Free Rad. Res., Vol. 27(5), pp. 539
Reprints available directly from the publisher
Photocopying permitted by license only

Book Review

Stress-Inducible Cellular Responses
Eds. U. Feige, R. I. Morimoto, I. Yahara and B. S. Polla
Birkhäuser Verlag, Basel, 1996

This multi-author book is devoted to the interesting topic of "stress proteins", proteins synthesized in increased amounts that help all species resist adverse conditions. Broadly-similar stress responses are seen in all organisms, from bacteria to humans, and must have had an ancient evolutionary origin. As expected, a large part of the book focuses on the "heat-shock proteins" as "molecular chaperones". There are clear and thorough descriptions of the types of protein changes that can occur in heat-stressed cells and of the hsps themselves. These include *E. coli* DnaK-DnaJ and GroEL/GroES systems, mitochondrial protein folding, the role of chaperones in assisting translocation across membranes, and protein folding within the endoplasmic reticulum, an environment markedly different from the rest of the cell. The interactions of chaperones with steroid receptors (keeping the inactive receptor in the cytoplasm until hormone arrives, and then assisting it to fold into correct binding conformations) and with the proteasome and other proteolytic systems (such as the ATP-dependent *E. coli* "heat shock" proteases) are also well described. In addition, control of hsp gene expression by the eukaryotic HSF transcription factors is clearly presented, although we are still uncertain as to how "adverse conditions" are sensed at the molecular level. There is an interesting parallel with the *E. coli rpoH* gene product and the σ^{32} regulon and a good chapter on the bacterial SOS response and mechanisms of DNA repair. Mammalian DNA repair is also well-covered.

Other protein-folding systems are not neglected, however. There is a good account of protein disulphide isomerase and its bacterial equivalent DsbA. The inter-relation of oxidative stress to other stresses is also well presented: there are excellent chapters on the IRP system that modulates eukaryotic cellular iron metabolism, the *E. coli oxy*R and *sox*RS systems, the effects of ultra-violet radiation on DNA and signal transduction pathways, mechanisms by which toxic metals upregulate gene transcription and induce metallothioneins and other proteins and the induction of MnSOD by TNFα.

The book ends with useful summary sections, the first relating what has gone before to events in complex multicellular organisms subjected to stress: viral and bacterial infections, autoimmune disease (the mammalian immune system often responds to bacterial hsps), inflammation and how the hsp response may be attenuated in old age. The second describes the use of stress proteins as "biomarkers" for toxic agents, their role in thermotolerance and resistance to ischaemia, and hsps as carriers for vaccines.

Overall, this is an excellent book—I did not find a bad chapter. It is nicely presented and can be recommended to everyone in the field of stress responses.

Barry Halliwell
International Antioxidant Research Centre
King's College London