1 axis. **Chem Biol Interact**. 2023 Aug 25;381:110566. doi: 10.1016/j.cbi.2023.110566. Epub 2023 May 29.PMID: 37257577

35. Sponging of five tumour suppressor miRNAs by lncRNA-KCNQ1OT1 activates BMPR1A/BMPR1B-ACVR2A/ACVR2B signalling and promotes chemoresistance to hepatocellular carcinoma, **Banerjee S----Gopal C Kundu, et al. Cell Death and Discovery**, (in press), 2023

H-index, i-10 index and total citations: **h-index:** 55, **i-10 index**: 101 and **total citations:** 9560

Collaborators:

International

- **Dr. Mathias Müsken, Helmholtz Centre for Infection Research, Germany**
- **Prof. Georg F. Weber, University of Cincinnati, Ohio, USA**
- **A/Prof. Gautam Sethi, National University of Singapore, Singapore**
- **Prof. S. Weiss, Hannover Medical Center, Hannover, Germany**
- **Prof. Bjarne Bogen, University of Oslo, Oslo, Norway**
- **Dr. Rakesh N.Veedu, Murdoch University, Perth, Australia**

National

- **Prof. Rohit Srivastava, IIT-Bombay, Mumbai**
- **Prof. V.G.M Naidu, NIPER, Guwahati**
- **Prof. Subhradip Karmakar, AIIMS New Delhi, India**
- **Dr. Sudip Gupta, ACTREC &TMH, Mumbai**
- **Prof. Mrutyunjay Suar, Director, School of Biotechnology, KIIT-DU, Bhubaneswar**
- **Prof. Srinivas Patnaik, Professor, School of Biotechnology, KIIT-DU, Bhubaneswar**
- **Dr. Sabyasachi Parida, Surgical Oncolgist, KIMS, KIIT-DU, Bhubaneswar**
- **Dr. Saroj Ranjan Sahoo, Surgical Oncolgist, KIMS, KIIT-DU, Bhubaneswar**
- **Dr. Sandeep Mishra, Scientist-F, Institute of Life Sciences (**ILS**), Bhubaneswar**
- **Dr. Pawan Singh, BVG Life Sciences, Pune**

List of patents:

(i) A. B. Mukherjee (Brookeville, MD, USA); **Gopal C. Kundu (Maharashtra, India)** and D. Panda (Montreal, Canada): 2002, Methods and compositions for treatment of restenosis. **US Patent No. US 6,458,590 B1**

(ii) Gopal C. Kundu, Amit S. Yadav, Mahadeo Gorain and Shamayita Roy. Stable Nanoparticles and its Pharmaceutical Composition. **Indian Patent Application Provisional No. 201721036409**

(iii) Janhavi Devrukhar, Rajendra Prasad, Barkha Singh; Deepak Singh Chauhan, Amit Singh Yadav, Mahadeo Gorain, Sumit Das, Rohit Srivastava, **Gopal C. Kundu:** A NANOHYBRID, ITS METHOD OF PREPARATION AND USE**. Indian Patent Application Provisional No. 201921020693**

(iv) KUNDU, Gopal C.; WEBER, Georg F: A Novel Method for Detection of Cancer**. Indian Patent Application Provisional No. 201821040459**

(v) Rohit Srivastava, Rajendra Prasad, Janhavi R. Devrukhkar, Ram Krishn Gupta, Deepak S. Chauhan, **Gopal C. Kundu**, Mahadeo Gorain and Amit S. Yadav. Fluorescent Hollow Mesoporous Silica and Method of Preparation Thereof. **Indian Patent Application Provisional No. 201821022718.**

(vi) Rajendra Prasad, Janhavi R. Devrukhkar, Ram Krishn Gupta, Deepak S. Chauhan, **Gopal C. Kundu**, Mahadeo Gorain and Amit S. Yadav, Rohit Srivastava. Deep tissue penetration and retention of graphene quantum dot mesoporous silica nanostructures for image guided solid tumor ablation. **Indian Patent Application Provisional No. 202121021279**

Ongoing Projects:

1) "Determination of biofilm pharmaco dynamics of newly formulated, nanoconjugated antibiotics to optimize treatment and dosing of chronic, antibioticresistant biofilm", Funded by ICMR, Govt. of India, 2020-2024.

2) ''Multipronged approach for pre-clinical assessment of novel curcumin formulations as drugs for breast cancer therapy'', Funded by DBT, Govt. Of India, 2020-2023.

3) ''Multi-Omics analysis to decipher mechanism of hormone resistance in Breast cancer'', Funded by DBT, Govt. Of India, 2017-2024.

4) DZNePA as a therapeutic drug candidate for breast cancer, Funded by DBT, Govt. Of India, 2021-2024.

5) Targeting nucleolin for refining anti-neoplastic chemoimmunotherapy and immunomodulation of B-Cell lymphoma, Funded by SERB, Govt. Of India, 2022-2025.

6) To investigate the Safety and efficacy of herbal extracts or purified extracts or leads in various cancers. Sponsored by BVG Life Sciences, Pvt. Ltd. (Industrial Project), 2023-2026

Lab members:

Current members (at Translational Research Laboratory (TRL), School of Biotechnology, KIIT University, Bhubaneswar)

Ms. Barnalee Mishra, Ph.D. Scholar and Indo-German ICMR Project SRF

PhD Research: She is investigating chemoresistance reversal in breast cancer through various bioactive compounds.

Mr. Venketesh K Panda, PhD Scholar (DST-INSPIRE JRF)

PhD Research: His research is to target Macrophages subsets for cancer immunotherapy.

Ms. Diksha Malhotra
Designation: Research Officer (RO), Director R&D Office, KIIT DU

Mr. Sinjan Khanra, Ph.D. Scholar and Project JRF

PhD Research: He is mainly involved in understanding the role of autophagy in breast cancer.

Mr. Sambhunath Majhi, Ph.D. Scholar and Project JRF

PhD Research: His research is to study the immunomodulation in B-cell lymphoma.

Mr. Biswajit Swain, Ph.D. Scholar and Project JRF

PhD Research: He is working on effect of bioactive compounds in various cancers.

Ms. Kavita Kumari, Ph.D. Scholar and Project JRF

PhD Research: Her research is to dissect VEGF-independent angiogenic pathway in breast cancer.

Ms. Samikshya Mahapatra, Ph.D. Scholar
PhD Research: She is mainly involved in understanding the role of autophagy in breast cancer.

Mrs. Priyanka P Mishra, Ph.D. Scholar

PhD Research: Her research interest is to target various subsets of CAFs in breast cancer.

Ms. Angitha N Nath, DBT Project-JRF

Group Photographs of Translational Research Laboratory, KSBT, KIIT University

Current members (Laboratory of Tumor Biology, Angiogenesis and Nanomedicine Research, National Centre for Cell Science (NCCS), Pune, India)

Mr Sumit Das, Ph.D. Scholar (Ex-CSIR-SRF, SPM Fellow)
PhD Research: To decipher molecular mechanism of OPN in understanding the lung metastasis in breast cancer using CRISPR-Cas9 technology.

Mr Pinaki Banerjee, Ph.D. Scholar (EX-DBT-SRF)
PhD Research: Understanding molecular mechanism of OPN in regulation of CSC-mediated cancer progression in castrate-resistant prostate cancer.

Previous Members (at NCCS, Pune) Ph.D. Awarded

1. Dr. Subha Philip, USUHS, Bethesda, USA
2. Dr. Ganpati Mahabeleshwar, CWRU, Cleveland, USA
3. Dr. Riku Das, The Cleveland Clinic, Cleveland, USA
4. Dr. Hema Rangaswami, UCSD, San Diego, USA
5. Dr. Goutam Chakraborty, Mount Sinai, NY, USA
6. Dr. Shalini Jain, MD Anderson Cancer Center, TX, USA
7. Dr. Mansoor Ahmed, Yale University, CT, USA
8. Dr. Reeti Behera, AACR, PA, USA
9. Dr. Vinit Kumar, The Wistar Institute, PA, USA
10. Dr. Priyanka Sharma, NIH, USA
11. Dr. Rajinder Kaur, ICGEB, New Delhi, India
12. Dr. Santosh Kumar, Georgetown University, USA
13. Dr. Smita Kale, Southwestern University, TX, USA
14. Dr. Remya Raja, Mayo Clinic, Arizona, USA
15. Dr. Rosalin Mishra, University of Cincinnati, USA
16. Dr. Dhiraj Kumar, Columbia University, USA
17. Dr. Pompom Ghosh, Moffitt Cancer Center, USA
18. Dr. Amit Singh Yadav, Lund University, Sweden
19. Dr. NNV Radharani, Lund University, Sweden
20. Dr. Ramesh Butti, UT Southwestern Univ., Texas, USA
21. Dr. Deepti Tomar, Mumbai, India
22. Dr. Totakvra V. S. Santosh Kumar, Startup Company, Hyderabad
23. Dr. Nimma Ramakrishna, UT Southwestern Univ., Texas, USA

List of Ex- & Current Ph.D. students & National & International Current Projects:

No. of Student Awarded Ph.D. degree: 23
No. of Current Ph.D. Student: 8
No. of Current Post-Doc/RA: 1
No. of Current International Grant (Indo-German, ICMR): 1
No. of Current National Grants: 5
No. of Completed National Grants: 12

No. of Completed International Grant: 1

Research Activities

Ongoing Research

- **To study the role of various splice variants of Osteopontin (OPN) in regulation of cancer stem cell-mediated lung metastasis in breast cancer using CRISPR/Cas9.**
- **To develop novel biomarkers and therapeutic agents by using established cell lines, Patient Derived Xenograft (PDX) and patients' specimens from different sub-types of breast cancer and other cancers using genomics and proteomics approach.**
- **To develop target specific nanoparticle-conjugated drug formulations and deliver in pre-clinical and clinical breast cancer models.**
- **To develop combination therapy targeting intra-tumoral heterogeneity and tumor-immune cells interactions for the management of tumor growth, lung metastasis and angiogenesis in melanoma/skin cancer models.**
- **To establish innovative and technology driven translational research in the area of cancer, cardiovascular and other inflammatory diseases.**
- **To train high class human resources including Ph.D. Students, Research Associate, Post-Doc and Project Students by providing high class research environment and research projects at the international level.**

Prof. Gopal C Kundu's laboratory is focused on high quality research in the area of Tumor Biology, Regulation of Gene Expression, Targeted Drug Delivery, Angiogenesis, Cancer Stem Cells, Chemical Biology and Nanotechnology. His group has primarily focused on understanding the biology of Osteopontin, a chemokine like ECM protein in various cancers including breast. His laboratory is extensively working in following areas for more than last 25 years

1. **Deciphering the role of Osteopontin (OPN) in tumor progression**: Prof. Kundu's group have dissected the molecular mechanisms by which Osteopontin (OPN) and its associated genes regulate the metastatic potential of breast and other cancers. A better understanding of mechanism by which OPN promotes tumorigenesis may be useful in crafting novel OPN-based anti-cancer therapy. The role of OPN in promoting cancer progression is the subject of in depth investigation. Thus, targeting OPN and its regulated signaling network could be a novel strategy to block tumor growth and angiogenesis and may develop an effective therapeutic strategy for the management of cancer. Figure No. 1 (Trends in Cell Biol, 2006, Expert Opin. Ther. Targets. 2007, 2010, 2014):

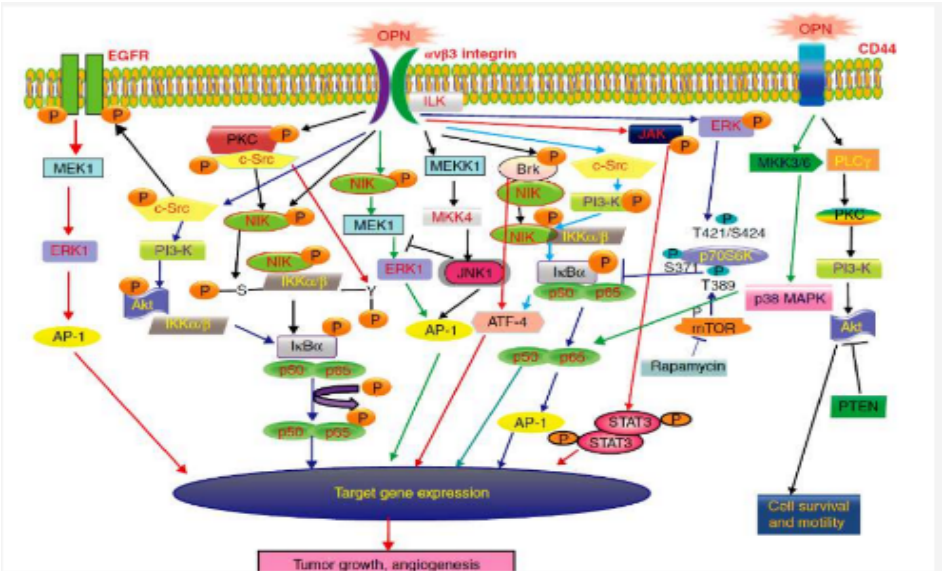

Figure No. 1 (Trends in Cell Biol, 2006, Expert Opin. Ther. Targets. 2007, 2010, 2014)

2. **Cancer Stem Cells (CSCs) and their role in Tumor Growth and Metastasis**: Tumor initiating cells having stem cell characteristics were first discovered in leukaemia and later in solid tumors that recently has become an important area in cancer research. These stem like tumor cells, termed as cancer stem cells (CSCs) govern tumor progression, angiogenesis and metastasis via modulating specific pathways that depends upon the type of the tissue. Prof. Kundu and group have recently shown that Notch1-MAPK signaling axis regulates CD133+ cancer stem cell-mediated melanoma growth, angiogenesis and lung metastasis and andrographolide, a druggable molecule suppresses CD133+ cancer stem cell-mediated lung metastasis in skin cancer.

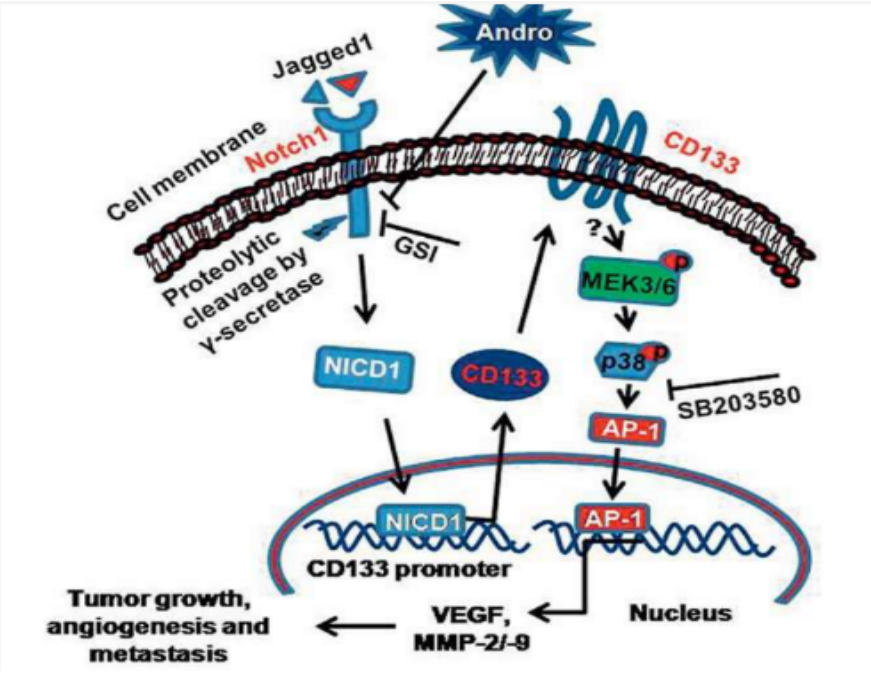

Fig. No. 2: (Kumar et al; Journal of Investigative Dermatology, 2016)

3. **Role of tumor microenvironment in tumor progression**: Tumor microenvironment consists of various cellular players including extracellular matrix (ECM), hypoxia, fibroblasts, neuroendocrine (NE) cells, adipose cells, immune-inflammatory cells and the lymphatic vascular networks. These components play crucial role in tumor growth, immune evasion, metastasis and angiogenesis. Earlier, Prof. Kundu and group have demonstrated the role of hypoxia and TAMs in Osteopontin regulated tumor progression in breast cancer and melanoma models respectively. Recently, our groups have explored how Tumor Activated Macrophages (TAMs) promotes cancer stem cell (CSC) phenotype and CSC-mediated breast tumor growth. Moreover, our group has studied how fibroblast differentiates into Myo fibroblast or Cancer Associated fibroblast (CAFs) and how that control breast tumor progression

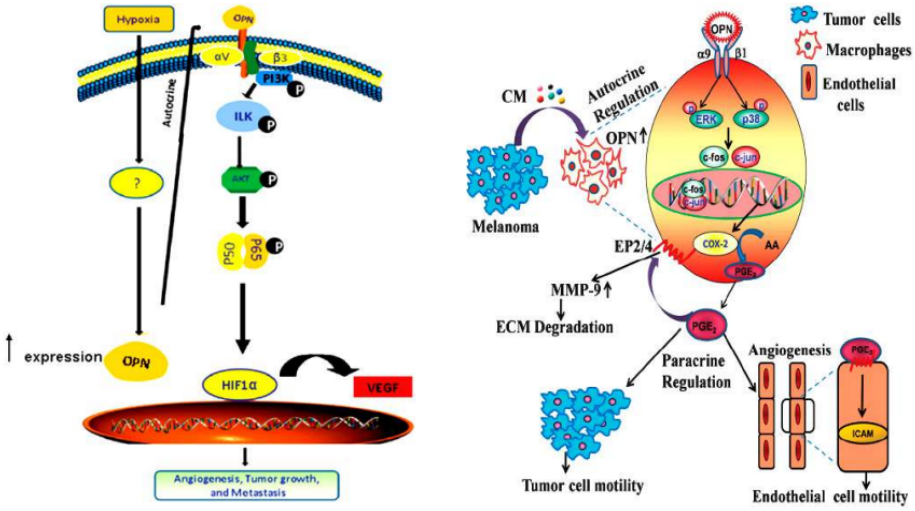

Fig. No. 3 (Raja et al, Oncogene, 2014; Kale et al, Oncogene, 2014)

4. **Nanomedicine and Cancer Therapy**: Breast cancer is a complex disease and most breast cancer treatments are limited to chemotherapy, radiation, and surgery. Substantial advances in breast cancer treatments have resulted in a significant decrease in mortality. However, existing breast cancer therapies often result in high toxicity and nonspecific side effects. Therefore, better targeted delivery and increased efficacy of drugs are crucial to overcome these effects. Application of nanotechnology or nanoparticle-mediated drug delivery can resolve some of these issues and these areas of research are expanding dramatically. Prof Kundu and group have synthesized and characterized cRGD peptide conjugated chitosan nanoparticles loaded with anticancer drug raloxifene or andrographolide. Enhanced uptake of Cy5.5 conjugated RGD CHNP was studied in triple negative and αvβ3 integrin over-expressing breast cancer cells. The decrease in cell viability was observed by MTT assay after treatment with drugencapsulated nanoparticles. RGD conjugated nanoparticles exhibit enhanced inhibition of cell viability in these breast cancer cells. In vitro and in vivo toxicity studied revealed that these nano-drugs are not toxic in normal cells and tissues. Finally, Prof Kundu and his group have demonstrated that andrographolide or raloxifene encapsulated RGD-CHNPs significantly inhibited the breast tumor growth suggesting that RGD conjugated chitosan nanoparticles could be an effective approach for targeted therapeutic delivery in different sub-types of breast cancer.

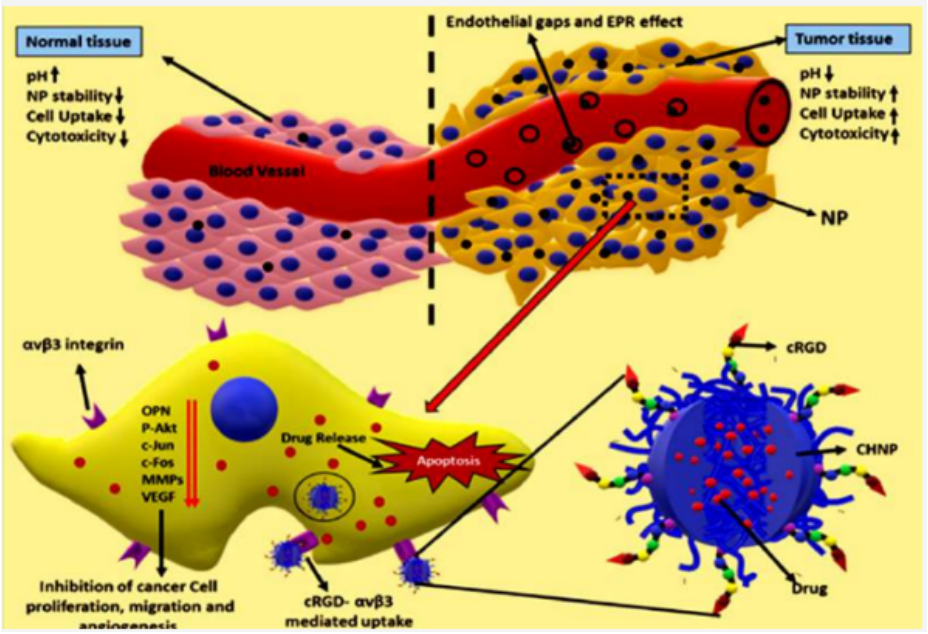

Fig. No. 4: (Yadav et al, Nanoscale, 2020)

5. **CAFs and Cancer cells:** Here, we report the crosstalk between the cancer cells and stromal fibroblasts that leads to tumor progression. The process is initiated by secretion of a chemokine like protein, osteopontin (OPN) from the cancer cells that differentiates the fibroblasts to myofibroblasts. Tumor-derived OPN achieves this transition by engaging CD44 and αvβ3 integrins on the fibroblast surface, which mediates signaling via Akt and ERK to induce Twist1-dependent gene expression. The OPN-driven CAFs then secrete CXCL12, which in turn triggers epithelial to mesenchymal transition (EMT) in the tumor cells. OPN, produced by the cancer cells, and CXCL12, secreted by activated fibroblasts, are necessary and sufficient to perpetuate the crosstalk. Knocking out OPN in carcinogen-induced mammary tumors or knocking down OPN in cancer cells and fibroblast coimplanted xenografts abrogates myofibroblast differentiation, Twist1, and CXCL12 expression. OPN expression is correlated with CAF-specific gene signature as shown by breast tumor tissue microarray consisting of 100 patient specimens. Bioinformatics analyses have confirmed that the expression of OPN is significantly correlated with the expression of myofibroblast-specific markers as demonstrated in human breast carcinoma dataset of 2509 patients. Our findings describe OPN and CXCL12 act as compelling targets to curb the tumor-promoting features of the stromal components and further suggested that OPN-regulated CXCL12 network might act as potential therapeutic target for the management of CAFmediated breast cancer progression.

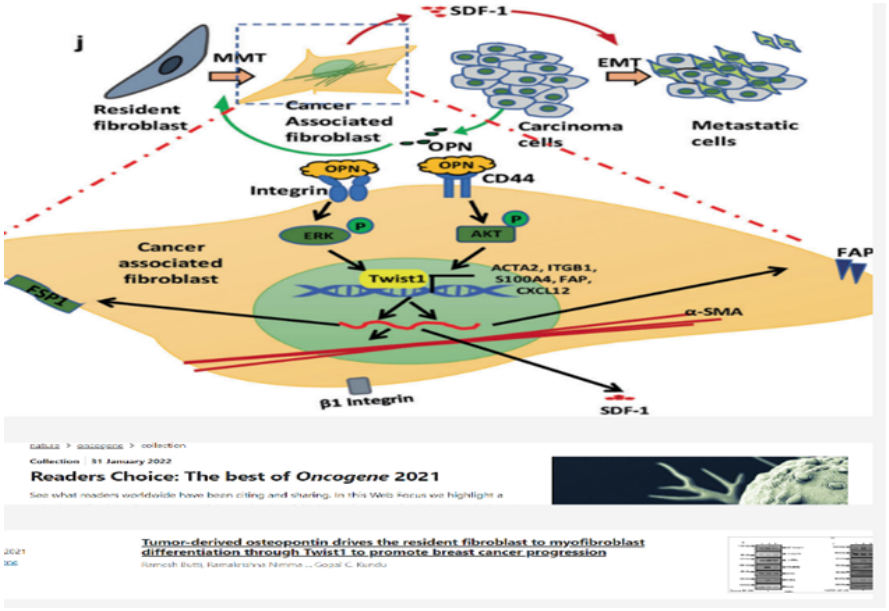

Fig. No. 5: (Butti et al, Oncogene, 2021)

6. TME and Cancer stem cells (CSCs): Cancer stem cells (CSCs) play crucial role in tumor progression, drug resistance and relapse in various cancers. CSC niche is comprised of various stromal cell types including Tumor-associated macrophages (TAMs). Extrinsic ques derived from these cells help in maintenance of CSC phenotype. TAMs have versatile roles in tumor progression however their function in enrichment of CSC is poorly explored. In this study, we report that macrophages upon interaction with breast cancer cells activate tumor promoting function and exhibit diferential expression of various proteins as shown by secretome analysis using proteomics studies. Based on secretome data, we found that Interleukin-6 (IL-6) is one of the up-regulated genes expressed in activated macrophages. Further, we confrm that TAMs produce high levels of IL-6 and breast cancer cell derived factors induce IL-6 production in activated macrophages via p38-MAPK pathway. Furthermore, we demonstrate that tumor activated macrophages induce enrichment of CSCs and expression of CSC specifc transcription factors such as Sox-2, Oct-3/4 and Nanog in breast cancer cells. We further prove that TAM derived IL-6 plays a key role in TAM mediated CSC enrichment through activation of Signal transducer and activator of transcription 3 (STAT-3) signaling. TAM derived IL-6 infuences breast cancer cell migration and angiogenesis. Moreover, our in vivo fndings indicated that TAM derived IL-6 induces CSC population and resulting tumor growth in breast cancer.These fnding provide evidence that TAM derived IL-6 plays a major role in CSC enrichment and tumor progression in breast cancer and IL-6 and its regulated signalling network may act as potential therapeutic target for management of breast cancer.

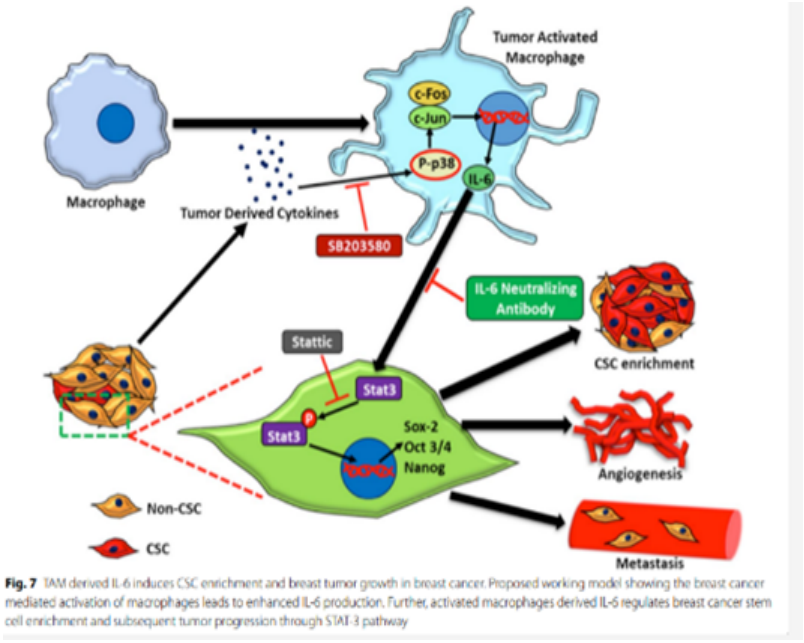

Fig. 7 TAM derived IL-6 induces CSC enrichment and breast tumor growth in breast cancer. Proposed working model showing the breast cancer mediated activation of macrophages leads to enhanced IL-6 production. Further, activated macrophages derived IL-6 regulates breast cancer stem cell enrichment and subsequent tumor progression through STAT-3 pathway

Fig. No. 6: (Radharani et al, Cancer Cell International, 2021)

7. PDX and Breast cancer therapy: Numerous years of cell line-based studies have enhanced the current understanding of cancer and its treat- ment. However, limited success has been achieved in treating hormone receptor-positive, HER2-negative metastatic breast cancers that are refractory to treatment. The majority of cancer cell lines are unsuitable for use as pre-clinical models that mimic this critical and often fatal clinical type, since they are derived from treatment-naive or non-metastatic breast cancer cases. The aim of the present study was to develop and characterize patient-derived orthotopic xenografts (PDOXs) from patients with endocrine hormone receptor-positive, HER2-negative metastatic breast cancer who had relapsed on therapy. A patient who progressed on endocrine hormone therapy provided her tumor via a biobank. This tumor was implanted in mice. It was then serially passaged by implanting PDOX tumor fragments into another set of mice to develop further generations of PDOXs. These tissues were characterized using various histological and biochemical tech- niques. Histological, immunofluorescence and western blot analyses indicated that the PDOX tumors retained a similar morphology, histology and subtype-specific molecular features to that of the patient's tumor. The present study successfully established PDOXs of hormone-resistant breast cancer and characterized them in comparison with those derived from the original breast cancer tissue of the patient. The data highlight the reliability and usefulness of PDOX models for studies of biomarker discovery and preclinical drug screening. The present study was registered with the clinical trial registry of India (CTRI; registration no. CTRI/2017/11/010553; registered on 17/11/2017).

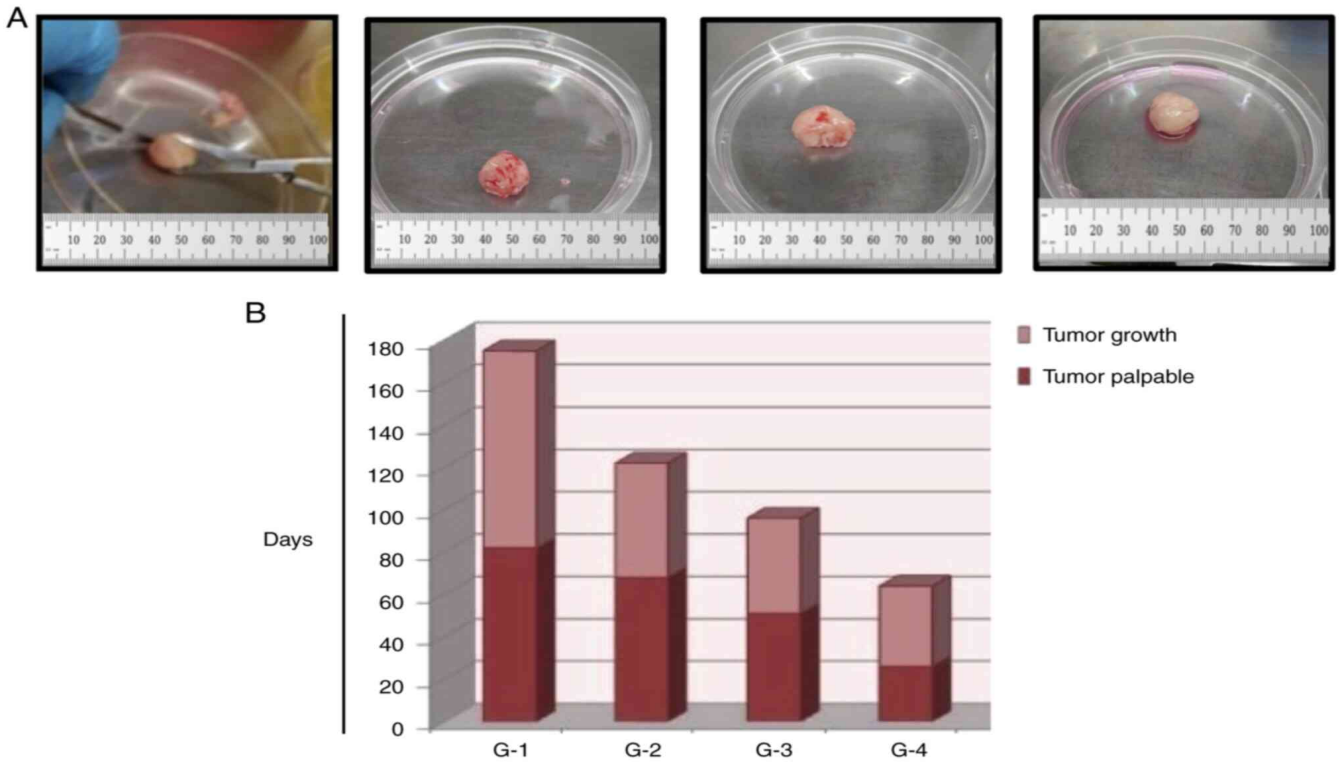

Figure 2. - Generation of PDOXs from hormone therapy-resistant breast cancer. The patient's tumor fragments were implanted to develop PDOXs and serially passaged. Tumors were excised after reaching a certain volume that was monitored with digital calipers. (A) Photographs of resected G1-G4 PDOXs tumors (scale in cm). (B) Bar graph representing time to tumor palpability and tumor burden of G1-G4 PDOXs tumors. PDOX, patient-derived orthotopic xenograft.

Fig. No. 7: (Butti et al, Oncology Reports, 2023)