PhD Project

Project Details

| Project Title | Functional genomics studies of Hepatobiliary disorders in Indian patients |

| Project Summary |

Gallbladder and biliary tract cancer had the ninth highest incidence rate among females in 2016 in India (2.6 per 100,000, 95% UI 2.3–2.8). There were 26,000 (95% UI 23,000–29,000) incident cases in India, of which 64.4% were in females, and there were 21,000 (18,000–23,000) prevalent cases. This rate varied 5.9 times across the states of India in 2016. The incidence of gallbladder and biliary tract cancer in females was highest in the states of Assam and Delhi in 2016. 9.1% of the gallbladder and biliary tract cancer DALYs in India in 2016 could be attributed to high body-mass index in GBD. In Delhi, it is the 4th most common cancer in females, and most common digestive system related cancer. Biliary tract cancer is one of the most heterogenous cancers and overall prognosis is still poor. Surgery is the mainstay during the therapy in early stages. However, cases mostly present in advanced stages and chemotherapy remains the only option for these cases. The overall response and survival in advanced stages is very poor.

Therefore, we propose to dissect the molecular origin of hepatobiliary malignancies, with a primary focus on Gall bladder cancer and its metastasis to the liver, using a combination computational genomics and experimentation in in-vitro model systems (cell-lines) to develop better diagnostics, prognostic, and therapeutic interventions. The thesis will be divided into five objectives:

1. The first objective of the thesis will be used to identify genetic perturbations that lead to aberrant gene expression changes in primary and metastasized cancer.
2. The second objective of the thesis will be to associate these mutations with the clinical outcome of the patients and develop a methodology for stratification of patients based on their prognosis in retrospective samples.
3. The third objective of the thesis will be to characterize the role of the identified genes using in-vitro cell-line model systems through genetic perturbations coupled with imaging-based and molecular phenotyping.
4. The fourth objective will be to use the validated genes as a cancer mutation panel (specific for Indian patients) coupled with imaging modalities for patient stratification towards a novel prognostication platform.
5. The fifth objective to propose a list of potential targets using computational parsing of published datasets that can be taken further towards drug development.

PhD Supervisors

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<thead>
<tr>
<th>Role</th>
<th>Faculty</th>
<th>Academic Unit in IITD</th>
<th>Email ID</th>
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<tbody>
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Project requirements (Student qualifications, experience required, etc)
- MBBS and MD
- Practicing clinician with at least 5 years clinical experience
- This is a PART-TIME PhD position, the candidate is responsible for their salary.

**Source of funding (IRD/FITT Project details, if any)**

The project is ideal for MD candidates who want to pursue a part-time PhD. There is no funding support is available to pay the student salary for this project. Funding support is available to execute the project.

**Role of Faculty Members involved:**

Prof. Ishaan Gupta, will coordinate the computational biology, bioinformatics and genomics analysis to generate testable hypotheses in the form of target genes and the regulatory networks involved that may be driving the disease. The candidate will be trained in using computational approaches particularly based on sequencing followed by the state-of-the-art data analysis workflows using CPU/GPU based tools.

Prof. Shilpi Minocha, will coordinate the experimental validation of the target genes identified upon the data analysis using in-vitro model systems such as cell-lines to modulate the expression of identified regulatory networks and characterize their role in pathogenesis. The candidate will be trained in using molecular biology tools particularly based in-vitro cell culture, assays to modulate gene expression and characterize phenotypic outcome of such modulation.

Through a holistic computational and molecular biology approach, the project aims to speed the process of understanding the molecular origin of metabolic disorders.