DEPARTMENT OF
CHEMICAL & PHYSICAL SCIENCES
COLLOQUIUM SEMINAR SERIES

Wednesday, January 16th
3:10pm in KN L1220

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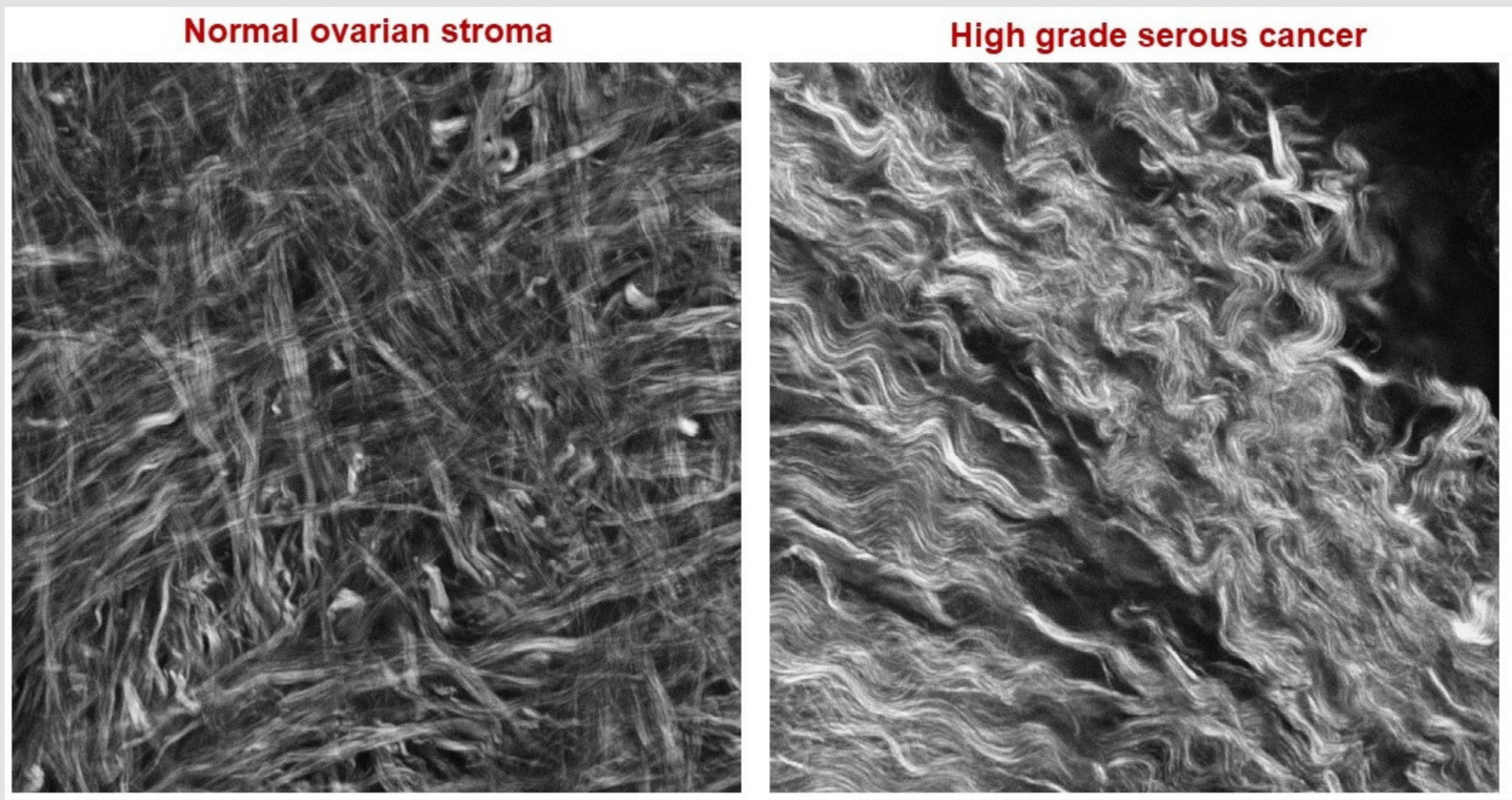
Imaging collagen structure in ovarian cancer and prostate development by Second Harmonic Generation microscopy



Human ovarian cancer is a deadly disease, where poor 5 year survival rates (~25%) are due to insufficient screening tools, where current clinical imaging modalities do not have sufficient resolution and specificity for early detection. To improve upon this situation, we examined the collagen organization in the extracellular matrix (ECM) by Second Harmonic Generation (SHG) microscopy. This is important as the collagen structure is altered in ovarian cancer as well as in other cancers, and this modality may provide an earlier detection method. Here we use pixel-based SHG polarization analyses to investigate the macro/supramolecular collagen structure in ex vivo human ovarian tissues (normal stroma, benign tumors, and high grade serous tumors). We found significant differences in the respective collagen structures, suggesting these differences may provide a label free biomarker for ovarian cancer. We also implemented a form of 3D texture analysis to delineate the fibrillar morphology observed in SHG images of normal ovary and a spectrum of ovarian benign and malignant tumors. We developed a tailored set of 3D filters which extract textural features in the 3D image sets to build statistical models of each class and we achieved 83-91% accuracies for the six classes. Lastly we used SHG analyses to investigate the collagen structure in the developing prostate using an established mouse model. This is important as collagen is altered in both prostate cancer and benign prostate hyperplasia (BPH), where age is an increased risk factor. However the underlying collagen assembly in the developing normal prostate has not been investigated. We found pronounced structural differences in the normal prostate vs that in a disease model, where these studies may inform future screening tools based on collagen alterations.