

Bioinformatics

UNDERSTANDING THE HISTORY OF PAEDIATRIC TUMOURS FROM GENOMIC SCARS ACCUMULATED OVER TIME

WHO IS THE CHILDREN'S CANCER INSTITUTE?

The Children's Cancer Institute is the only independent medical research in Australia dedicated to research into the causes, prevention, better treatments and ultimately a cure for childhood cancer. More than 40 years on, our vision remains unchanged – to save the lives of all children with cancer and improve their long-term health, through research. The Institute has now grown to employ nearly 350 researchers, operational staff and students, and has established a national and international reputation for scientific excellence. Our focus is on translational research, whereby we have an integrated team of laboratory researchers and clinician scientists who work together in partnership to discover new treatments which can be progressed from the lab bench to the beds of children on wards in our hospitals as quickly as possible.

The Institute has recently embarked on a remarkable adventure towards joining with our clinical colleagues at the Kids Cancer Centre, Sydney Children's Hospital, in a brand-new purpose built home, Australia's first Children's Comprehensive Cancer Centre, which when completed, will house up to 900 child cancer clinicians and scientists.

OUR SHARED VISION

Our shared vision for the Children's Comprehensive Cancer Centre is to be the leading children's comprehensive cancer centre world-wide, providing for the seamless integration of child cancer research, clinical care and education, with the goal of putting an end to childhood cancer.

WE BELIEVE THAT

- No child should die from cancer or suffer life-long side effects from their treatment.
- Medical research is fundamental to curing childhood cancer.
- It is the critical iterative relationship between translational research, research that moves laboratory findings into the clinic; and discovery research, bench to bedside and back again, that is bringing us closer to one day curing childhood cancer.
- It's not if. It's when.

OUR PURPOSE

Children's Cancer Institute exists solely to put an end to the devastating impact of childhood cancer. Every week in Australia, three children and adolescents die of cancer. Only when that three becomes zero, and when all the survivors can live a normal life, will our work be done.

Our purpose as the only independent medical research institute in Australia focused exclusively on childhood cancer, is to Translate and Discover, through world class research, new treatments that will cure cancer and reduce side effects in children and adolescents.

OUR STRATEGIC OBJECTIVES

Translate—Accelerate the integration of our translational research into clinical care, including delivery of the flagship Zero Childhood Cancer program.

Discover—To pursue world class discovery research, and to feed the translational pipeline through the depth, breadth and impact of our science.



OUR STRATEGIC ENABLERS

Empower—Attracting and developing the brightest minds in a vibrant collaborative high-performance culture that fosters diversity, innovation, and success.

Innovate—By providing our researchers and support teams with access to advanced technologies, infrastructure, and facilities, we will create a dynamic and cutting-edge environment for innovation.

Connect and engage—Partnering and collaborating with UNSW and Sydney Children's Hospitals Network together with national and international clinical and research leaders and organisations, governments, and industry to leverage and maximise the outputs and impact of our research.

Promote and fund—Sharing our beliefs, vision, and purpose with others to drive awareness, engagement and support for our cause that ensures we deliver our strategic objectives in a financially sustainable way.

YOUR ROLE

Team:	Computational Biology	Reports To:	Sam El-Kamand
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YOUR PURPOSE

Tumours develop from a single aberrant cell, accumulating thousands of mutations over time; these mutations are caused by exogenous sources, like bursts of UV damage, or exposure to chemotherapy, or due to endogenous mechanisms like genetic damage to DNA repair enzymes or collateral damage when fighting a virus. In a way, understanding the genomic signatures of a tumour helps us decipher the unique narrative inscribed in their DNA, and holds the key to understanding the chronological history of the tumour. Genomic signatures may even enable prediction of a patient's prognosis and their response to treatments.

This project aims to enhance our ability to identify genomic scars in paediatric cancer through mutational signature analysis. It involves benchmarking cutting-edge signature detection toolkits, running the best tools on real patient samples, then summarising the results in user-friendly reports. Participants will gain foundational skills in genomic analysis, translational research, and data science.

This project requires some familiarity with programmatic analysis and visualization of data as well as command-line scripting. A basic understanding of genomics and traditional statistics will be helpful but not required. This Project will be supervised by Associate Professor Mark Cowley (MCowley@ccia.org.au), who has >15 years of experience as a bioinformatics researcher and a passion for improving outcomes in cancer patients. Co-supervising with Mark will be Sam El-Kamand (selkamand@ccia.org.au), a Bioinformatics Research Scientist with 3 years of experience in cancer genomics.

YOUR KEY OUTPUTS AND ACTIVITIES

1. Connection to the Cause	<ul style="list-style-type: none"> Deliver agreed outcomes in a self-motivated manner with minimal direct supervision. Exercise excellent judgement and problem solving You undertake other activities as directed to support the Institute's vision and purpose.
2. Systems & Processes	<ul style="list-style-type: none"> Be involved in the design and establishment of a high-quality biological resource for clinical and research use. Ability to work with currently developed code. Maintain high rigor code testing and debugging for optimal computational efficiency.
3. People & Teams	<ul style="list-style-type: none"> Work with a team of curation scientists to ensure clinically relevant development of software program Positively contribute to the team dynamic You foster a harmonious and collaborative team culture and support the REDI vision – respect, equity, diversity, and inclusion. You maintain and enhance your skills and knowledge through participation in education and the Institute's Personal BEST performance and development program
4. Conduct & Safety	<ul style="list-style-type: none"> You role model behaviours that positively reflect the Institute's Code of Conduct, Research Code of Conduct and all relevant WHS policies and procedures.

	<ul style="list-style-type: none"> • You comply with all relevant Institute WHS policies and procedures. • You take reasonable care to maintain your own health and safety and that of others. • You actively participate in making the Institute a safe and healthy workplace through communication and consultation processes.
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YOUR PROFILE

Skills/Qualifications	Capabilities
<p>Essential:</p> <ul style="list-style-type: none"> • Undergraduate student with a major in either software engineering, computational science or biology 	<p>Capabilities are the knowledge, skills and abilities required to succeed in this role.</p> <ul style="list-style-type: none"> • Resilience – persist despite challenges, obstacles, and interruptions • Creativity – innovative and apply resources in new ways • Empathy – understand and consider other’s feelings, thoughts, and experiences • Imagination – see through variety of lenses and challenge present assumptions • Emotional intelligence – understand other’s emotions and experiences • Teaming – collaborate effectively across organisational boundaries • Critical thinking – analyse, evaluate, and reconstruct information • Adaptive thinking – recognise new patterns and apply patterns in new contexts

*To submit your application, please send your CV to selkamand@ccia.org.au
subject: summer studentship*