**Project Titles and Areas:**

1. Drug resistance to targeted therapies in cancer
2. Characterizing tumor heterogeneity and therapy resistance through research autopsy.
3. Discovery and characterization of novel oncogenic mutations using genomic sequencing
4. Characterization of the microbiome and its impact on cancer therapy (computer science students)
5. Discovery and development of methylation biomarkers for cancer therapy (computer science students)

**Research Description:** Our mission is to translate cancer genomics for patient care through clinical trials. We accomplish this through Teamwork and Training in the following areas: 1) development of analytical validated targeted DNaseq and RNAseq assays in a CLIA-certified Cancer Genomics Laboratory to enable molecular enrichment of patients to trials, 2) genomics-driven clinical trials, 3) rapid research autopsy to study tumor heterogeneity in patients, 4) omics strategies including whole exome, RNAseq, targeted capture, bisulfite sequencing, and protein arrays to a) study drug resistance, b) contribute to target discovery, and c) molecularly characterize exceptional responders. The Lab runs a CLIA-certified Cancer Genomics Laboratory that utilizes custom-targeted cancer gene sequencing to develop novel molecular diagnostics for patient care. The Lab runs a study "OSU-13053: Personalized Cancer Medicine Through High-Throughput Sequencing" (IRB-approved) that evaluates individual patients with advanced cancer considering clinical trials, and seeks to identify "driving" mutations that provide molecular eligibility for novel molecularly targeted therapies in development at Ohio State. The Lab also runs a Body Donation Study for Cancer Research. We are grateful to our patients for donating their bodies to the cause of cancer research. We will study their genomes to determine how certain cancer cells acquire resistance and use this knowledge to advance the discovery of new cancer drugs.

**Potential Projects for Undergraduate Students:**

1. Drug Resistance to Targeted Therapies in Cancer: This involves learning techniques including tissue culture, western blotting, and molecular biology. Preferably an undergraduate student majoring in a biology discipline.

2. Characterizing tumor heterogeneity and resistance through research autopsy. Patients participating in a new study will undergo rapid research autopsy so that our team of scientists can characterize how cancers becomes resistant to therapy.

3. Discovery and characterization of novel oncogenic mutations using genomic sequencing. Students with prior laboratory experience will learn and apply methods for DNA and RNA sequencing to detect novel oncogenic mutations including point mutations and gene fusions. Students will subsequently learn to functionally characterize these genomic alterations through in vitro assays.

4. Characterization of the microbiome and its impact on cancer therapy. We will characterize the diversity and abundance of specific microbial flora in patients with cancer and evaluate its relationship to cancer therapies in clinical trials. Project involves cell biology, genetics, computer science/programming.
5. Discovery and development of methylation biomarkers for cancer therapy. We will identify and validate novel methylation biomarkers that can predict response to specific therapies for cancer. Project involves using existing databases, biostatistics, computer science/programming, and cell biology.

**GPA/Major Requirements:** Minimum GPA 3.4 in Biology, Biochemistry, Molecular Genetics, Computer Science, and other Biology-disciplines

**Required Skills:** First and Second year students. No research experience necessary.

**Time Commitment:** 10-20 hours per week. Students are expected to commit to long-term research training and project through graduation. This includes up to 3 years of research during undergraduate years and each summer dedicated for 10-12 weeks each summer (funded) doing research/training.

**Compensation:** Academic credit/Volunteer

**How to Apply:** Contact Dr. Sameek.roychowdhury@osumc.edu. Rolling admission.

**Information to Provide:** Please provide a resume and short cover letter answering the following questions: 1) Introduce yourself, 2) Why you want to do research, 3) what traits set you apart from others (strengths)