

Discussion

DR. G. D. KERSLEY (*Bath*) The first controlled trial of radiotherapy in arthritis was performed in Bath by Max Desmarais. Rheumatoid subjects, osteoarthritis, and spondylitis were treated and the controls in each group were put under the machine but the current was not turned on. They were assessed at 3 and 6 months. In general, radiotherapy was found to be of no value in rheumatoid arthritis, but in ankylosing spondylitis it was of dramatic benefit, and in osteoarthritis there was a significant improvement.

DR. J. GLYN (*London*) I think that one should separate those patients with degenerative arthritis who manifested effusions from those who did not. The former presumably have a much greater potential for improvement than those with dry and chronically worn-out joints. Did you, in fact, find that those with effusions derived greater benefit?

DR. GIBSON We analysed these patients and we failed to find any improvement in the group with effusions.

DR. A. G. S. HILL (*Stoke Mandeville*) We heard some years ago in this Society the results of treating hip joints with a radioactive source inserted into the femoral head. I cannot recall having heard anything about this since. Does anyone know anything about this work? (Robson and van Miert, 1965).

ANON They have stopped using it.

DR. J. J. DEBLÉCOURT (*Holland*) We have published the results of a double-blind clinical trial of radiotherapy in 330 patients with osteoarthritis of the knee, the hip, and the cervical spine (*Acta rheum. scand.*, 1958, 4, 908). These patients were given a placebo dose, 150 rads over 3 weeks, or 250 rads over 3 weeks. We found no significant therapeutic differences between the three regimes and concluded that there was no point in treating osteoarthritis with radiotherapy.

This trial also included patients with ankylosing spondylitis and peri-arthritis humeroscapularis, in whom the result of treatment with a placebo dose was significantly less than that obtained by 'substantial' radiotherapy.

References

- Desmarais, M. H. L. (1953) *Ann. rheum. Dis.*, 12, 25
 Robson, P. N., and van Miert, P. J. (1965) *Ibid.*, 24, 176 (Abstract)

Inter-relationship of Articular Cartilage Thickness and Cellularity. By R. A. STOCKWELL (*Department of Anatomy, University of Edinburgh*)

Knowledge of the cellularity of articular cartilage is important in the interpretation of various aspects of normal and abnormal tissue. It is useful to possess data which permits the comparison of different joints in the same species or the same joint in different species. The present investigation is a study of the cell density of articular cartilage in a number of young adult synovial joints in eight mammalian species.

Measurements were made in sections cut vertical to the articular surface. The basal calcified layer was not included in the measured cartilage thickness; nuclear counts also were confined to the uncalcified part of the tissue and were corrected for nuclear diameter.

Cell-density varies from about 14,000 cells/mm.³ in

human femoral condylar cartilage to about 330,000/mm.³ in the mouse.

The results indicate that there is an inverse relationship between cartilage cellularity and thickness. For all specimens studied this may be expressed by a formula of the allometric type: $y = 27,900x^{-.89}$ (y = number of cells per mm.³; x = cartilage thickness in mm.). Similar relationships hold either for small and large joints of the same species or for the same anatomical joint of small and large species. Therefore, the absolute number of cells deep to 1 mm.² of articular surface is of the same order in all specimens, the mean value being $25,500 \pm 8,800$.

With respect to the nutrition of cartilage, the results of the present study, when related to what is known of the metabolism of articular chondrocytes, suggest that the glucose requirement for the cartilage tissue deep to the same unit area of articular surface will be approximately the same in all joints. They suggest also that the cell clusters found in fibrillated cartilage are a response to the increased surface area available for diffusion from the synovial fluid.

Discussion

DR. R. J. FRANÇOIS (*Belgium*) Does the number of cells increase from the surface to the deeper layers of the cartilage? Did you take into account that some animals have perforating channels through the epiphyseal bone plate and other animals do not?

MR. STOCKWELL The cell density decreases with distance from the articular surface. I have ignored any possibility of nutrition from the subchondral marrow spaces but have treated it entirely as a relationship of the thickness of the uncalcified tissue.

PROF. E. G. L. BYWATERS (*Taplow*) Evidence has been produced of increased synthetic activity in the cells of fibrillated cartilage. Could we not then think of this the other way round, so that the increased or abnormal synthesis could be considered as the primary factor responsible for cartilage matrix degeneration?

MR. STOCKWELL The evidence for an increased synthetic activity per cell in fibrillated cartilage is not conclusive. In my paper I have accepted the conventional idea that cell cluster formation is preceded by vertical fibrillation.

DR. J. GLYN (*London*) Do you think that your observations might have a clinical implication in relation to the development of osteoarthritis? I ask this because of some recent experimental work in which the destruction of articular cartilage cells by cryoprobe was followed by undoubted loss of metachromic staining and a depletion of chondroitin sulphate. However, in a 6-months follow-up, no evidence of classical degenerative arthritis was seen.

MR. STOCKWELL I cannot make any comment on that. The evidence suggests that the cell clusters are not very effective anyway in repair processes.

MR. A. R. TAYLOR (*Stoke Mandeville*) Have you compared the cell populations in weight-bearing and non-weight-bearing joints of roughly the same size in the same animal?

MR. STOCKWELL I have no results that I can quote. I would expect that weight-bearing areas with thicker cartilage would have a lower cellularity than thinner and non weight-bearing areas.