BRIDGING THE GAP BETWEEN CONFOCAL MICROSCOPY AND TRANSMISSION ELECTRON MICROSCOPY USING SERIAL BLOCK FACE SCANNING ELECTRON MICROSCOPY.

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Serial block-face scanning electron microscopy (SBFSEM) is a new automated technique for providing 3D information about cells or tissues at a resolution of 50 nm or better [1]. SBFSEM provides a streamlined and automated 3D data acquisition process for imaging samples formerly only suitable for TEM. An automated microtome equipped with a diamond knife is mounted inside the chamber of the SEM and shaves the block face sample in between imaging steps. In this way a series of images are collected that can be brought together as a 3D dataset. The SBFSEM imaging process allows for the routine collection of 100 or 1000s of slices through a sample, spanning many tens or hundreds of micrometers.

In this example a Gatan 3View was used to image serial sections of murine neural tissue (approx 4 nm x 4 nm x 50 nm pixels) [2]. A total of 700 sections were imaged, reconstructed and segmented as shown in Figure 1. In this data set the dendritic spines can be clearly visualized. Shown in Figure 2 are the individual synaptic vesicles observed within the synaptic cleft.