ABSENCE OF LIPOPROTEIN IN PULMONARY SURFACTANTS

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The "alveolar-capillary barrier", which separates the air of the pulmonary alveoli from the blood of the pulmonary capillaries, has been rather well defined by electron microscopy as consisting of the capillary endothelial cell, interstices, alveolar epithelial cell, and acellular lining layer. The latter covers the plasma membrane of the epithelial cell and is the external limiting surface that makes contact with alveolar air (1,2)(Fig. 1). The chemical components of the alveolar lining layer, which have been termed "the surfactant system of the lung" (3), probably include proteins, carbohydrates, phospholipids and other lipids (2,3,4).

The discovery that saline extracts of pulmonary tissue and foam obtained from normal lungs are highly surface-active led to the hypotheses that pulmonary surfactants are essential determinants of alveolar stability (5) and that they modulate alveolar liquid balance to prevent pulmonary edema (6). Indeed, experimental alteration of the surface properties of the lung results in alveolar instability, alveolar collapse, and pulmonary edema (7,8). In addition, several pathological conditions of the lung have been related to disruption of normal surface properties of the alveoli (3).

The pulmonary surfactants reside in the alveolar lining layer and are components of the surfactant system (3). As such they probably form a surface film at the interface between the lining layer and alveolar air, and thus impart to the lung the surface properties that are essential for normal function. The idea that the physiologically important surfactants of the alveolar lining layer are phospholipids was established by Klaus and co-workers (9).
Fig. 1. Electron micrograph of normal rat lung. Magnification 40,000 x. A: alveolus. Arrow: surface film. H: hypophase. (Courtesy of Dr. Yutaka Kikkawa).