OMB No. 3145-0279 (Expiration Date 10/31/2026)

NIH BIOGRAPHICAL SKETCH COMMON FORM

Name: Bariana, Manpreet

Persistent Identifier (PID) of the Senior/Key Person: https://orcid.org/0000-0003-0571-1648

Position Title: Supervisor, Research Assistant Member

Organization and Location: Hackensack Meridian Center for Discovery and Innovation, Nutley, New Jersey, United States

PROFESSIONAL PREPARATION

INSTITUTION AND LOCATION	DEGREE	Start Date	Completion Date	FIELD OF STUDY
Hackensack Meridian Center for discovery and innovation, Nutley, NJ, United States	Fellow	01/2022	12/2023	Immunoncology
Hackensack Meridian Center for Discovery and Innovation, Nutley, NJ, United States	Postdoctoral Fellow	01/2019	01/2022	Immunoncology
The University of Adelaide, Adelaide, South Australia, Australia	DOCTOR OF PHILOSOPHY	02/2013	03/2017	Biomedical Engineering
The University of Adelaide, Adelaide, South Australia, Australia	Other training	05/2012	01/2013	Pre-doctoral Internship-Nanomedicine
University of South Australia, Adelaide, South Australia, Australia	Other training	05/2011	12/2011	Master's Dissertation-Nanomedicine
Amity University, Noida, Uttar Pradesh, India	MASTER OF ENGINEERING	08/2010	03/2012	Nanotechnology
Amity University, Noida, Uttar Pradesh, India	BACHELOR OF ENGINEERING	08/2006	03/2012	Nanotechnology

Appointments and Positions

2025 - present	Supervisor, Research Assistant Member , Hackensack Meridian Center for Discovery and Innovation, Nutley, New Jersey, United States
2023 - present	Assistant Professor , Hackensack School of Medicine, Nutley, New Jersey, United States
2023 - 2025	Senior Research Associate , Hackensack Meridian Center for Discovery and Innovation, Nutley, New Jersey, United States

Products

Products Closely Related to the Proposed Project

1. Bariana M, McGuire M, Tuckett A, Cassella E, Anand S, Anuncio SA, Mina S, Avtalion S, Lloren MA, Bogert N, Konstandin M, Boucher J, Beatty N, McSain S, Hu W, Xue HH, Davila ML, Zakrzewski JL. Cre-dependent gene expression enables thymic development of autoreactive tumor-associated antigen targeting CAR-T cells. Mol Ther. 2025 Dec 24; PubMed PMID: 41445186.
2. Varkey A, Bariana M, Batistick M, Church J, Cassella E, Anuncio S, Samimi S, J Vallone A, Hameem Z, Gill S, McCloskey J, Chen Y, Tan M, Albitar M, Tycko B, F Chow K, Mantile-Selvaggi G, S Siegel D, L Zakrzewski J. B cell maturation antigen is a novel target for immunotherapy of acute myeloid leukemia. J Hematol Oncol. 2025 Oct 24;18(1):89. PubMed Central PMCID: PMC12553267.
3. Bariana M, Anand S, Batistick M, Cassella E, Anuncio SA, Aptekmann A, Siegel DS, Oelke M, Kim S, Wang R, Ragheb JA, Zakrzewski JL. Combining antigen specific T-cells with T-cell engager therapy induces a molecular signature that favors T-cell fitness. Blood Immunol Cell Ther. 2025 Jun;1(1) PubMed Central PMCID: PMC12228535.
4. Bariana M. Multimodal therapy of hematologic malignancies based on targeted drug delivery and photothermal ablation enabled by B cell maturation antigen-directed gold nanoparticles. BMES 2024 Annual Meeting, Cancer Drug Delivery &

Nanotechnology; 2024 October; Baltimore, MD, United States. Available from: https://2024bmesannual.eventscribe.net/fsPopup.asp?PresentationID=1503254&mode=presInfo

5. Bariana M, Zhang B, Sun J, Wang W, Wang J, Cassella E, Myint F, Anuncio SA, Ouk S, Liou HC, Tan M, Wang H, Zakrzewski JL. Targeted Lymphoma Therapy Using a Gold Nanoframework-Based Drug Delivery System. ACS Appl Mater Interfaces. 2023 Feb 8;15(5):6312-6325. PubMed Central PMCID: PMC9911369.

Other Significant Products Highlighting Contributions to Science

1. Bariana M, Cassella E, Rateshwar J, Ouk S, Liou HC, Heller C, Colorado I, Feinman R, Makhdoom A, Siegel DS, Heller G, Tuckett A, Mondello P, Zakrzewski JL. Inhibition of NF-κB DNA Binding Suppresses Myeloma Growth via Intracellular Redox and Tumor Microenvironment Modulation. Mol Cancer Ther. 2022 Dec 2;21(12):1798-1809. PubMed Central PMCID: PMC9722601.
2. Bariana M, Kaidonis JA, Losic D, Ranjitkar S, Anderson PJ. Titania nanotube-based protein delivery system to inhibit cranial bone regeneration in Crouzon model of craniosynostosis. Int J Nanomedicine. 2019;14:6313-6324. PubMed Central PMCID: PMC6690047.
3. Bariana M, Dwivedi P, Ranjitkar S, Kaidonis JA, Losic D, Anderson PJ. Glypican-based drug releasing titania implants to regulate BMP2 bioactivity as a potential approach for craniosynostosis therapy. Nanomedicine. 2018 Oct;14(7):2365-2374. PubMed PMID: 28648641.
4. Bariana M, Aw MS, Moore E, Voelcker NH, Losic D. Radiofrequency-triggered release for on-demand delivery of therapeutics from titania nanotube drug-eluting implants. Nanomedicine (Lond). 2014;9(8):1263-75. PubMed PMID: 24359550.
5. Kumeria T, Bariana M, Altalhi T, Kurkuri M, Gibson CT, Yang W, Losic D. Graphene oxide decorated diatom silica particles as new nano-hybrids: towards smart natural drug microcarriers. J Mater Chem B. 2013 Dec 7;1(45):6302-6311. PubMed PMID: 32261703.

Certification:

I certify that the information provided is current, accurate, and complete. This includes but is not limited to information related to domestic and foreign appointments and positions.

I also certify that, at the time of submission, I am not a party to a malign foreign talent recruitment program.

Misrepresentations and/or omissions may be subject to prosecution and liability pursuant to, but not limited to, 18 U.S.C. §§ 287, 1001, 1031 and 31 U.S.C. §§ 3729-3733 and 3802.

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NIH BIOGRAPHICAL SKETCH SUPPLEMENT

Name: Bariana, Manpreet

Persistent Identifier (PID) of the Senior/Key Person: https://orcid.org/0000-0003-0571-1648

Position Title: Supervisor, Research Assistant Member

Organization and Location: Hackensack Meridian Center for Discovery and Innovation, Nutley, New Jersey, United States

Personal Statement

My academic training as a biomedical engineer, combined with extensive experience in immuno-oncology research, has provided a strong foundation for developing innovative nanomaterial-based drug delivery systems to advance molecularly targeted cancer therapies. Over the past decade, I have pursued interdisciplinary experimental research spanning precision nanomedicine, immunoengineering, T cell biology, drug development, and regenerative medicine—areas critical for the translation of novel therapeutics into clinical practice.

My under-/postgraduate training in nanotechnology established a robust foundation in bioengineering and materials science. This training was complemented by competitive awards, multiple research projects , and an international research internship at the UniSA, which initiated my long-standing interest in nano-/biomaterial-based drug delivery. My predoctoral research at the University of Adelaide resulted in 4 first-author and multiple co-authored publications. During my PhD, I developed substantial technical expertise while collaborating with physician-scientists to fabricate a nanoengineered therapeutic implant designed as a molecular adjunct for craniosynostosis treatment. This work culminated in 3 publications and a Dean's Letter of Commendation for exemplary doctoral research contributions.

My postdoctoral training at the HMH-CDI enabled the strategic expansion of my nanotechnology expertise into hematologic malignancies and cancer immunotherapy. This experience was pivotal in identifying the therapeutic potential of non-conventional antigen targets in blood cancers. My research portfolio reflects established credibility as an immuno-oncology investigator, with 6 publications in high-impact journals including Molecular Therapy, Journal of Hematology & Oncology, Molecular Cancer Therapeutics, Blood ICT, Haematologica, and ACS Applied Materials & Interfaces. These studies span immunotherapeutic and nanoparticle-based platforms for AML, lymphoma, and MM. In my current role as Research Assistant Member, I have developed the comprehensive technical competencies, including expertise in syngeneic and orthotopic mouse models, in vivo immunotherapy evaluation, primary human/murine immune cell engineering, advanced FACs, CAR-T and TCR engineering, and nanoparticle fabrication, characterization, and optimization.

Honors

2023	ASH Abstract Achievement Award, The American Society of Hematology
2017	Dean's Letter of Commendation, The University of Adelaide (Australia)
2015	Colgate Travel Award, International Association for Dental Research (IADR) ANZ Division
2015	Best Presentation Award (Research Day), The University of Adelaide (Australia)
2014	Joan Chong Award, International Association for Dental Research (IADR) ANZ Division
2013	Australian Dental Research Foundation (ADRF) grant, ADRF (Australia and New Zealand)
2013 - 2017	International Postgraduate Research Scholarship (IPRS), The University of Adelaide (Australia)
2011	International Visiting Student Scholarship, University of South Australia (Australia)
2006 - 2011	Merit scholarship, Amity University (India)

Contributions to Science

1. Biomaterial-Based Therapeutic Delivery Systems:
   My early career contributions were focused on applying my knowledge of biomaterials for therapeutic delivery applications. More specifically, I investigated the morphology and changes in surface chemistry of diatomaceous earth (DE) to achieve variable release patterns for both hydrophobic and hydrophilic drugs as well as developed a nano-hybrid of graphene oxide decorated DE as a smart natural drug microcarrier. I was also involved in researching a new implantable drug delivery system that integrated polymeric micelles as drug nanocarrier and Titania nanotube (TNT) as nanoporous substrate to achieve a stimuli-responsive drug delivery of poorly water-soluble drugs. This strategy showed considerable potential to design advanced

implantable drug delivery system for countering emergency conditions where immediate releasing of high concentrations of drug was required. The TNT-based localized delivery system ultimately formed the basis of my future PhD research.

Bariana et al. Radiofrequency-triggered release for on-demand delivery of therapeutics from titania nanotube drug-eluting implants (Nanomedicine 2014)

Kumeria et al. Graphene oxide decorated diatom silica particles as new nano-hybrids: towards smart natural drug microcarriers (Journal of Materials Chemistry B 2013).

2. Nanomaterial-based Implants for Craniofacial applications:
My graduate research contributions confirmed the potential of the nanoengineered Titania nanotube/Titanium (TNT/Ti) implants fabricated via electrochemical anodization as an effective protein (glypican) delivery system in a murine model, to address a key clinical challenge of delaying rapid post-operative sutural bone growth in craniosynostosis. The results of this interdisciplinary project were highly relevant as they provided insights into optimization of biocompatible TNT/Ti implants that may evolve into a non-surgical molecular adjunct to minimize the need for recurrent re-operations in human craniosynostosis management. This project led to three subsequent publications, highlighting both in vitro and in vivo efficacy of the TNT/Ti therapeutic delivery system. After nearly 8 years of refining this approach, my research team back in Australia is planning for future human trials.

   Bariana et al. Titania Nanotube-based protein delivery system to inhibit cranial bone regeneration in Crouzon Model of Craniosynostosis (International Journal of Nanomedicine 2019).

   Bariana et al. Glypican-based drug releasing titania implants to regulate BMP2 bioactivity as a potential approach for craniosynostosis therapy (Nanomedicine: Nanotechnology, Biology and Medicine 2017)

3. Development of novel approaches for T cell-based immunotherapy of hematologic malignancies:
My recent work has focused on designing next-generation T cell–based immunotherapies that enhance efficacy while addressing fundamental barriers such as central tolerance, target selection, and T cell exhaustion. Using a Cre-dependent transgene system, I enabled thymic development of tumor-associated antigen–targeting CAR T cells, providing a strategy to generate highly proliferative naïve CAR T cells with improved fitness and persistence. Through collaborative studies, I helped identify B cell maturation antigen (BCMA) as a novel, actionable target for acute myeloid leukemia, expanding the applicability of BCMA-directed therapies beyond plasma cell disorders. In complementary mechanistic work, I demonstrated that combining antigen-specific T cells with T-cell engager therapy induces a molecular signature associated with enhanced T cell fitness, supporting rational design of synergistic cellular–bispecific regimens for hematologic malignancies.

   Bariana et al. Cre-dependent transgene expression enables thymic development of autoreactive tumor associated antigen targeting chimeric antigen receptor T cells (molecular Therapy 2025)

   Bariana et al. Combining antigen specific T-cells with T-cell engager therapy induces a molecular signature that favors T-cell fitness (Blood ICT 2025)

   Varkey et al. B cell maturation antigen is a novel target for immunotherapy of acute myeloid leukemia (Journal of Hematology & Oncology 2025).

4. Development of molecularly tailored targeted therapies of hematologic malignancies:
I led studies demonstrating that inhibition of NF-κB DNA binding suppresses myeloma growth by modulating intracellular redox balance and tumor–microenvironment interactions. This work established mechanistic links between transcriptional regulation, redox biology, and myeloma progression and provided a foundation for therapeutic exploration. Leveraging my expertise in biomaterials and nanotechnology, I developed a gold nanoframework–based drug delivery system for targeted cancer therapy, targeting the tumor associated antigens CD44 and BCMA. This work integrated material synthesis, physicochemical characterization, and in vivo validation, demonstrating enhanced therapeutic efficacy and tumor targeting. These studies established feasibility for applying engineered nanomaterials to hematologic malignancies and informed subsequent translational nanotherapy efforts. Notably, this platform enabled combined targeted drug delivery and photothermal ablation, establishing a proof-of-concept for multimodal nanotherapeutic strategies in hematologic malignancies (Oral presentation at BMES 2024). These studies collectively advanced the translational application of engineered nanomaterials for precision oncology.

   Bariana et al. Multimodal therapy of hematologic malignancies based on targeted drug delivery and photothermal ablation enabled by B cell maturation antigen-directed gold nanoparticles (BMES 2024)

Bariana et al. Targeted Lymphoma Therapy Using a Gold Nanoframework-based Drug Delivery System (ACS Applied Materials & Interfaces 2023).

Bariana et al. Inhibition of NF-κB DNA Binding Suppresses Myeloma Growth via Intracellular Redox and Tumor Microenvironment Modulation (Molecular Cancer Therapeutics 2022)

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