DNA Repair Protocols

Series Page

METHODS IN MOLECULAR BIOLOGY™

DNA Repair Protocols

Prokaryotic Systems

Edited by

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Preface

When setting out to decide on the content of *DNA Repair Protocols: Prokaryotic Systems*, I was conscious of the need to portray the vast array of pathways and enzymatic activities that are part of the discipline of DNA repair. In addition to the classical DNA repair activities, I wanted to convey the significant interest that has been generated in recent years in the use of the proteins and repair systems as research tools, much like the use of restriction enzymes over the last few decades. Therefore, in addition to chapters detailing protocols for investigating specific repair activities, I have included several chapters in this book on the applied use of DNA repair proteins and systems.

The many years of research on bacterial DNA repair systems have allowed us to really understand the majority of DNA repair pathways in bacterial cells. Building on this knowledge, research has lead to major advances in understanding mammalian DNA repair and uncovered its links to human disease, such as DNA mismatch repair and colon cancer, nucleotide excision repair and xeroderma pigmentosum, DNA helicase function in Bloom's syndrome, and so on. Such have been the advances that *Science* magazine identified the collective DNA repair systems as its "Molecule of the Year" in 1994. Because interest in DNA repair continues today, our hope is that new researchers in the field will find this book useful to bring themselves up to date on the basis of cellular DNA repair activities, be their interest in prokaryotic or eukaryotic systems. Also included here is the investigation of DNA repair in thermophilic bacteria. It is interesting to note that in these cells, repair protein needs to sustain activity at high temperatures in an environment where DNA is inherently more susceptible to damage. Therefore it is clear that more researchers will be attracted to the investigation of the classical DNA repair activities in these organisms, both because of the novel nature of the molecular environment and of the possible biotechnological use of these thermostable enzymes.

As stated earlier, I have included many protocols detailing the study of various repair activities found in cells, and contrasted this with a number of chapters where researchers have taken these same DNA repair enzymes and systems and used them as tools or reagents in various techniques. Several chapters deal with the use of repair proteins in mutation detection. Mutation and polymorphism detection is a growing field of research. It is central to the

frantic race to uncover the multitude of genetic variations impacting on human and animal health, both in the search for disease genes, drug response and drug metabolism genes, and to breeding and trait selection in animals and plants. The use of DNA repair proteins as biotechnological tools is invaluable in this effort owing to the specificity of these proteins and our in-depth understanding of their action.

I thank all the authors of this volume for their diligence and cooperation in putting together this book and wish them continued success in their research. I hope you the reader find our collection interesting, informative, and practical.

Pat Vaughan

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