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Abstract 4750: Real-time imaging of 3-dimensional cancer cell movement in tissues

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Abstract 4750: Real-time imaging of 3-dimensional cancer cell movement in tissues

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Abstract

Our knowledge of how cells move in 3D in tissues is limited due to the lack of imaging methods that can produce 3D images fast enough and with sufficient resolution. Cancer cells migrate in 3D by forming adhesion points at the end of very long cellular protrusions. These protrusions are very thin and it is difficult to visualize adhesions along the protrusion surface. Conventional 3D stack reconstruction has relatively low resolution unless it is done using many frames. This results in a very slow acquisition in 3D confocal microscopy. Faster methods of 3D data acquisition (spinning disk microscopy) cannot be easily implemented since there is significant amount of scatter in tissues. A major obstacle in imaging adhesions is to find and track them so that they will not go out of focus. We are developing a new method which is based on orbiting imaging around cellular protrusions to visualize protein dynamics during extravasation. A feedback mechanism controls the center of the orbit to be at the center of the fluorescence distribution. A program reconstructs the shape of the protrusions in 3D. The fluorescence intensity in one or more channels is also simultaneously measured. The fluorescence intensity of one channel is used to paint the protrusion shape, which results in the 3D reconstruction of the protrusion. During the orbit, the second channel of the microscope measures the second harmonic generation (SHG) signal. We then correlated the appearance of bright fluorescence spots on the protrusion surface with the points of contact of the protrusion. This method will enable imaging of cancer cell invasion in 3-dimentions in live mice in real time.

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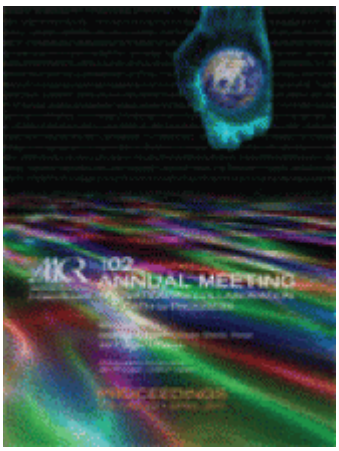

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