

Preface

The evolutionary appearance of multicellular organisms is coincident with the emergence of molecular mechanisms that allow cells to contact their neighbors and to receive positional cues essential for the development of complex tissue architecture and function. Cells interact with one another and with the extracellular matrix (ECM) through a variety of mechanisms. Often, large macromolecular complexes assemble at sites of contact in order to perform specific functions, including adhesion, communication, and to form barriers between tissue compartments. These complex molecular assemblies—or “cell junctions”—are now thought of as cellular organelles that not only mediate physical interactions, but also couple cell contact to signaling pathways that influence cell shape, cell-cycle progression, and gene expression. The manifestation of these various functions becomes apparent in model organisms in which genes encoding cell junction proteins have been ablated, and in the growing list of human disorders that are now known to result from gene mutations in junction components. Indeed, the phenotypes and clinical presentations of these genetic and acquired disorders are impressive in both scope and variety.

The chapters of this book cover a wide range of cell–cell and cell–matrix interactions. The first section of the book focuses on cell–matrix interactions, including focal adhesions and hemidesmosomes. Embedded within these chapters are discussions of integrin activation and cytoskeletal interactions, as well as signaling mediated by integrins and their cytoplasmic binding partners. The importance of the physical three-dimensional structure of the ECM in regulating cell behavior is underscored. The second section of the book concentrates on cell–cell interactions, including anchoring junctions such as adherens junctions and desmosomes, which utilize cadherins as the major adhesive molecules. Tight junctions and gap junctions are also highlighted, with unique insights provided into the roles of these proteins in complex epithelia and disease pathogenesis. Several chapters in the volume converge on the regulation of cell junction dynamics, including the turnover of membrane proteins, the exchange of components into and out of junctions, and the interface between membrane-trafficking pathways and adhesion receptors. The book concludes with a chapter on how cell–cell and cell–matrix interactions are coordinated during complex morphogenic processes.

We hope that the assembly of these chapters—all in one bound volume and authored by some of the world's leading investigators—provides a resource that is valuable to the new student of cell junctions, to experienced scientists in the field, and to those educators who require a comprehensive assembly of overviews in the discipline of cell contact and adhesion. We are enormously grateful to the authors of each chapter for their outstanding contributions. It is our hope that this book provides not only a resource and compilation of existing knowledge and insight, but also a foundation for future studies designed to understand how cell contact and adhesion influence development and human disease.

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