Hybrid imaging of fluorescently labeled cancer drugs and label-free FWM microscopy of cancer cells and tissues

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Fluorescent labels are well suited as tracers for cancer drug monitoring [1]. Identifying cellular target regions of these drugs with a high resolution is important to assess the working principle of a drug. In this study we investigate the applications of label-free four-wave mixing (FWM) microscopy in biological imaging in combination with fluorescence imaging of fluorescently labeled cancer drugs. Results from human A431 tumor cells with stained nuclei and incubated with IRdye 800CW labeled cancer drug cetuximab targeting EGFR at the cell membrane show that FWM is well suited for cellular imaging. A comparison between vibrationally nonresonant FWM imaging with vibrational resonant coherent anti-Stokes Raman scattering (CARS) signals revealed nearly identical qualitative information in cellular imaging. FWM is also suitable for tumor tissue imaging in combination with fluorescence imaging of IRdye 800CW labeled, HER2 targeting cancer drug pertuzumab and provides additional information over transmission microscopy.