McGill

Department of Anatomy and Cell Biology

Seminar Series

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Hosted by: Natalie Zeytuni, Ph.D.

Wednesday, Nov. 23, 2022

11:30 am -12:30 pm

Room 1/12 - Strathcona Anatomy and Dentistry Building

"Structural biology and biochemistry of PARP family enzymes "

PARP enzymes use NAD+ to produce ADP-ribose posttranslational modifications that regulate virtually all aspects of human biology. PARP family members have distinct sets of regulatory domains that control catalytic output, that select for appropriate targets for modification with ADP-ribose, and that interact with partner proteins, nucleic acids, and the ADP-ribose modification itself. Our work focuses on the structural biology of PARP family members, addressing key questions regarding the unique modes of regulating ADP-ribose modifications and PARP cellular functions. In the cellular response to DNA damage, PARPs 1, 2, and 3 facilitate genome maintenance by rapidly detecting DNA strand breaks, recruiting repair factors to sites of DNA damage via poly(ADP-ribose), and modulating the local structure of chromatin. This talk will provide our latest research on PARP1 and PARP2 regulatory mechanisms in response to DNA damage and in response to PARP inhibitors that are used to treat cancer. PARP4 has several regulatory domains in common with PARPs 1, 2 and 3, yet there are relatively limited insights into PARP4 mechanism of action and structure. Our recent work on PARP4 structural biology and biochemistry will be presented. Lastly, structural and biochemical results on PARP13 (also known as ZAP – zinc antiviral protein) will be presented, highlighting a novel combination of domains with a distinct mode of engaging poly(ADP-ribose).