Fd Chem. Toxic. Vol. 20, p. 249
Pergamon Press Ltd 1982. Printed in Great Britain

MEETING REPORT

TOXICOLOGICAL ASPECTS OF AGEING

When the British Toxicology Society (BTS) discussed ageing in the context of toxicology at its meeting at the University of Kent, Canterbury on 17 and 18 September 1981, it quickly became apparent that the subject is broad, diffuse and urgently in need of definitions and structure. Dr D. A. Hall of the Department of Medicine in Leeds defined ageing as "a decrease in ability to cope with the stresses of life". This is no doubt applicable to the inmate of a geriatric unit, but it is not true for the individual who merely aged his skin by excessive exposure to the sun or for the sedentary worker who is unaware of the fact that his vital capacity has fallen to half what it was in his youth. Nor is it helpful to the toxicologist who seeks ways of measuring ageing in various tissues and models for studying mechanisms involved in its pathogenesis. Are ageing changes genetically programmed or do they simply represent an accumulation of random damage due to exposure to environmental toxins? In general, as with most diseases, genetic and environmental factors interact as determinants of ageing effects. Certainly changes such as those that occur at and after the menopause in women are genetically programmed, but there are plenty of examples of facilitation of ageing processes by environmental factors such as smoking and sunlight.

It is all too easy to confuse an age-associated disease with ageing. In practice most chronic diseases if untreated get worse with time and hence with age. Pulmonary tuberculosis is an obvious example. An important first step, therefore, must be to try to distinguish between diseases that are primarily ageing phenomena and diseases that just happen to be more debilitating in old age but are not primarily due to ageing. In the present state of our knowledge it would seem reasonable to class post-menopausal osteoporosis as primarily an ageing phenomenon, and at the BTS meeting Dr J. Aaron from the Mineral Metabolism Unit in Leeds described the pathogenesis of osteoporosis in this light. Similarly, Dr Stephen Webster (Chesterton Hospital, Cambridge) described how the villi of the small bowel show progressive atrophy with age with the result that xylose absorption, which is customarily used to measure small-bowel function, is deficient in about 25% of old people.

It is now well established for laboratory animals and with less certainty for humans that diet restriction, especially early in life, is associated with increased longevity, with a reduced age-standardized risk of a variety of age-associated diseases and with a strikingly reduced risk of tumour development. This is an obvious starting point for active research into the field of ageing. A second line of approach relates to the study of age-related hormonal changes, particularly to ascertain the extent to which these are causes or effects of ageing.

It was particularly noticeable at the meeting that there is at present a serious paucity of laboratory animal models for the kinds of ageing effect that commonly present problems in man. For instance, there was no mention of animal models for studying senile osteoporosis or dementia. Half jokingly, no doubt, Dr Kenneth McCullagh (Searle Laboratories, High Wycombe) suggested that the elephant might be a good model for human atherosclerosis, but it hardly seems to be a practical alternative to the monkey or the White Carneau pigeon, neither of which is of more than limited value in this regard.

Professor Paul Grasso (British Petroleum, Sunbury) discussed the significance of lipofuscin pigment as an index of toxic damage. It is likely that in this case what happens in laboratory animals also occurs in man. But accumulation of pigment is not itself disabling and, therefore, is not of immediate interest to geriatricians.

Not unexpectedly, old people tend, for a long list of reasons including differences in pharmacokinetic profile and receptor sensitivity, to be more or less sensitive to various drugs than younger subjects. However, according to Dr P. Crome (New Cross Hospital, London) and Professor Ian Stevenson (University of Dundee) no single pattern is involved and each drug must be considered individually in judging how to take a patient's age into account when prescribing. From the discussion on this subject, one was certainly not left with the impression that, in future, safety tests on drugs should include studies on old animals as well as young ones.

The toxicology of ageing is going to become an increasingly important subject. Clearly, therefore, it now needs to be put on to a firmer and more structured scientific basis than was apparent at the BTS meeting.

F. J. C. Roe,
19 Marryat Road,
Wimbledon Common,
London,
SW19 5BB,
England