



Project Proposal for Ph.D.

Project Details (The research problem must clearly indicate the need for an interdisciplinary approach)

Project Title	Investigating the role of gut bacteria and metabolites for improving immune checkpoint blockade immunotherapy for colorectal cancer
Project Summary (Minimum 500 and maximum 2000 characters)	Colorectal cancer (CRC) ranks as the third most frequently occurring cancer worldwide. By the year 2040, it is projected that the burden of CRC will significantly increase, with an estimated 1.6 million deaths and 3.2 million new cases. In spite of the great success of immune checkpoints blockade (ICB) immunotherapy, treatment benefits have been limited to patients suffering from CRC. Recent studies have provided strong evidence that the gut microbiota can affect antitumor immunity, and composition of the intestinal microbiome may even predict the efficacy of immune checkpoint blockade (ICB) therapy. A series of seminal studies revealed that the efficacy of ICB therapies is dependent on gut microbiota and that treatment with ICB-promoting bacteria may help overcome primary resistance to ICB therapies for solid cancers such CRC. Despite the findings that gut microbiota have been associated with increased antitumor immunity, specific anaerobic bacteria from tumor site and microbial metabolites of gut origin have not been investigated for using them to improve the ICB therapy for treating CRC. In the present proposal, we want to investigate the role of specific gut anaerobic bacteria of tumor site and gut microbial metabolites for improving the efficacy of ICB cancer immunotherapy in different mouse models of colorectal cancer. We also want to elucidate the underlying molecular mechanism of how gut bacteria and gut microbiota derived metabolites can enhance ICB therapy efficacy. This approach of involving specific gut bacteria and metabolites may lead to the development of robust adjuvant “immune checkpoint therapies” for the treatment of solid cancer such as colorectal cancer. Outcome of the proposed activity could be translated into products/processes for prolonging and saving the lives of cancer patients suffering from colorectal cancer.

Ph.D. Supervisors*
(Supervisor 1 and Supervisor 2 cannot be from the same department of IITD)

Role	Name of Faculty	Academic Unit in IITD/Institute/University	Email ID (Official)
Supervisor 1*	Dr. Saran Kumar	Indian Institute of Technology, Delhi (IITD)	ksaran@iitd.ac.in
Supervisor 2	Dr. Anil Kumar	National Institute of Immunology, New Delhi (NII)	anilk@nii.ac.in

*Supervisor 1 must be from IIT, Delhi.
+All cells in this table are mandatory fields that need to be filled by faculty for consideration of proposal.
§The date of superannuation of supervisors should be at least three years from the date of registration of selected candidates.

Project requirements (Student qualifications, experience required, etc)
*The candidate will be shortlisted based on common shortlisting criteria decided by ScRC (SIRe)

- M.Sc. Biotechnology (2024)
- CSIR/UGC/DBT/DST-INSPIRE Fellowship Qualification
- Only candidates with an active fellowship will be shortlisted for the next round

Source of fellowship/funding and project number (CSIR/UGC/DBT/ICMR/ICAR/NEET-PG/DST-INSPIRE/IRD/FITT Project details, if any)
Candidate with his own fellowship / Project Fellowship

Role of Faculty Members involved:	
Dr Saran Kumar (KSBS, IIT Delhi) Supervisor-1	Dr. Saran Kumar, with expertise in Cancer Biology at IIT Delhi, will likely lead efforts related to understanding the molecular mechanisms of colorectal cancer progression and immune response. He will oversee the design and execution of experiments involving mouse models of CRC, evaluate tumor biology, and assess the impact of gut microbiota and metabolites on tumor growth and immunotherapy efficacy.
Dr Anil Kumar (NII, Delhi) Supervisor-2	Dr. Anil Kumar, an expert in microbiome and human cancer at NII, Delhi, will primarily focus on the characterization and manipulation of specific gut anaerobic bacteria and microbial metabolites. His role will involve identifying, isolating, and studying these bacteria and metabolites, as well as elucidating how they influence immune responses and enhance ICB therapy, bridging microbiome research with cancer immunotherapy development. Dr. Anil Kumar from NII, Delhi, has access to the necessary animal facility and has secured the project funding required to execute this research.

Note :-

1. **Approval from the respective DRC/CRC/ScRC of your Department/Centre/School will be required for using the "Full-time Institute Assistantship (Category-wise) (FIA)" for selecting the students in SRe.**
2. **Declaration:- Faculty members, please ensure that you have at least 3 years of service left before superannuation along with adequate sitting space & lab facilities for the SRe student.**
3. **PI/s are also encouraged to submit joint proposals with AIIMS, NII, JNU and institutes with which IITD has an existing MoU. If the Co-PI (Supervisor 2) is from outside IITD, kindly share his/her detailed CV.**
4. **If a research scholar is to be considered for selection under the project fellowship, then the project should have a minimum of two-year duration remaining.**
5. **A candidate applying with a valid JRF/INSPIRE/any national level fellowship should have at least two-year validity from the date of joining the Ph.D. program.**
6. **The third supervisor’s name (if required) can be added only after the formation of Student Research Committee (SRC) subject to a strong recommendation of SRC and subsequent approval from the competent authority.**
7. **If Institute fellowship is being sought, then DRC approval of the parent department of Supervisor 1 is required at the time of selection.**