PREFACE

The seminal observation by Liggins in 1969 that glucocorticoid treatment of fetal lambs resulted in enhanced lung maturation initiated the concept that the fetal lung is a hormonally responsive organ. During the past thirty years, great progress has been made in defining the roles of steroid, peptide, and polypeptide hormones in lung branching morphogenesis, differentiation of specialized cell types, and surfactant synthesis. In addition to glucocorticoids, it is apparent that the sex steroids, retinoids, catecholamines, prostaglandins, and peptide and polypeptide hormones, including a number of growth factors and cytokines, influence lung growth and differentiation as well as surfactant synthesis. Whereas the steroids and certain polypeptide hormones are delivered to lung through the systemic circulation, growth factors are produced locally by mesenchymal cells surrounding the developing lung buds, by type II epithelial cells, or by their precursors. Additionally, a variety of bioactive peptides are produced by innervated clusters of neuroendocrine cells that lie within the primitive airway epithelium.

Endocrinology of the Lung: Development and Surfactant Synthesis contains contributions from investigators studying the actions of the various classes of endocrine, paracrine, and neuroendocrine factors on lung development and surfactant synthesis. The model systems used in their studies range from whole animals to organ and cell culture and to transgenic, genetically altered, and gene-targeted mice. The first seven chapters are devoted to the actions of glucocorticoids on lung development and on the synthesis of surfactant glycerophospholipids and the surfactant proteins—SP-A, SP-B, and SP-C. Included in this group is a chapter on the role of the major histocompatibility complex (MHC) locus in glucocorticoid responsiveness, as well as one that addresses the role of corticotropin-releasing hormone (CRH) and glucocorticoids in lung development and surfactant synthesis using CRH gene-targeted mice. Two chapters address the actions of hormones that bind to other members of the nuclear receptor family; one is concerned with mechanisms that underlie the sexual dimorphism of fetal lung maturation and sex differences in responsiveness to perinatal glucocorticoid administration, while the other is concerned with the roles of retinoids and their receptors in lung development, surfactant synthesis, and the repair of lung injury in human premature newborns. Another chapter deals with fetal lung maturation and surfactant synthesis in the diabetic pregnancy and the effects of insulin on the synthesis of surfactant lipids and proteins. The remaining six chapters review the importance of cell–cell interactions and elaborate on various growth factors and bioactive peptides in lung branching morphogenesis, cell differentiation, gene expression, and pulmonary pathophysiology. The use of transgenic and gene-targeted mice to define the roles of members of a number of growth-factor families and their receptors in the regulation of lung morphogenesis and cellular differentiation also is addressed.

It is therefore apparent that lung growth, differentiation, and surfactant production are controlled by a variety of circulating and locally produced hormones and growth factors that exert their effects via endocrine, paracrine, autocrine, neuroendocrine, and possibly intracrine mechanisms. In light of the importance of circulating hormones and of growth factor-mediated cellular interactions in lung growth, cell differentiation, function, and pathophysiology, it is my hope that *Endocrinology of the Lung: Development and Surfactant Synthesis* will have appeal, not only to pulmonary biologists, but also to those working in the areas of hormone action, and developmental and cell biology of other organ systems.

I would like to express my sincere appreciation to the contributors who have collaborated to make this a comprehensive review of the lung as an endocrine-responsive organ.

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