Project Title: Could liquid biopsy reliably support clinical decision-making in advanced cancer?	**Code: CCS9**
Host School / Institute: Central Clinical School	**Address:** Department of Medical Genomics at Royal Prince Alfred Hospital, NSW Health Pathology
Certificates & Clearances required: No	
Primary Supervisor: A/Prof Bing Yu	
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Co-Supervisor/team: Ms Cassandra Kavanagh and Dr Jerry Wei, Hospital Scientists, Department of Medical Genomics at Royal Prince Alfred Hospital, NSW Health Pathology.	
Project Type: Laboratory based; Data Analysis	
Project Category: Genetics; Cancer	
Skills / Attributes of a successful student: Cancer somatic mutations and targeted therapy selection, PCR and real time PCR, DNA assessment.	
Project Keywords: liquid biopsy; cancer somatic mutation; targeted therapy; data interpretation	

Project Description: Cancer is fundamentally a genome disease, where the sequential accumulation of somatic mutations and epigenetic changes disrupts the delicate cellular homeostasis. Traditionally tumour tissue is required for the detection of somatic mutations in order to make diagnosis and prognosis, select right drugs for right patients, as well as monitor therapeutic response, drug resistance and potential relapsing. Tumour biopsy is invasive and only reflects the molecular characteristics at a certain time-point and the defined sampling region. Sometimes tumour site is even impossible to access and it could be difficult or unable to have repeated tissue biopsies.

The alternative is called liquid biopsy, which refers to blood taking from a cancer patient. There is no access issue and much less invasive than surgical biopsy or even imaging studies. Liquid biopsy delivers information of entire tumour burden in a patient and can be repeatedly taken for the temporal study. More research is required to accurately and reliably detect the very low fraction of tumour variant(s) in cell free DNA samples. The prospective student will work in a national accredited diagnostic laboratory and engage the bench-to-bed translational research. The proposed project will apply real time PCR, modified high resolution melting technologies and sophisticated liquid handling robotics in the diagnosis of melanoma and lung cancer. The student is expected to define a reliable range of DNA input for cancer diagnosis and determine the lower limit of detection of the single targeted mutation assays. Research will be required in the field of data mining and variant interpretation using various in silico tools.