Spring 2025

Biochemistry and Molecular Biology Brown Bag Series

Mike Kemp, Ph.D.

Associate Professor

"Damaged cell-free DNA as a biomarker and mediator of the DNA damage response"

Tuesday, January 21, 2025

11:00 AM

Location 125 Oelman Hall

Lab: Mike Kemp, Ph.D.

Boonshoft School of Medicine
WRIGHT STATE UNIVERSITY

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https://science-math.wright.edu/biochemistry-and-molecular-biology

Abstract

Cell-free DNA (cfDNA) is increasingly being used as a biomarker for many different disease states and for determining the efficacy of treatment strategies. Previous studies have primarily focused on the mere presence of extracellular DNA or how DNA sequences can be used in diagnosis and have not considered the fact the DNA can undergo chemical modifications. However, cellular DNA is well-recognized to be susceptible to DNA adduct formation by endogenous metabolism, environmental carcinogens, and anti-cancer drugs, but how these adducts influence cfDNA biology has yet to be explored. Using UV radiation and cisplatin as representative DNA damaging agents capable of generating bulky DNA lesions, our group has recently found that adduct-containing DNA is released from cells in a caspase-dependent manner. Moreover, we have observed that this DNA can be taken up by other bystander cells where it may activate DNA damage and innate immune signaling responses if not efficiently degraded by nucleases. However, little is known about the diversity of DNA damage agents that can lead to release of adduct-containing cfDNA (ac-cfDNA), how cells process this damaged cfDNA, or whether this damaged DNA affects recipient cells that take up damaged cfDNA. Current studies in the lab are aimed at addressing these important questions.