Spectrally Mapping Doxorubicin in Cancer Cells

Doxorubicin (Dox), a class of antibiotic, is used to treat many forms of cancer including leukemia, non-Hodgkin's lymphoma and cancers of the ovary, breast and other soft tissues. Dox is often encapsulated in liposomes to target these cancers. There are several experimental therapies combining Dox with other drugs designed to enhance cancer treatments and reduce toxic side effects of the drug. The uptake and intracellular availability of the drug in live cancer cells can be studied using the CytoViva Hyperspectral Microscope System. Using the CytoViva system, a high signal-to-noise spectral image of free Dox in solution on a glass slide was obtained (Figure 1). The spectral signature of the drug, determined from the data contained in this hyperspectral image, has a prominent peak near 580nm and an abrupt drop in the spectrum at shorter wavelengths (Figure 2), thus providing a unique signal for spectrally mapping the drug in cells.

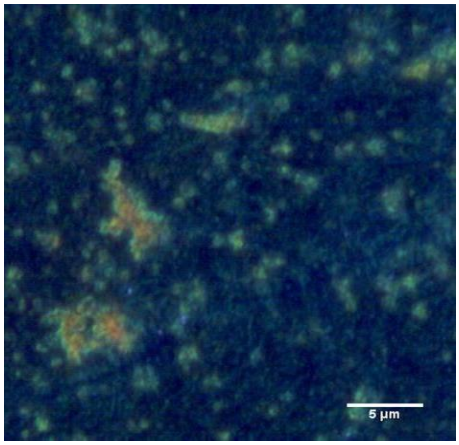

Figure 1: 5 Dox in solution

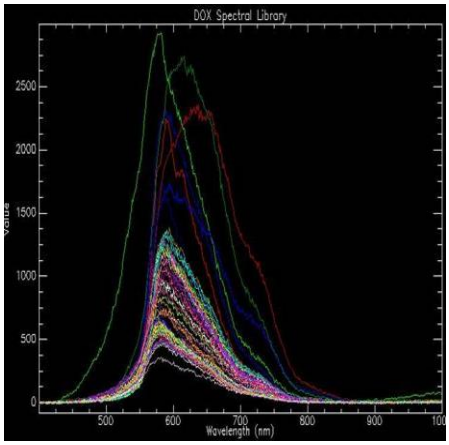

Figure 2: Dox Spectral Profile

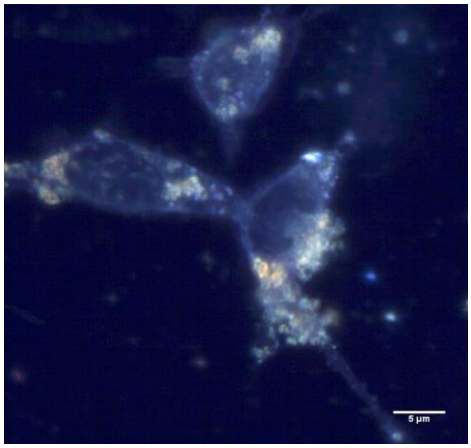

Figure 3: Cancer cells incubated with Dox.

Figure 3 is a hyperspectral image of unstained cancer cells that have been incubated with Dox. While the intracellular location of Dox seems optically apparent, spectral analysis is needed for verification. The presence of Dox in the cells is confirmed by comparing the spectral signatures in Figure 2 to the data contained in Figure 3. Figure 4 shows (in red) the pixels that spectrally confirm the presence of Dox in these live cancer cells.

This experiment is an example of the CytoViva Hyperspectral Microscope system's ability to spectrally characterize and determine the location of drugs in cells.

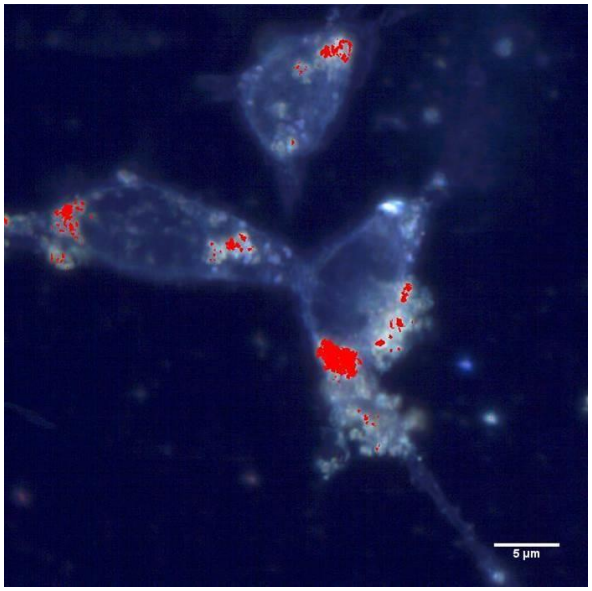

Figure 4: Pixels in red show location of Dox in cells .

CytoViva, Inc • 570 Devall Drive • Suite 301 • Auburn, AL • 36832
info@cytoviva.com • 888-737-3130 • www.cytoviva.com