SPRING 2024

Biochemistry and Molecular Biology Brown Bag Series

Mike Kemp, Ph.D.

Assistant Professor

"Emerging functions for damaged cell-free DNA"

Tuesday, January 23, 2024

11:00 AM

Location 125 Medical Sciences Building

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. cfDNA is released from both normal and diseased cells as extracellular chromosomal circular DNA (eccDNA), small, single nucleosomal DNAs, and as larger linear chromatinized DNA fragments that associate with extracellular vesicles (EVs). These DNAs may travel systemically throughout the body and be taken up by bystander cells to potentially impact disease pathogenesis and management. 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. 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 and in association with small extracellular vesicles (SEVs). 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. Here, I will discuss our ongoing and future planned work on this underappreciated aspect of cfDNA.