

Tuesday, July 2, 2024 at 09:31:22 Eastern Daylight Time

Subject: Dissertation Defense - Rayan Ibrahim Alhammad, PhD Biosciences
Date: Monday, July 1, 2024 at 12:28:06 PM Eastern Daylight Time
From: SSB Faculty List on behalf of Diane St. Germain
To: SSB-FACULTY-LIST-L@LISTSERV.GMU.EDU

Dissertation Defense Announcement
To: The George Mason University Community

Candidate: Rayan Ibrahim Alhammad

Program: PhD Biosciences

Date: Wednesday July 10, 2024

Time: 2:00 PM Eastern Time (US and Canada)

**Location: In Person, IABR Conference Room #1004
And Via Zoom**

Join Zoom Meeting:

<https://gmu.zoom.us/j/99781469882?pwd=MAGsTtQEZmnwBONuTCvkH0nSMr6w6W.1>

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Committee chair: Dr. Alessandra Luchini

Committee members: Dr. Lance Liotta, Dr. Donald J. Johann Jr., Dr. Mariaelena Pierobon

Title: "Field Cancerization and Microbiome Effects On Lung Cancer: A Source Of Early Detection Biomarkers To Improve Patients' Outcome"

Abstract:

Lung cancer results in more deaths than any other cancer in the United States, with non-small cell lung cancer (NSCLC) accounting for most cases. Diagnosis typically involves chest imaging, molecular testing, and biopsy. However, most patients are diagnosed at advanced stages, with only a 6% chance of a 5-year survival rate. In contrast, early-stage diagnosis and treatment can result in a favorable prognosis, with a high 5-year survival rate of 70-90%.

The concept of tumor field cancerization describes a phenomenon where normal-appearing cells adjacent to a tumor exhibit molecular alterations associated with tumor development due to carcinogen exposure. Additionally, microbiota dysbiosis might influence tumor development.

Studies have identified several commensal bacteria present in the lower airway tracts, such as *Streptococcus*, *Prevotella*, and *Veillonella*.

The high mortality rate of lung cancer is often attributed to its late-stage diagnosis. To address this challenge, our research focuses on identifying risk protein biomarkers. These biomarkers are the earliest molecular changes indicative of an ongoing tumorigenic process, thus offering significant potential for early intervention.

Our study investigates the field cancerization of NSCLC to understand the molecular changes in the bronchial tree of patients and correlates these findings with blood for a non-invasive diagnostic approach. Using proteomic-based analysis, including nanoparticles and liquid chromatography tandem mass spectrometry (LC-MS/MS), we identified a set of 6 and 13 risk biomarkers for lung cancer. Additionally, we explored the microbiome proteome composition in NSCLC patient tissue and plasma to support future characterization of its potential role in cancer development.

Risk biomarkers will enable the evaluation of individuals at high risk, guiding necessary lifestyle adjustments and facilitating the development of personalized prevention plans and therapies.

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