

Seminar Announcement

Speaker: **María Torres**
Title: **Improving the Diagnosis of Pancreatic Cancer Patients
Using Surface-Enhanced Raman Spectroscopy**
Date: **Friday, September 20, 2013**
Time: **11:30 AM**
Location: **WSLR 116**

Abstract:

Pancreatic cancer (PC) remains at the top list of the malignancies with worst prognosis and poor survival rates. The absence of symptoms combined with the lack of sensitivity and specificity of the current diagnostic tests contribute to the late diagnosis and consequential failure of PC treatments. It is well known that serum markers play an important role in the early diagnosis, predicting relapse, prognosis and assessing response to cancer therapy. The expression of the transmembrane glycoprotein MUC4 has been implicated in the progression of PC and its expression correlates with poor patient survival. Its novo expression in the precursor lesions of PC, the pancreatic epithelial neoplasia (PanIN), confers ideal properties to MUC4 to become a potential PC biomarker. Currently, we are evaluating the diagnostic capability of MUC4 using Surface Enhanced Raman Spectroscopy (SERS).

SERS technology has emerged as a strong platform for the development of an ultrasensitive, rapid assay capable of detecting single molecules from small sample volumes in a single readout. Initially, we concentrated our efforts on systematically optimizing the experimental procedure to develop the capture surface with optimum low-noise characteristics and optimize the readout procedure for Raman spectroscopy. Subsequently, the detection of MUC4 was carried out in the serum of healthy controls (N=18), chronic pancreatitis patients (N=17) and PC patients (N=38), using our optimized SERS-based immunoassay platform. Analysis of variance (ANOVA) was used to determine if MUC4 levels differed significantly between groups. Pairwise comparisons were adjusted using Tukey's method.

Overall, our results indicate that PC patients had significantly higher Raman intensity values of MUC4 when compared to healthy controls ($p=0.005$) and chronic pancreatitis patients ($p=0.001$). These results validate the potential of MUC4 as a PC biomarker and the capacity of the SERS technology for the detection of mucins in PC sera. Larger number of samples are currently being tested to determine the significance of MUC4 as a sensitive and specific marker for differentiating PC from other benign diseases. Additionally, as a combination of biomarkers is found to be more useful in improving the sensitivity and specificity of diagnostic tests, the analysis of multiple biomarkers, including the widely used diagnostic marker for PC CA19-9 and other aberrantly expressed mucins in PC, with the ultrasensitive SERS-based detection platform will aid in generating an optimized diagnostic/prognostic assay for PC patients.

Biography:

María Torres is a Postdoctoral Research Associate in the Department of Biochemistry and Molecular Biology at the University of Nebraska Medical Center. Her postdoctoral work focuses on the development of novel diagnostic assays and therapies against pancreatic cancer. She was born in Ponce, Puerto Rico and completed B.S. degrees in Chemistry and Chemical Engineering from the University of Puerto Rico, Mayagüez Campus in 2003. In 2008 she obtained a Ph.D. in Chemical Engineering from Iowa State University in Ames, IA. Her thesis project consisted on the development of novel biodegradable polyanhydride vaccines for protein delivery. Currently her major research goal is to combine her training in polymer chemistry and cancer biology towards the development of promising cancer theranostics.