Cell Death and Differentiation (2004) 11, 1053–1054

www.nature.com/cdd

Book Review

Methods for Checking Cell Cycle Checkpoints

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Cell Death and Differentiation (2004) **11,** 1053–1054. doi:10.1038/sj.cdd.4401464

Methods in Molecular Biology. Cell Cycle Checkpoint Control Protocols. Edited by HB Lieberman, Humana Press, Totowa, NJ, USA. ISBN 1-58829-115-4. Year 2004. Price $99.50

An interesting book has recently appeared from the Humana press on 'Cell Cycle Checkpoint Control protocols', in their series on Methods in Molecular Biology.

Generally, the subject is really brought up to date. The analysis of different proteins, potentially involved in the checkpoints between different phases of the cell cycle, has become more and more important in a variety of fields, from embryology to cancer research. Basic knowledge of the field is also essential for thinking towards new therapies for cancer and other diseases, based on the inhibition or activation of checkpoint proteins.

The editor of this book, Dr. Howard B Lieberman has worked in this field for at least the last 10 years, and so is admirably suited to edit a volume covering this area. Contributors come from different laboratories in the States and Canada, and have different scientific backgrounds thus bringing different perspectives to the subject.

The book is divided into four parts: induction and detection of changes in cell cycle progression, analysis of genes involved in checkpoint control, analysis of proteins involved in checkpoint control and, finally, chromosomes and the cell cycle. Each part is full of protocols applied to different kinds of cells, from yeast to mammalian species. Every chapter starts with a brief introduction, followed by detailed lists of materials, step-by-step description of methods and many notes to help in problem solving and in ensuring success.

The first part, of eight chapters, deals with the most commonly used methods to synchronize cells at specific points of the cell cycle. The first chapter describes cell cycle checkpoint induction by treatments with gamma and UV irradiation; those following deal with different methods of synchronization.

Part II begins with the explanation of possible strategies to isolate evolutionarily conserved genes that are involved in the checkpoints. Among them, the use of microarray, *in vitro* mutagenesis and gene overexpression are described. The third part includes a description of proteomic analysis, the detection of kinase and phosphatase activities and the study of protein–protein interactions.

The last chapters concern chromosomal damage in relation to cell cycle checkpoints, analysis of the influence of proteins involved in regulating the cell cycle on telomere metabolism and a study of spindle formation and disassembly in yeast. The first three parts are in appropriate proportions to each other and adequately cover their respective subjects. However, the last part contains only three chapters on 'chromosomes and the cell cycle' and does not fit very well with the rest of the book. In fact, chapter 24 is titled: 'Chromosomal Changes and Cell Cycle Checkpoints in Mammalian Cells', but deals only with the different kinds of chromosomal aberrations that can be induced in the various cell cycle phases. Nothing is said about the relationship between cell cycle checkpoints and chromosome aberrations. It would also be useful to add a chapter on studies of spindle assembly and disassembly related to mitotic checkpoints, in mammalian cells, as is presented for yeasts. This subject has emerged in the last years as very important, not only for basic science but also for studying the genomic alterations that occur during tumor transformation. Indeed, several proteins involved in the control of the transition between metaphase and anaphase have been characterized.

Inevitably, it is difficult to ensure consistency of style and to avoid repetition in books written by many authors. The different authors bring different backgrounds and experience and overall there is some heterogeneity in coverage. Some chapters are really exhaustive and up to date, while others do not report all the most widely used and recent techniques and references are not always fully updated. Some chapters also lack figures and diagrams, which can be very useful to illustrate the technique and show the sort of results anticipated. For example, in chapter 2, entitled 'Methods for Synchronizing Mammalian Cells', only the shake-off method (which is not suitable for all cell types) is described, with or without the addition of agents that can arrest cells in G1/S or S/G2. The possibilities of chemically synchronizing mammalian cells are much wider, and at least drugs that arrest cells in mitosis should have been described. Moreover, the most recent article cited dates from 1987.

In contrast, chapter 5, showing 'Methods for Detecting Cells in S Phase', is really quite exhaustive, even if no figures clarifying the expected results are included. Another useful chapter is chapter 9, 'Strategies to Isolate Evolutionarily Conserved Cell Cycle Regulatory Genes', which illustrates the pathways available for researchers to identify genes involved in the checkpoints of the cell cycle and that have been conserved during evolution.

Another reservation arises from the publication of methods for yeast and mammalian cells together. It is true, certainly, that

many genes involved in cell cycle control are well conserved from yeast to mammals, although generally researchers focus on either yeast or mammalian cells. It would perhaps have been preferable to have a book fully dedicated to one or the other cell type, but if both yeast and mammalian systems are to be incorporated, then a chapter describing the advantages and disadvantages of each would have been useful.

In general, this book will prove useful for researchers in this field, if they already have a basic knowledge of methods for culturing yeast, frog or mammalian cells. Most methods are well described. Moreover, the notes at the end of each chapter are really useful, particularly for researchers with limited experience, to allow them to optimize their techniques and trouble-shoot any problems.