

Research Theme: Inflammation and gene regulation
Research Project Title: Role of MAPK signaling in chromatin organization and transcriptional control of cancers
Principal Investigator/Supervisor: Asst/Prof Li Yinghui
Co-supervisor/ Collaborator(s) (if any): NA
Project Description a) Background: Mitogen-activated protein kinases (MAPKs) are key mediators of signal transduction pathways that regulate gene expression changes in response to extracellular stimuli. Mutations in components of the MAPK signaling pathways such as B-Raf (V600E) and K-Ras (G12D) are frequently observed in several human cancer types and documented to play important roles in the survival and proliferation of cancer cells. While MAPK signaling is known to elicit gene expression changes through interaction and/or post-translational modification of multiple transcription factors associated with cancer development, the precise roles of MAPK pathways in regulating gene transcription through modulation of the 3D chromatin organization remains uncharacterized. The primary goal of this PhD project is to investigate how MAPK signaling regulates long-range chromatin interactions to mediate key transcriptional programs of malignant cancers. b) Proposed work: We will characterize specific cancer models with aberrant MAPK pathway activation for expression signatures of major oncogenic transcription factors associated with MAPK signaling and map their binding sites in the genome, using high-throughput methods such as ChIP sequencing and RNA sequencing. We will also analyze the roles of their associated co-factors for combinatorial regulation at disease-linked gene loci and investigate for their functional roles in mediating chromatin interactions. This project will involve genomics, biochemistry and several molecular biology techniques such as genome-editing and chromatin immunoprecipitation. Highly motivated candidates with a keen interest in cancer epigenetics and cancer cell biology are strongly encouraged to apply.
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