CURRICULUM VITAE

NAME

Dr. Anamika Bose

POSITION TITLE

Assistant Professor
Department of Pharmaceutical Technology Biotechnology (PTBT)
National Institute of Pharmaceutical Education and Research (NIPER), SAS Nagar, Mohali
Punjab 160062

DATE OF BIRTH

January 1, 1977

CONTACT DETAILS

Pharmaceutical Technology Biotechnology
National Institute of Pharmaceutical Technology (NIPER)
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Residence: Type V, Flat 39; Sector 67; NIPER

INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
Christian College, Burdwan University,	BSc	1998	Botany
Burdwan University, Burdwan, India	MSc	2000	Botany
Jadavpur University, Kolkata, India	PhD	2008	Cancer Immunology

PROFESSIONAL CAREER:

- January 1, 2004 – January 1, 2006
  JRF (UGC-CSIR NET), CNCI, Kolkata, India
- January 2, 2006 – October 30, 2008
  SRF (UGC-CSIR NET), CNCI, Kolkata, India
- November 1, 2008 – January 31, 2011
  Postdoctoral-Research-Associate, UPMC, Pittsburgh, USA
- March 8, 2011 – March 7, 2014
  CSIR-Pool-Scientist, Bose Institute, Kolkata, India
- July 9, 2014 – July 8, 2017
  DST Young-Scientist (SERB), CNCI, Kolkata, India
- November 6, 2017 – March 31, 2021
  DST (WOS-A), CNCI, Kolkata, India
- *January 2, 2023-January 31, 2023*
  DST (WOS-A), CNCI, Kolkata, India
- *February 1, 2023-present*
  Assistant Professor, NIPER, Mohali, Punjab, India

Ph.D THESIS TITLE:

"Studies on the regulation of interferon gamma signaling by biological immunomodulators: Possible implications in antitumor immune functions"

Ph.D Supervisor & Work done at:

Dr. Rathindranath Baral, Ph.D
Former Head
Department of Immunoregulation and Immunodiagnostics
Chittaranjan National Cancer Institute (CNCI), Kolkata, India

Field of Specialization: Cancer Immunology and Immunotherapy; Stromal and Stem Cell Biology; Immunomodulation with NLGP in Cancer

Academic Honors:

- Five years fellowship from UGC, Govt. of India,
  - through joint CSIR-UGC NET
- Invited by Immunology Foundation of India and Ranbaxy Science Foundation to deliver a talk in their Annual Symposium was held at NII, New Delhi (January 2008).
- Three years SRA-ship from CSIR under the Scientists' Pool Scheme (March, 2011)
- Three years Fellowship from DST-SERB as 'Young-Scientist' (July, 2014).
- Recognized as 'Leading Scientists of the World, 2015', by International Biographical Centre, Cambridge, England
- Three years Fellowship from DST as WOS-A (February, 2018)
- Enrolled Ph.D supervisor of University of Calcutta (Faculties of Microbiology, Biochemistry, Physiology and Zoology) and Jadavpur University (Faculty of Life Science and Biotechnology)
- Three years Fellowship from DST as WOS-A (January, 2023)
- Three years Fellowship from DHR as 'Woman-Scientist' (January, 2023)

Academic Awards:

- Dr. V. V. Kamat Memorial Best Presentation Award for Mid Level Scientist from 'Indian Association for Cancer Research' at RGCB, Thiruvananthapuram, February 2014.
- Best Paper Presentation Award in Symposium of Society of Biological Chemists (India) at CSIR-IICB, April, 2014
- Hiralal Jaju Memorial Best Presentation Award for Mid Level Scientist from 'Indian Association for Cancer Research' at Bose Institute, Kolkata, February 2018.

Reviewer of Journals:

Melanoma Research, *LWW;* Blood, *ASH;* J Ethnopharmacology, *Elsevier;* Cancer Letters, *Elsevier;* Frontiers in Oncology*;* Frontiers in Immunology*, Frontiers Media SA;* BMC Cancer, *BioMed Central*; J Immunology, *AAI;* Stem Cell Research & Therapy, *Nature Group;* Scientific Reports, *BMC;* iScience, *Cell Press.*

Membership of the Scientific Societies:

- Associate Member: AACR, 2009-2010
- Life Member: SBC, India; IACR, India; IIS, India
- Honorary Member: European Academy for Tumor Immunology, France

• Acting as an Executive Committee Member of 'Indian Association for Cancer Research', India as an Eastern Indian representative (2022-2025).

Symposium/Webnier organized [National]

Symposiums on the occasion of World Immunology Day
In April 29 of 2013, 2014, 2015 at CNCI, Kolkata

Webinar on the occasion of World Immunology Day
In April 28 of 2023 at NIPER, SAS Nagar, Mohali

Contributions to Teaching

1. Acted as operational supervisor for several short term (1-6 months) projects of B. Sc, M. Sc, B.Tech students from Institutions of different parts of India during 2004-2008 in Department of Immunoregulation and Immunodiagnostics (DIRID), CNCI, Kolkata
2. Acted as mentor of SURP students (3 months) in University of Pittsburgh Medical Center, Pittsburgh, USA
3. Serving as a teacher of Ph.D students of DIRID, CNCI in the Frontiers areas of Cancer Biology and Immunology
4. Appointed as a teacher and examiner in the M.S. and M.Tech courses of NIPER, SAS Nagar, Mohali
5. Appointed as Question setter in NIPER, JEE (2023) examination
6. Appointed as a Member of Selection Committee in NIPER, JEE (2023) examination

Subject of teaching is 'Immunology, Immunopharmacology, Biochemistry, Cell Biology & Metabolism, Human Physiology, Cancer Immunotherapy and Vaccine'.

Proven ability of guiding research

Acted as a co-supervisor of following students of CNCI, Kolkata registered under Ph.D program of Calcutta University (CU) and Jadavpur University (JU)

1. Shayani Dasgupta: CU (Biochemistry) in 2022 (Awarded)

2. Akata Saha: CU (Biochemistry) in 2022 (Awarded)

3. Mohona Chakravarti: CU (Zoology) in 2023 (Submitted)

4. Juhina Das: CU (Physiology) in 2023 (To be Submitted)

5. Anirban Sarkar: JU (Life Sciences & Biotechnology) in 2023 (To be Submitted)

6. Sukanya Dhar: JU (Life Sciences & Biotechnology) in 2023 (To be Submitted)

7. Nilanjan Ganguly: CU (Biochemistry) in 2023 (To be Submitted)

8. **Pritha Roychoudhuri:** CU (Zoology) in 2022 (Registered)

Acting as a supervisor of following Ph.D students in NIPER, Mohali.

1**. Tushar Kanti Malakar, 2023**
2. **Shravankumar Santlal Yadav, 2023**

Major Research Topics

1. Understanding Tumor associated impairments of T cells biology, metabolisms and functions
2. Understanding hypoxia and cellular plasticity in tumor microenvironment
3. Understanding the stromal cell-immune cell cross talk and downstream signaling within tumor microenvironment and its influence in therapeutic outcome in cancer.
4. Understanding the role of immune cell subsets in regulation and maintenance of cancer stem cells.
5. Evaluation of influence of pre-existence of type1 diabetes on cancer progression from the perspective of T cell metabolism
6. Understanding the basis of neem leaf glycoprotein (NLGP) mediated immune-targeting of cancer in murine and human systems
7. Characterization of tumor and tumor-stroma associated receptor tyrosine kinase (RTK) antigens and targeting these antigens as a tool to develop cancer vaccines for the treatment of various cancers
8. Understanding the mechanism of 'Immune adjuvant like functions' of RTK Inhibitors (sunitinib, axitinib, imatinib, dasatinib etc) with type 1-DC-based immunotherapy
9. Significance of nuclear RTK localization in cancer

Details of Independent Research Funding Obtained

Sl. No.	*Title*	*Funding Agency*	*Duration/ Years*	*Amount in Lakhs*
1.	Immune targeting of tumor associated stroma by RTK inhibitors and vascular peptide pulsed NLGP matured dendritic cells: Vaccination approach for mono and combinational therapy.	CSIR (As pool scientist)	2011–2014 *(Completed)*	25

	Implemented in: Bose Institute, Kolkata, India			
2.	Influence of tumor associated pericytes on CD8+ T cell functions. *Implemented in:* CNCI, Kolkata, India	DST-SERB (As Young Scientist)	2014 –2017 *(Completed)*	30
3.	Understanding the role of T cell subset(s) in regulation of cancer initiating stem like cells. *Implemented in:* CNCI, Kolkata, India	DST (As DST Women Scientist (WOS-A))	2018 –2021 *(Completed)*	30.6
4.	Understanding the influence of prolong Statin treatment in antigen presenting cells and its impact on cancer immunoediting process *Proposed to be implemented in*: CNCI, Kolkata, India	DST (As DST Women Scientist (WOS-A))	2023 *(Resigned after obtaining faculty position in NIPER, Mohali)*	35
5.	Understanding the role of nuclear-RGS5 in shaping up immunoregulatory and metabolic signature of tumor pericytes *Will be implemented in*: NIPER, Mohali, India	DHR (As Women Scientist)	2023 *(Transfered from CNCI, Kolkata to NIPER, Mohali*	48

Details of Independent Research Funding Proposed

(*To be Implemented in:* NIPER, SAS Nagar, Mohali, India**)**

Sl. No.	*Name of Grant*	*Funding Agency*	*Status/Date of Proposal Submission*	*Amount in Lakhs*
1.	Potentiality of LAMP3 and NRP1 as Predictive Biomarker for PD1-Therapy Response in Cancer and Elucidation of Signaling Cascade Associated with Therapy Resistance in Terminally	DBT In Cancer Disease Biology	In process March 14, 2023	55.5

	Exhausted T cells to Design New Targeting Strategy			
2.	Studies on the crosstalk between RGS5 and Ceramide signaling in tumor-pericytes to design better therapy for optimum drug delivery through vascular normalization	SERB-DST In Core Research Grant (CRG)	In process March 15, 2023	40.0
3.	Understanding the Type 1 Diabetes associated metabolic modulation in regulating anti-tumor efficacy of effector $CD8^{+}T$ cells	ICMR Ad-Hoc	In process April 28, 2023	58.7
4.	Understanding the influence of prolong Statin treatment in Cancer Stem Cells and its impact on disease progression in female vs male tumor hosts	CSIR Ad-Hoc	In process May 28, 2023	26.3

Scientific communications: At a Glance

- Scientific Papers Published: 70
- Review Published: 4
- Chapters Published in Books: 8
- National Patent: 1
- US Patent: 1

Cumulative Impact Factor: 281.82
Cumulative Citation Index: 2264 (till 28th August, 2023)

Indicies from Google Scholar:

- **h-Index: 29**
- **i10-Index: 53**
- **h-Index: 17 (Since 2017)**
- **i10-Index: 39 (Since 2017)**
- **Citations: 2266**

List of Publications:

As a Corresponding Author

1. Chakravarti M, …….. **Bose A**, PD1-therapy-resistant terminally exhausted $CD8^{+}T$ cells promote generation and maintenance of functionally aggressive cancer stem cells (2023) *Cancer Res, 83(11)1815-1833.* ***IF:12.70; CI:3***

2. Dasgupta S, ……. **Bose A**, NLGP regulates RGS5-TGFß axis to promote pericyte-dependent vascular normalization during restricted tumor growth (2022), *The FASEB J*, 36 (5), e22236. ***IF:5.19; CI:1***

3. Dasgupta S, …….. **Bose A***. RGS5-TGFβ-Smad2/3 axis switches pro- to anti-apoptotic signaling in tumor-residing pericytes, assisting tumor growth (2021) *Cell Death and Differentiation,* 28(11), 3052-3076. ***IF: 15.83; CI:16***

4. Guha I, …….. **Bose A***. Tumor arrests DN2 to DN3 pro-T cell transition and promotes its conversion to thymic dendritic cells by reciprocally regulating Notch1 and Ikaros signaling (2020) *Front. Immunol*., 11:898. ***IF:7.56; CI:5***

5. Guha I, …….. **Bose A***. NLGP reverses tumor induced and age associated thymic involution to maintain peripheral CD8+ T cell pool (2020). *Immunotherapy* 12(11):799-818. ***IF:3.02; CI:3***

6. Saha A, …… **Bose A***. Neem Leaf Glycoprotein restrains VEGF production by direct modulation of HIF1α-linked upstream and downstream cascades (2020) *Front Oncol* ***IF:4.3; CI:6***

7. Ghosh T, ……**Bose A***. NLGP counterbalances the immunosuppressive effect of tumor-associated mesenchymal stem cells to restore effector T cell functions (2019) *Stem Cell Res Ther*, 10, 296. ***IF:5.3; CI:17***

8. Ghosh T, ……. **Bose A***. Tumor-associated mesenchymal stem cells inhibit naïve T cell expansion by blocking cysteine export from dendritic cells (2016) *Int J Cancer,* 139, 2068-2081. ***IF:6.5; CI:30***

9. **Bose A***, ……. Majumdar S. Tumor-derived vascular pericytes anergize T helper cells (2013) *J Immunol,* 191, 971-981. ***IF:5.59; CI:66.***
Cited as a featured article in www.MDLinx.com; 1st among Top 20 articles in the Domain of Article 23785117, Since 2013

As a Senior Author

10. Sarkar M, …… **Bose A**, Baral R, NLGP salvages T cell functions from MDSC-suppression by altering IL-10/STAT3 axis in melanoma tumor microenvironment. *Melanoma Res, (*2021) 31(2):130-139. ***IF:2.62; CI:3***

11. Ghosh S, …….. **Bose A***, Baral R*, Neem leaf glycoprotein generates superior tumor specific central memory $CD8^+$ T cells than cyclophosphamide that averts post-surgery solid sarcoma recurrence (2017) *Vaccine*, 35, 4421-4429. ***IF:3.41*; *CI:5***

12. Sarkar M, …… **Bose A***, Baral R*, Neem leaf glycoprotein prevents post-surgical sarcoma recurrence in swiss mice by differentially regulating cytotoxic T and myeloid-derived suppressor cells, *PLoS One* (2017) *12,* e0175540. ***IF: 4.41; CI:6***

13. Goswami KK, …… **Bose A***, Dasgupta PS, Baral R*. Neem leaf glycoprotein regulates expression and function of tumor associated M2 macrophages in immunosuppressed hypoxic tumor core: Critical role of IL-10/STAT3 signalling (2016) *Mol Immunol,* 80, 1-10. ***IF:3.37; CI:28***

14. Ghosh S, ……. **Bose A***, Baral R*. Neem leaf glycoprotein promotes dual generation of central and effector memory $CD8^+$ T cells against sarcoma antigen vaccine to induce protective anti-tumor immunity (2016) *Mol Immunol,* 71, 42-53. ***IF:2.97; CI:16***

15. Banerjee S, , …….. **Bose A***, Baral R*, Neem leaf glycoprotein prophylaxis transduces immune dependent stop signal for tumor angiogenic switch within tumor microenvironment (2014) *PLoS One,* 9, e110040. ***IF: 4.09; CI:34***

16. Mallick A, …… **Bose A***, Baral R*. Neem leaf glycoprotein activates $CD8^+$ T cells to promote therapeutic anti-tumor immunity inhibiting the growth of mouse sarcoma (2013) *PLoS One,* 8, e47434. ***IF: 4.09; CI:43***

17. Banerjee S, **Bose A***, …….. Majumdar S*. TLR signaling mediated differential histone modification at IL-10 and IL-12 promoter region leads to functional impairments in tumor associated macrophages (2011) *Carcinogenesis,* 32, 1789-97. ***IF:5.63; CI:48***

As a First Author

Bose A*, ……. Majumdar S. Tumor-derived vascular pericytes anergize T helper cells (2013) *J Immunol,* 191, 971-981. **Corresponding Author* ***IF:5.59; CI:66***

18. **Bose A,** Baral R. COVID-19 imparted immune manifestation can be combated by NLGP: Lessons from cancer research (2022) *Cytokine* 158:155980. ***IF:3.93; CI:Yet to cite***

19. Low DB*, **Bose A***, …… Storkus WJ. Dasatinib promotes an expanded and therapeutically-superior T cell repertoire in response to vaccination against melanoma (2014). *Oncoimmnunology,* 3, e27589. **Joint 1st Author* ***IF:6.28; CI:46***

20. **Bose A***, Zhao X***,** …….. Storkus WJ. Vaccines targeting tumor-associated stromal antigens are protective/therapeutic in HLA-A2 transgenic mice (2012) *J Immunol,* 188, 1782-1788. **Joint 1st Author*. ***IF: 5.52; CI:49***

21. **Bose A,** …….. Storkus WJ. Combined vaccine + axitinib therapy yields superior anti-tumor efficacy in murine melanoma model (2012) *Melanoma Res,* 22, 236-243. ***IF:2.52; CI:66***

22. **Bose A***, Zhao X*, …….. Storkus WJ. Intratumoral IL-12 gene therapy results in the cross priming of Tc1 cells reactive against tumor associated stromal antigens (2011) *Mol Ther,* 19, 805-814. **Joint 1st Author*. ***IF:7.04; CI:48***

23**. Bose A**, ……. Storkus WJ. Sunitinib facilitates the activation and recruitment of therapeutic anti-tumor immunity in concert with specific vaccination (2011) *Int J Cancer,* 129, 2158-70, 2011. ***IF:6.20; CI:156***

24. **Bose A,** ……. Baral R., Neem leaf glycoprotein induces perforin mediated tumor cell killing by T and NK cells through differential regulation of IFNα signaling (2009) *J Immunother*, 32, 42-53. ***IF:4.84; CI:50***

25. **Bose A,** …….. Baral R, Neem leaf glycoprotein directs T-bet associated type 1 immune commitment (2009) *Human Immunol*, 70, 6-15. ***IF:3.06; CI:46***

26. **Bose A**, …….. Baral R. Dysregulation in immune functions is reflected in tumor cell cytotoxicity by peripheral blood mononuclear cells from head and neck squamous cell carcinoma patients (2008) *Cancer Immunity,* 8, 10. ***CI:108***

27. **Bose A,** Baral R, NK cellular cytotoxicity of tumor cells initiated by neem leaf preparation is associated with CD40-CD40L mediated endogenous production of IL-12 (2007) *Human Immunol,* 68, 823-831. ***IF:3.06; CI:51***

28. **Bose A**, Haque E, Baral R, Neem leaf preparation induces apoptosis of tumor cells by releasing cytotoxic cytokines from human peripheral blood mononuclear cells (2007) *Phytother Res,* 21, 914-920. ***IF:0.88; CI:48***

29. **Bose A,** Baral R, IFNalpha2b stimulated release of IFNgamma differentially regulates T cell and NK cell mediated tumor cell cytotoxicity (2007) *Immunol Lett,* 108, 68-77. ***IF:3.06; CI:21***

30. **Bose A**, …….. Baral R, Interferon□2b augments suppressed immune functions in tobacco related head and neck squamous cell carcinoma patients by modulating cytokine signaling (2006) *Oral Oncol*, 42, 161-171. ***IF: 2.93; CI:26***

As an Associated Author

31-70. Forty (40) publications as an Associate Author in several international peer-reviewed classical journals, like, *J Immunother Cancer (IF:13.751), Cancer Immunol Immunother* (IF:4.8), *Front Oncol* (IF:4.3), *PLoS One* (*IF: 4.09),* Cytokine (*IF:3.93*), Oncotarget (IF:3.7), *J Immunother* (IF:3.46), Imm Lett (IF:2.48), *Oncoimmunology (IF:6.28), Int Immunopharmacol (IF:2.97), Mol Immunol, (IF:*2.65), *Human Immunol (IF:2.30), Immunotherapy (IF:2.39), Clin Vaccine Immunol* (*IF:2.47), Transla Res (2.30) and others.*

Reviews:

71. Goswami KK, **Bose A**, Baral R, Macrophages in tumor: An inflammatory perspective (2021) *Clin Immunol,* 232, 108875. ***IF:8.39*; *CI:23***

72. Goswami KK, Banerjee S, **Bose A**, Baral R, Lactic acid in alternative polarization and function of macrophages in tumor microenvironment (2022) *Human Immunol,* 83, 409-417. ***IF:*2.85; *CI:1***

73. Goswami KK, …… **Bose A**, Baral R, Tumor promoting role of anti-tumor macrophages in tumor microenvironment (2017) *Cellular Immunol,* 316, 1-10. ***IF:*2.39; *CI:286***

74. **Bose A***, Ghosh T, Baral R. An overlooked tumor promoting immunoregulation by non-hematopoetic stromal cells (2016) *Immunol Lett*, 176, 114-121. **Corresponding Author* ***IF: 2.48; CI:4***

Book Chapters:

75. Saha A, ……. **Bose A**. Neem Leaf Glycoprotein restrains VEGF production by direct modulation of HIF1α-linked upstream and downstream cascades. In: Targeting the microenvironment niche in solid and hematologic malignancies: Basic and translational research. *Edited by:* Botta C, Rossi M, Bolli N, Weinhold N, Front Oncol, Frontiers Media SA. Page 18-28. 2022.

76. Bhuniya A, ……. **Bose A**, Baral R, NLGP Attenuates Murine Melanoma and Carcinoma Metastasis by Modulating Cytotoxic $CD8^+$ T Cells (2022). In: Cancer Cell Metabolism and Immunomodulation in the Context of Tumor Metastasis. *Edited by:* Dong, Q., Hu, B., Nelson, P. J., Zhang, H., Zhao, Y., Frontiers Media SA. Page 21-37. 2022.

77. Baral R, …….. **Bose A**, Neem leaf glycoprotein as a new vaccine adjuvant for cancer immunotherapy. In: "*Comprehensive Bioactive Natural Products; Immune-modulation & Vaccine Adjuvants"* (Ed. V. K. Gupta), Vol 5, Chap 2, *Studium Press LLC, USA, 2010*, pp. 21-45.

78. **Bose A,** ……. Baral R. Cancer Immunoediting: Prefessional Editorship by Neem leaf glycoprotein. In: "*Treatments of Advanced Stage Cancers: current status and emerging frontiers*" (Ed. G. P. Talwar & O. P. Sood), *Narosa Publishing House Pvt. Ltd***,** India, 2009, pp 148-152.

79. Chakraborty T, **Bose A,** …….. Baral R. Suppression of Suppressors: Neem leaf glycoprotein Guided Crosstalk Between Regulatory T cells and T cells/NK Cells/ Macrophages in Cancer. In: "*Treatments of Advanced Stage Cancers: current status and emerging frontiers*" (Ed. G. P. Talwar & O. P. Sood), *Narosa Publishing House Pvt. Ltd***,** India, 2009, pp 153-157.

80. **Bose A**, …… Baral R. Immunotherapeutic targeting of multiple dysregulated immune functions in cancer by neem leaf glycoprotein. In: "*Medicinal Plants: Phytochemistry, Pharmacology and Therapeutics."* (Ed. V. K. Gupta), *Daya Publishing House, New Delhi,* 2012, pp. 41-78.

81. Barik S, …… **Bose A**, Baral R. Tumor and its environment: Effort by neem leaf glycoprotein to keep it green. In: **"**Bioactive Phytochemicals, perspectives for Modern Medicine*"* (Ed. V. K. Gupta) Vol 2, Daya Publishing House (Astral Int. Pvt. Lyd.), New Delhi, 2014, 51-82.

82. **Bose A,** Baral R. Neem Leaf Glycoprotein in Cancer Immunotherapy. In: "New Look to Phytomedicine" by Elsevier Publications, 391-408, 2018.

Patents:

83. Baral RN, Laskar S, **Bose A**, Sarkar K, Process for isolating glycoprotein(s) from neem leaf, which has immunomodulatory and cancer preventive functions (2014) (Indian Patent). Patent No. 259434.

84. Storkus WJ, **Bose A,** Taylor JL, Zhao X, Lowe DB. Vaccines for the promotion of immune response against tumor-associated stromal antigens (2011) (Patent No. US 9345770B2).