Mueller matrix colposcope for the characterization of cervical collagen anisotropy by Karla A. Montejo | Joseph Chue-Sang | Yuqiang Bai | Susan Stoff | Mariacarla Gonzalez | Jefferson Gomes | Nola A. Holness | Amir Gandjbakhche | Viktor V. Chernomordik | Jessica C. Ramella-Roman

Preterm birth (PTB) presents a serious medical heath concern in both economically developed and developing nations. There is a high incidence of PTB ranging from 11%-15% worldwide, and 18% in Miami-Dade County. The causes of PTB are numerous, but always results in compromised cervical structure. Changes in cervical collagen bundle orientation and distribution may prove to be a predictor of PTB. Polarization imaging is an effective means to measure optical anisotropy in birefringent extracellular matrix tissue such as those rich in collagen. Non-invasive, full-field Mueller Matrix polarimetry (MMP) imaging methodologies, optical coherence tomography (OCT), and second harmonic generation (SHG) microscopy were used to assess cervical collagen content and structure in non-pregnant porcine cervices. The OCT imaging was used to verify the efficacy of the MMP in assessing changes in collagen orientation. Circular statistics were used to obtain kurtosis and mean orientation angle of polarization sensitive images. In vivo studies using a Mueller Matrix colposcope are underway. Further studies of cervical collagen orientation at different time points during remodeling are needed to understand if Mueller matrix polarimetry can effectively measure changes in cervical collagen orientation in pregnancy or disease.