—Photogravure—

The Surface Morphology of Normal Human Leukocytes by Chilled Scanning Electron Microscopy

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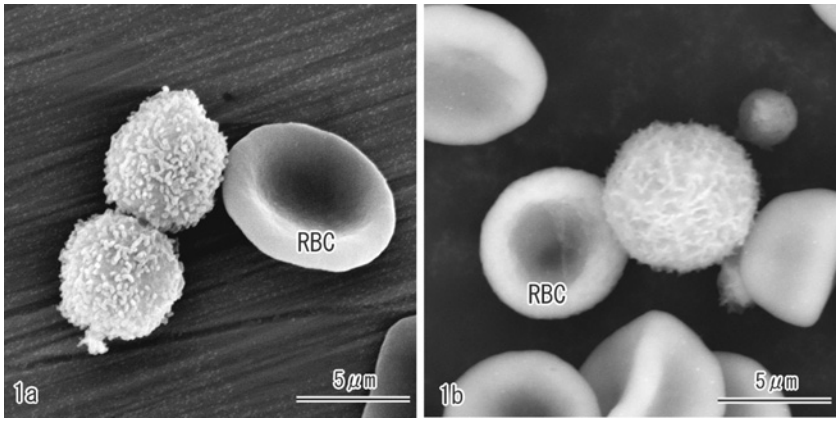

Fig. 1

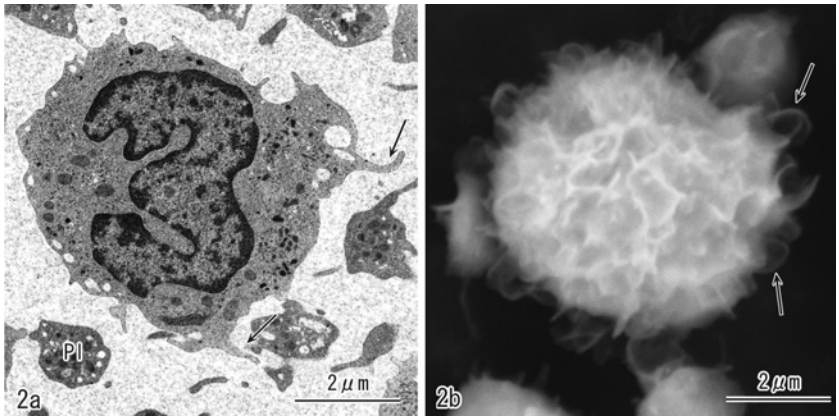

Fig. 2

In conventional scanning electron microscopy (SEM), granulocytes are difficult to distinguish from monocytes and lymphocytes. Therefore, we tried a new method of chilled SEM[1]. Chilled SEM, a low-vacuum SEM with a cooling stage, provides images through back-scatter electrons. In comparison with specimens for conventional SEM, specimens for chilled SEM are not completely dehydrated in ethanol and require no critical-point drying and no metal coating[1]. Chilled SEM images provide information beneath the surfaces of uncoated specimens[2,3]. Thus, chilled SEM appears able to distinguish different leukocytes. Granules are observed in neutrophils, eosinophils, and basophils. Lymphocytes have no granules. Monocytes have well-developed ridge-like ruffles that other leukocytes do not.

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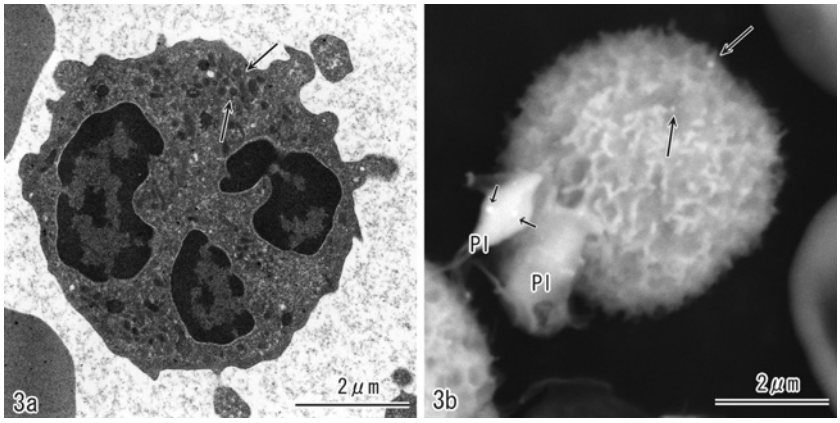

Fig. 3

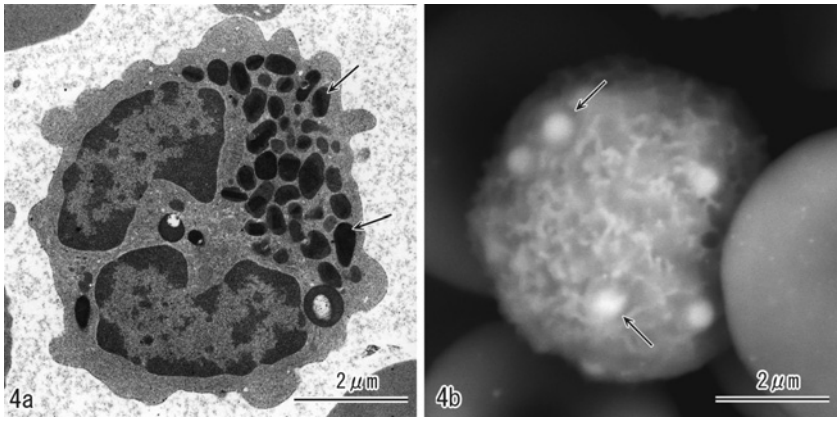

Fig. 4

Fig. 1 Comparison of conventional SEM and chilled SEM for lymphocytes. **a**: The surface of cells have many microvilli on conventional SEM. **b**: Many smaller ridge-like ruffles are seen on chilled SEM. Circulating disk-shaped red blood cells (RBCs) have the same surface morphology with both conventional SEM and chilled SEM.

Fig. 2 Ultrastrucure of monocytes. **a**: A well-developed cytoplasmic projection **(arrows)** is seen on transmission electron microscopy. Pl, platelet. **b**: Well-developed ridge-like ruffles **(arrows)** are seen with chilled SEM.

Fig. 3 Ultrastrucure of neutrophils. **a**: Cytoplasmic projection and many small granules **(arrows)** are seen with transmission electron microscopy. **b**: Smaller ridge-like ruffles and a few small granules **(long arrows)** in neutrophils are seen with chilled SEM. A few small granules **(short arrows)** are also seen in platelets (Pl).

Fig. 4 Ultrastrucure of eosinophils. **a**: Cytoplasmic projection and many big granules **(arrows)** are seen with transmission electron microscopy. **b**: Big granules **(arrows)** and smaller ridge-like ruffles are seen with chilled SEM.

References

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