A new imaging method for confocal microscopy

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It is well known that the confocal microscope is indispensable today as the tool that clarifies three-dimensional structures and temporal transformations of the living specimen. The biggest advantage of the confocal microscope is to obtain "Optical slices" (Section images) in the direction of depth. The specimen is illuminated point by point in the confocal microscope, and the emission from each single point is detected by a photodetector through a small aperture (pinhole). The smaller the diameter of the aperture, the thinner the optical slice becomes. Closing the aperture causes a decrease in Signal-Noise (S/N) ratio by reducing the detection signal.

By using a traditional confocal microscope the images are acquired after adjusting and fixing the diameter of the pinhole aperture according to the specimen conditions. After acquisition, it is impossibleto change the thickness of the section images. When using living cells, during time-lapse experiments, this can be a big problem as the specimen often drifts in Z direction. In this presentation, a new detection method, which solves these problems, is introduced. By using this method, only one scan is done to acquire an image that incorporates information of different optical slices, without scanning a z series. Images are acquired with low photo damage to the specimen and at high speed. Moreover, the image display in real time. In addition, the changeable width of the optical section for each pixel enables to widen the dynamic range of images.