
Preface

A lot of fascinating biology occurs at epithelial interfaces, whether between organism and environment or within body compartments. Many diseases inflicting huge personal and societal burdens result from dysfunction of epithelial systems, e.g., carcinomas. Bolstered by the breakthrough studies of George Gey that introduced HeLa cells to the world in 1953 (*J Exp Med.*; 97(5):695–710), epithelial cell cultures have been an integral and crucial part of the biomedical research enterprise, adding unique capabilities and enabling mechanistic approaches. In modern times, thousands of publications reporting studies using epithelial cell cultures are added to the peer-reviewed literature annually. The first edition of *Epithelial Cell Culture Protocols* hit the shelves in 2001, but since then there has been an ever-escalating series of research advances: directed differentiation of embryonic stem cells and induced pluripotent stem cells, robotic high-throughput screening, whole genome siRNA and shRNA libraries, massively parallel sequencing at low cost, identification of somatic stem cells in key organs, to name a few. There has been a quieter but steady change too. Depending on the question, many studies routinely done in the past with well-known and easily cultured cell lines on conventional plastic are no longer acceptable to reviewers and editors of the highest tier journals or to members of study sections making decisions for granting agencies. Common refrains are “will it hold up in primary cells?” or “needs to show in well-differentiated primary cells.” Although still models, modern culture methods for primary cells that recapitulate the structure and function of the endogenous cells *in vivo* are often superior. In our own field of cystic fibrosis research, therapeutic validation in well-differentiated human airway epithelial air–liquid interface cultures appears better than heterologous screening assays for predicting ultimate success in clinical trials. However, there is a catch. Procurement of primary tissues requires approval by ethics committees and cooperation of pathologists or organ procurement agencies, modern state-of-the-art methods can be complex and costly, commercial cell suppliers use proprietary methods for expensive products, primary cells are unpredictable, variable, and difficult to transfect, and so on. Although it would be impossible to cover all epithelia, we sought to provide a cross-section of up-to-date culture protocols for the most heavily studied cell systems. Chapter by chapter, we start at the head and move down the body axis, focusing on human primary cells. In some cases of heavily used models or when no human counterpart is established, we include animal models. We also feature supporting technologies. Our goal was to provide the best possible information from outstanding investigators. For this, we are eternally grateful to the excellent scientists who responded positively to our solicitations. We are especially thankful to those who submitted well-formatted manuscripts in a timely fashion and those who filled in late stage gaps. We appreciate the patience and understanding of all our contributors and Professor Walker, the Series Editor. Our sincere hope is that the protocols herein will assist readers in their quest to advance biomedical science for the betterment of humankind.

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