

Cellular Ageing

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This book is based on a competition organized by the Heinz Karger Memorial Foundation in which authors were invited to submit review papers interpreting their personal contribution as well as original findings on the topic of 'Cellular Ageing'. The resultant response reflects the striking diversity in experimental approaches towards an understanding of the complexities of ageing at the cellular level. So diverse is the problem that there is not even agreement in the spelling of the word 'Ageing or Aging'. Be that as it may, the papers published here, the two joint winners and 15 runners-up, are high-quality presentations. The winners were T.B.L. Kirkwood 'Towards a unified theory of cellular ageing' and J.R. Smith 'A hypothesis for in vitro cellular senescence based on the population dynamics of human diploid fibroblasts and somatic cell hybrids'. In this monograph these and the other papers are divided into 5 sections 'Cellular ageing: an overview' with contributions by Kirkwood; Harrison; Bowen; and Holliday, preceded by an introduction by Aufderheide. Section 2 is entitled 'In vitro vs in vivo ageing' and contains just two contributions both concerning the eye (Flood, Haley and Gouras; and Rink). There are three papers in section 3 concerning 'Immune senescence' (Weksler and Siskind; Szewczuk and Wade; and Steinmann and Muller-Hermelink), while in section 4, 'Gene expression and nuclear ageing', the authors are Sarkander, Tas and Smith. The final section 'Cytoplasmic ageing' contains 5 papers (Spoerri; Holliday and Rattan; Gazzola, Bussolate, Longon,

Dall'Asta, Franchi-Gazzola and Guidotti; Kay and Cummings). The arguments presented, as expected from these authors, range from general error theories, via nuclear, cytoplasmic and mitochondrial changes with effects on the mitochondrial DNA to suggestions that the stem cells might have longer proliferative life spans than expected and might even be immortal. However, ageing clearly occurs in terminally differentiated cells, e.g. red cells, neuronal and lens cells, all of which lend themselves to study. Sarkander's results suggest an age-related dysregulation of sequential transcription in neuronal cells of the rat, while studies in the red cell show the accumulation of a band 3 degradation product with cell age. What emerges from these papers is that ageing is associated with changes in homeostatic processes which, as intimated by Kirkwood, require the expenditure of energy for their efficient operation.

This stimulating monograph contains the distillation of many of the leaders in ageing research and should provoke more thoughts on the basis of ageing.

As pointed out by Holliday, experiments which convert a population of transformed cells with indefinite growth into ones which age and die would have far-reaching implications. The experiments of Smith suggest that in hybrid human cells immortality is recessive, which indicates that we may not be far from achieving such a goal.

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