CYTOLOGY

Periodic Acid–Schiff Positive Giant Cells in the Mouse Thymus Cortex

HAMMAR[1] first described cells, laden with fat granules, in the thymus cortex of ageing humans. More recently, a detailed description of the histochemical reactions of these cells in the mouse thymus has been given by Loewenthal and Smith[2], who pointed out that these cells gave a strong red colour when stained with the periodic acid–Schiff reagent (PAS).

During a survey of the morphology of the thymus in high- and low-leukæmia strain mice, these cells were observed in large numbers in the cortices of ageing *AKR* and *C3H* mice. Their nuclei resembled thymic reticulum cell nuclei rather than those of the lymphocyte series. The cytoplasm of these cells was voluminous, and packed with granular material with the following staining reactions: positive to PAS (diastase resistant), pyronine and scharlach *R*; negative to toluidine blue (stained pale green), eosin and Feulgen. The cells appeared capable of phagocytosis, since they frequently contained pyknotic nuclear material, presumably lymphocytic in origin. These cells first appeared in the thymus in mice aged between two and four months, and their number increased with advancing age, although varying considerably in individual thymuses. These cells were found in increased numbers in thymuses of mice in the second half of pregnancy, if aged older than four months. The development of these PAS cells appeared to be related to changes in age of cellular elements within the thymus itself. One-week-old thymuses were grafted subcutaneously into six-month-old *C3H* mice and examined histologically one month after grafting. Although all host thymuses showed numerous PAS cells, none of the grafted thymuses showed such cells. Similar negative results were obtained with week-old thymuses grafted to pregnant six-month-old *AKR* hosts. These results appear to exclude the possibility that circulating humoral factors in ageing mice are primarily responsible for the development of these cells.

The location of the PAS cells was usually subcapsular, but frequently they were scattered uniformly throughout the cortex. The cells were not uniform in size and varied from 7μ to 26μ in diameter. The mean size of the cells increased progressively with advancing age. The PAS cells were surrounded by tightly packed lymphocytes. Frequently lymphocytes were seen which had invaginated the cytoplasm of the PAS cells and were lying in deep crypts, projecting into the cells.

In 7μ sections, one in three PAS cells was observed to have one or more mitotic lymphoid cells in contact with some part of the cytoplasm of the cell. A quantitative analysis was made of the frequency of mitotic lymphoid cells in the area surrounding PAS cells, relative to areas distant from these cells. In each thymus, twelve fields, 72μ × 72μ, were selected at random and drawn on graph paper and the total PAS area determined (area of PAS cells, plus area 5μ in width around each cell). Cortical tissue outside this area was designated 'non-PAS' area. The number of mitoses in both areas was determined and the stage of each mitosis noted. The results (Table 1) indicated that, in *AKR* thymuses, mitoses per unit area were three times more frequent in the PAS areas than in the adjacent 'non-PAS' areas. The results in thymuses of the low-leukæmia strain *C3H* indicated much less difference in the incidence of mitoses between the two areas. These results require extension to confirm the reality of this difference in strain.

Table 1

Strain	Age (months)	Sex	No. of thymuses	Mean percentage PAS area	Mean mitoses in PAS area, per unit area	Mean mitoses in 'non-PAS' area, per unit area	Ratio PAS mitoses 'non-PAS' mitoses*
AKR	6–10	M	13	27	95	32	3·1 ± 0·8
AKR	6–8	F	10	21	73	26	3·0 ± 0·8
C3H	8–10	M	12	24	59	42	1·4 ± 0·4

* ± *S.D.*

The analysis of the percentage of cells in various stages of mitosis in the two areas revealed, in *AKR* thymuses, a predominance of prophase mitoses in the PAS areas (11 ± 4 per cent versus 6 ± 3 per cent in the 'non-PAS' areas). The percentages of the other stages of mitosis were similar in both areas.

The significance of the association between lymphocyte mitotic activity and PAS cells in the thymus cortex is not known. The PAS cells may either stimulate mitosis in neighbouring lymphoid cells, or may attract cells about to enter mitosis. The predominance of prophase mitoses around PAS cells suggests that such stimulation or attraction may be related to the initial phases of mitosis, and that some of the mitotic cells may later move away from the PAS cells before mitosis is complete.

Since the PAS cells and associated mitoses occur only in post-involutional thymuses, they may represent some type of regulation of thymic lymphocyte mitotic activity, supervening on an earlier form of regulation present in the pre-involutional thymus.

D. METCALF
M. ISHIDATE

Cancer Research Laboratory,
Walter and Eliza Hall Institute,
Royal Melbourne Hospital P.O.,
Australia.

[1] Hammar, J. A., *Endocrinol.*, **5**, 543 (1921).
[2] Loewenthal, L. A., and Smith, C., *Anat. Rec.*, **112**, 1 (1952).

VIROLOGY

A Method of treating Asbestos Filter Pads for Virus Filtration

PRE-TREATMENT of Seitz-type filters with serum or with digest broth will reduce, to some extent, the often serious losses of virus caused by adsorption during filtration. Solutions of gelatin have been used recently instead of serum or broth with the same object in view. Although certain advantages are claimed for the use of gelatin, for example that most samples are antigenically inert, experience has shown that losses during filtration through asbestos filters treated with this protein substance are not uniformly negligible.

For some purposes it is desirable to avoid the addition of foreign protein to virus preparations, and so investigations were made to determine whether