MONASH BIOINFORMATICS PLATFORM

2021 SEMINAR

Polylox(Express): an in vivo barcode generator for tracing stem cell fate

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Abstract

The ability to trace the progeny of a single stem cell in its natural environment in vivo has allowed unprecedented quantitative insight into the laws that govern development and tissue renewal. However, established approaches label stem cells with comparatively few distinct colors and are not applicable to hematopoiesis, where thousands of stem cells exist in a rather fluid state in the fetal liver and the adult bone marrow. The *Polylox* DNA substrate has met the challenge of uniquely labeling such numbers of stem cells in situ, without the need for invasive cell isolation. *Polylox* exploits the random, non-processive mode of action of Cre recombinases to generate up to ~2 million distinct barcodes. In my talk, I will review the rules of *Polylox* recombination, show how they manifest themselves in experimental animals, and discuss applications of *Polylox* to diverse biological questions. The latter include the recently developed *PolyloxExpress* system, where the DNA barcodes are transcribed and can be read out together with the transcriptome in single cell.

Bio

Prof Thomas Höfer is the Head of DKFZ Division, Theoretical Systems Biology. Prof Höfer studied Biophysics at the Humboldt University Berlin and went on to complete a PhD in mathematical sciences, Mathematical Institute, Center of Mathematical Biology, University of Oxford, UK with Philip Maini. The DKFZ pursues multidisciplinary research to understand how biological function emerges from interacting components - molecules within a cell and cells within an organism. Prof Höfer's work is essentially collaborative and characterized by a tight interplay between experimentation, data analysis and mathematical modelling, dissecting the molecular switches that regulate the proliferation and differentiation of T lymphocytes and thus orchestrate adaptive immune responses. The second focus is on growth-factor signalling and cell-cycle control, studying the interplay of these processes in human tumour models to understand how therapy resistance arises from synergistic oncogene action. From both strands of work common principles at the systems level are emerging. This work aims at identifying the functional behaviour of molecular networks in the cell and at quantifying the control exerted by individual components to inform novel therapeutic approaches.

EVENT DETAILS:

DATE:
Wednesday 26 May 2021

TIME:
4:00pm AEST

VENUE:
Zoom link
https://monash.zoom.us/j/939547270?pwd=Vi9qRlVzMERyWnBpczFZNzB2VzFVQT09

Meeting ID: 939 547 270
Passcode: 799679

HOSTS:
Kirill Tsyganov, MBP & Dr Alberto Rosello Diez, ARMI

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