Human Cell Culture Protocols
Human Cell Culture Protocols, edited by Gareth E. Jones, 1996
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Human Cell Culture Protocols

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Humana Press Totowa, New Jersey
Preface

Cell culture is now a routine approach for the preparation of cells from a variety of sources as an adjunct or replacement for animal work. In an earlier era, the methodology seemed shrouded in mystery, a useful device for sustaining exclusivity by some of the pioneers, notably Alexis Carrel. Although he was undoubtedly responsible for many early developments, his claims for the extreme difficulty of the tissue culture techniques put off a lot of his contemporaries and interest in tissue culture declined markedly for many years even after he gave up his own studies. Nevertheless, not everyone succumbed to the inertia engendered by Carrel’s domination, and the work of others such as Harrison and Rous was sufficiently innovative to attract a small stream of followers. By the outbreak of World War II, increased knowledge of cell metabolism had brought about significant improvements in the formulation of culture media and fully defined media were being produced by the 1960s.

Despite technical advances, such as using enzymes or defined or near-defined media, cell or tissue culture was still a time-consuming technique at this time, largely because of the huge chore of weekly media preparation. Fortunately the growing importance of cell culture drove the development of a whole industry devoted to supplying materials for tissue culture, so that by today there are companies providing 80 varieties of media, along with culture flasks, pipets, enzyme solutions, and even cultures of cells. Much of the drudge facing the worker in cell culture has now disappeared, and there are now many books published devoted entirely to the detailed description of specialist culture techniques. So why produce this volume?

The origins of Human Cell Culture Protocols lie in the repeated requests of clinical scientists and their allies for advice on cell culture. Despite the great advances described above, it is fair to say that the bulk of the available help is directed to those working with nonhuman material. Even where human cells are described, there has been a tendency to concentrate on a few well-established cell lines, such as HeLa or A431 cells. Though such sources can be very useful for certain work, no one would pretend that such lines are representative of normal human tissue. Scientists closely involved with clinical research have largely been obliged to adapt many of the techniques developed for the culture of such cell lines, introducing many innovative approaches to deal with the particular problems of establishing cultures from biopsied human samples. Very great progress
has been made over the last decade, driven by the demands of pharmaceutical companies as much as the academic interest in the cellular basis of human development and disease. These techniques are published, but not in a convenient form for rapid retrieval, since they are usually embedded in the methods sections of research papers. *Human Cell Culture Protocols* is the first attempt to provide a catalog of protocols devoted entirely to human cell culture.

It has been estimated that there are some 200 distinct cell types in the human body, though such a classification is somewhat arbitrary. Arbitrary or not, the present book could not possibly cover this range so I have selected contributors who were able to provide detailed protocols for a selection of the major tissue groupings. Connective tissue cells are well catered for, from fibroblasts through chondrocytes to osteocytes. Blood cells are similarly explored in detail with chapters covering NK-cells, monocytes, B-lymphocytes, and T-lymphocytes. Several examples of epithelial types are described; keratinocytes and airway cells being standard tissues used by many clinical investigators, but I also include less well-known material, such as thymic epithelial cells, which have unique functions in relation to normal organ function. Muscle is another major area of clinical research, and there are chapters detailing the culture of two very different smooth muscle sources, namely uterine and aortic smooth muscle. Skeletal muscle culture is also described, but I have not included a chapter on cardiac myocytes, since no satisfactory method yet exists for this material. Other major organs that had to be included were liver and kidney, as well as endothelia and some of the more esoteric tissues that nevertheless have considerable clinical significance. Among the selected range included in this volume you will find melanocytes, Langerhans' cells, trophoblasts, and cells of the conjunctiva.

The choice of chapters owes much to the advice of many clinical colleagues and friends, but I feel that coverage of neuronal tissue (including their support cells) must await a future edition. To provide some compensation, I have provided, in chapters prepared by Manuel Vega, protocols that demonstrate the power of modern molecular techniques applied to genetic disorders, in this case the disorder being cystic fibrosis. Finally I thought it wise to include a chapter on the detection of mycoplasma in cell cultures. These agents are pervasive in human material and, unlike most bacteria and common fungal contamination, not easy to eliminate once they spread throughout your cultures.

I would like to conclude by thanking Clare Wise for her ready assistance with proofreading and Professor John Walker for his steady encouragement throughout my labors. Thanks also to the staff of Humana Press for their tolerance of my sometimes tardy responses to their requests for chapter revisions, my only excuse is the constant wail of all academics—too busy!

*Gareth E. Jones*
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