

**Translational Research opportunities for medical students at GAU department of biomedical sciences**

Project 1: **Pharmacogenomics for statin drugs.**

Statins, HMG‐CoA reductase inhibitors, are widely used to reduce the morbidity and mortality of coronary artery disease, atherosclerotic heart problems and ischemic stroke by lowering LDL‐C levels in plasma. Although statins are highly effective, they significantly differ in efficacy and safety. Specifically, significant individual differences in response or adverse reactions to the treatment can be attributed to genetic polymorphisms. Four functional types of proteins are involved in statin metabolism: transporters, apolipoprotein, cytochrome P450 enzyme systems and related proteins such as HMGCR or LDLR.

The project will aim to design the molecular test utilizing known polymorphisms in the abovementioned functional genes and will predict individuals' responses to specific statin drugs. The project will accomplish the goals by carrying out several steps:

1. Literature review and analysis that will pinpoint all currently known genes involved in statin metabolism, as well as polymorphisms in those genes that could be significant pharmacogenomic markers.
2. Based on theoretical work, the selected SNP markers with respective interpretations will compile the pharmacogenomic panel for Statin efficacy and adverse effects.
3. The SNPs will be obtained (TaqMan assays), and preliminary runs of the pharmacogenomic panel will be carried out to evaluate the technical parameters of the potential test.
4. The statin efficacy pharmacogenomic research test will be ready for the RUO clinical applications

Summary: The project will explore the theory and practical implementation and will result in testing patients with qPCR based TaqMan assays. Pharmgen Inc., the biotechnology knowledge implementation company, will support the project.

Project 2: **Lynch Syndrome screening using Microsatellite Instability (MSI).**

Lynch syndrome, also known as hereditary non-polyposis colorectal cancer (HNPCC), is one of the most widespread genetic disorders that cause colorectal and other cancers, such as uterine, stomach, liver, kidney, and brain. Lynch syndrome is due to inherited loss-of-function mutations in DNA mismatch repair genes (MLH1, MSH2, MSH6, PMS2, and EPCAM). Microsatellite Instability (MSI) is a length variation of repeated DNA segments (microsatellites) resulting from Lynch syndrome genes not working correctly. Therefore, MSI and mismatch repair tests are widely used to screen and diagnose Lynch Syndrome. The project will aim to understand the prevalence of Lynch syndrome in Georgia and investigate the clinical value of Lynch syndrome screening to prevent various cancers.

The project will explore MSI in cancer patients in Georgia and how they are associated with other characteristics of cancers and clinical outcomes. The project will be implemented at Cancer Research Center.

**To apply for the projects: Please provide your letter of Interest/motivation, CV, and recommendations from GAU faculty members. Application deadline May 1, 2023**