

Three-Dimensional Analysis of Cells and Organelle Architecture

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Three-dimensional (3D) architectures of the living organism will link to their functions. However, it is difficult to analyze how protein particles assemble to the structure that we can observe by microscopy. Modern electron microscopic techniques such as electron tomography and focused ion-beam scanning electron microscopy (FIB/SEM) enable to reconstruct the detail 3D architecture of biological specimen with nanometer scale resolution and have a possibility to visualize the complete architecture of a cell^{1,2}. Additionally, FIB/SEM method has a characteristic that suit the correlative observation between light and electron microscopy referred to as CLEM observation. Using this property, we are trying to visualize the 3D organization of mitochondria-ER-associated membranes (MAMs) around a mitochondrion at a moment of fission. Now we can visualize the 3D organization of temporospatial specific object in the cell. This CLEM observation combined light-microscopic live imaging with FIB/SEM reconstruction would be a powerful tool for life science.

References

Ohta, K., Higashi, R., Sawaguchi, A. & Nakamura, K. Helical arrangement of filaments in microvillar actin bundles. *Journal of Structural Biology* 177, 513–519 (2012).

Ohta, K. et al. Beam deceleration for block-face scanning electron microscopy of embedded biological tissue. *Micron* 43, 612–620 (2012).

