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Book Review

Methods in molecular medicine

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Cancer Cell Culture: Methods and Protocols. Edited by P Simon. Humana Press, Langdon

Cultured cancer cells are one of the most powerful tools to study molecular changes during cellular transformation and carcinogenesis. They also serve as perfect *in vitro* models, useful for understanding the function of a gene of interest both alone and in association with other cellular components in that particular cancer type. Cancer Cell Culture: Methods and Protocols edited by Simon P Langdon supplies easy-to-follow protocols to isolate, characterize and culture various types of cancer cells, to perform several basic cell culture experiments and methods to identify and eliminate different kinds of contamination.

The book is composed of seven major parts, each subdivided into several chapters. At the beginning of several parts, there is a general introductory chapter, where essential and basic theoretical knowledge is provided. Other chapters begin with a brief Introduction, followed by a 'Materials and methods' section. The Materials and methods section is presented very clearly as the chemicals, buffers and lab hardware required to perform the techniques described in that particular chapter are listed under separate headings, instead of as a single long list. For example in Chapter 4, where authentication of cancer cell lines by DNA fingerprinting is described, the Materials and methods section is divided into three parts, where the requirements to perform DNA extraction, multiplex PCR fingerprinting and multifocus DNA fingerprinting are listed separately. However, it would be better if the recipes of the buffers were given as a list at the end of the book – instead of separately in the Materials and methods section in each chapter – both in order to prevent repetition of the same recipe in different chapters and to supply readers a more user-friendly guide.

One of the most appealing features of this book is the 'Notes' section at the end of almost every chapter, which forms a more detailed and expanded kind of trouble-shooting guide. In this section, authors not only explain solutions to commonly encountered problems but also give practical tips about critical parts of the experiments.

Part I is the main introduction and description of basic techniques where a historical perspective to the evolution of cancer cell culture is given, and the basic tools and techniques required to perform cancer cell culture, including the different types of media, basic lab design, initial establishment, routine maintenance, subculturing and cryopreservation of a primary culture, are explained. The web addresses of several cell line banks are also listed.

Part II explains characterization and authentication of cancer cell lines. It begins with an introductory chapter where the reason and importance of cell line characterization is explained and brief background information about the methods that can be used for this purpose is given. The other two chapters also start with brief introductions, where DNA fingerprinting and cytogenetic analysis are explained in rather more detail and protocols to perform these techniques are given.

One of the longest parts of the book is Part III where isolation and culture of cells originating from different types of tumor are described. This part covers many different cancer types, including colon cancer, melanoma, glioma, renal cancer, prostate cancer, ovarian cancer and leukemia. However, several other very commonly used cancer cell types, such as liver cancer, breast cancer or lung cancer models are missing. The introductory section in each chapter is very short but efficient with regard to the nature of the book. In almost every chapter there are pictures of examples of a primary cell culture and a cell line of that particular cancer type. Different methods of establishing a primary cell culture according to starting material, such as from solid tumors, ascites effusions or fine-needle aspiratory biopsies, are explained at different levels with useful experimental tips in the different chapters. Therefore, I would suggest reading all the chapters in Part III, in order to have a general idea about different methods for the isolation and culture of cancer cells, before starting this kind of an experiment.

Although specific cancer cell types may require specific methodologies, basic protocols for several cell types are similar, resulting in the recurrence of the same protocol in different chapters. For example, in Chapter 9 where isolation and culture of renal cancer cells are described, the Materials and methods and Notes sections are identical to those for colon cancer cell lines described in Chapter 6. However, the Materials and methods section for colon cancer cell lines covers additional techniques, such as primary cell culture from ascidic effusions, isolation and propagation of cancer cells from floating cell aggregates, tightly packed clumps and floating/adherent mixed subpopulations. In order to avoid such repetition, it would perhaps have been preferable to describe the basic methodology in a general methods section and give tissue-specific details in separate sections.

Procedures for functional assays to evaluate viability, apoptosis, migration, adhesion, invasion, senescence and angiogenesis are covered in Part IV. In this part, some of the introductory sections are longer and more satisfactory; however, Materials and methods sections supply limited but basic information. For example, three of the 11 chapters are

devoted to the detection of apoptosis and in each, some of the most commonly used techniques, such as PARP cleavage, TUNEL assay and annexin-V assay, are described. However, there is no information about induction of apoptosis by different agents, detection of apoptosis by different methods such as direct caspase activity assays, analysis of DNA laddering, comet assay or cytochrome *c* release. Therefore, although these chapters are a useful introduction to basic apoptosis methods, other sources are required for these perhaps more sophisticated techniques.

In the next part, several procedures for modifying cancer cells are summarized under four major headings, where gene transfer, development of drug-resistant models, immortalization of human prostate cells and use of matrigel as a tool for an *in vitro* xenograft model are explained. The techniques summarized in this part are brief but comprehensible. However, information about several new and powerful techniques, such as the use of siRNA, is missing.

In addition, the level of detail provided varies between different chapters. For example, in Chapter 24, where DNA-mediated gene transfer is described, various options to make transient or stable expression, such as by DEAE-dextran, calcium phosphate, cationic lipids/polymers or electroporation are explained. On the other hand, for measurement of transfection efficiency, only the use of β-galactosidase is described and use of fluorescence proteins is not mentioned.

The last two parts cover coculture systems and different types of cell culture contamination. The Introduction section to Part VII is comprehensive as it explains both microbial contamination and cross-contamination between cell lines. Tables summarize indications and sources of contamination and methods for the effective elimination of the contaminant. Finally, the last two chapters are dedicated to the detection and elimination of mycoplasma.

As an overall analysis, the general organization and format of the book is excellent. Commonly used key procedures are classified in seven major parts, which makes it easy and simple to jump quickly to particular protocols. Although some chapters provide short and relatively superficial theoretical background, the introductory sections of several chapters are very satisfying. Materials and methods sections are presented in a very user-friendly and clear style. However, in some chapters, the authors appear to describe their favourite techniques instead of giving a more general coverage; therefore, researchers seeking for broader and more detailed information need to look elsewhere. The chapters describing the isolation and culture of specialized cell types and potential contamination are particularly good. The Tables and charts are particularly efficient in summarizing information and serve their purpose extremely well. Finally, I again would like to emphasize the excellence of the 'Notes' sections, as they provide critical details and hints of experiments in a very practical way.