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Book Review

Biological Responses to DNA Damage. (CSH Symposia on Quantitative Biology, Volume LXV). Cold Spring Harbor Laboratory Press. 2001. 613 pages. ISBN 0 87969 605 2. Price $258. (hardcover). ISBN 0 87969 606 0. Price $110. (paperback).

Genome instability has been a key term over the last several years in molecular biology. A number of tumour suppresser genes and some genes responsible for premature ageing have been shown to be involved either in DNA repair or in arresting the cell cycle when the genomic DNA is damaged. The 65th Cold Spring Harbor Symposium, ''Biological Responses to DNA Damage'', was a crossover meeting of divergent fields including mutation study, DNA repair, cell cycle, chromosome structure, cancer and hard-core structural biology. As is always the case in top-level science, the presentations in the symposium have opened up a number of important questions to be answered in the near future. One of the highlights of the symposium was the description of the novel DNA polymerases which brought the tally of DNA polymerases in human cells to 15. The common characteristics of the novel enzymes are their capability to bypass lesions like pyrimidine dimers. Why are there so many? Apparently cells do not like their replication forks to remain stalled at the sites of base damage. However, even with the tremendous recent progress of the biochemistry of the proteins or protein complexes involved in DNA repair and checkpoint controls (these topics were extensively reported in the symposium), it is still not clear how DNA damages are primarily recognised and subsequently activate the checkpoint signal transduction pathway. Structural studies of repair enzymes shed some light on the recognition problem. A good example was the structure of MutS/DNA complex. MutS binds DNA as a protein clamp that facilitates the linear diffusion of the enzyme on DNA. The structure also suggested that the protein recognises a mismatch site by its susceptibility to kinking. Of course understanding how this works in chromatin packed into nucleosomes awaits future investigation. The overall impression received from the symposium was that the mechanisms used by cells (including bacteria) for genome maintenance are extremely complex. This book is not just an excellent coverage of the rapidly growing field but also provides some insights for the future questions to students and researchers.

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