Immunohistochemical Reactivity of Phagocytic and Non-phagocytic Histiocytes in Lymph Nodes with Lysozyme, Alpha-1-antichymotrypsin, S-100 Protein, Alkaline Phosphatase, and Acid Phosphatase

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Summary: Yellow-brown bodies were observed in the sinusoids of lymph node and histiocytes. The authors confirmed immunohistochemical reactivity of lysozyme, alpha-1-antichymotrypsin, S-100 protein, alkaline phosphatase, and acid phosphatase in non-phagocytic and phagocytic histiocytes which contained yellow-brown bodies. Phagocytic histiocytes (histiocytes with yellow-brown bodies) were not reacted with lysozyme, alpha-1-antichymotrypsin, S-100 protein, alkaline phosphatase, and acid phosphatase. On the other hand, non-phagocytic histiocytes were reacted with lysozyme, alpha-1-antichymotrypsin, S-100 protein, alkaline phosphatase, and acid phosphatase.

Yellow-brown bodies were first described by Hamazaki in 1938 in the mesenteric lymph nodes of a patient with appendicitis. Wesenberg reported similar structures, such as round or spindle shaped bodies in the lymph nodes of patients with sarcoidosis in 1966. Yellow-brown bodies are significantly more common in sarcoidosis than in other conditions (Hamazaki, 1938; Wesenberg, 1966; Boyd and Valentine, 1970; Doyle et al., 1973; Sieracki and Fischer, 1973; Ro et al., 1987). However, their pathogenesis and significance are not well understood.

The lysozyme, alpha-1-antichymotrypsin, and S-100 protein have been introduced by many authors as helpful markers in the diagnosis of malignant and benign histiocytic proliferative disorders (Meister et al., 1980; Carbone et al., 1981; Watanabe et al., 1983; Aoyama et al., 1984; Ducatman et al., 1984; Ide et al., 1984; Weiss et al., 1986; Flint et al., 1986; Wakuya, 1987; Wiettinen et al., 1987). The authors examined immunohistochemical properties of histiocytes with and without yellow-brown bodies, which were observed in two cases of lymph nodes with sarcoidosis and with ileus. In addition, immunohistochemical staining was used for studying intracytoplasmic lysozyme, alpha-1-antichymotrypsin, S-100 protein, alkaline phosphatase, and acid
phosphatase in assessing the cellular nature of phagocytic and non-phagocytic histiocytes in lymph nodes associated with yellow-brown bodies.

Materials and Methods

Two cases of yellow-brown body specimens were obtained from Nagasaki University Hospital with sarcoidosis and with ileus. The materials were fixed in 10% formalin and embedded in paraffin. Sections were cut at four micron and stained with hematoxylin-and-eosin, periodic acid Schiff (PAS), and Fontana-Masson's silver.

Histiocytes with and without yellow-brown bodies were stained with lysozyme (Dako PAP Kit, K504, Lot. 115-1), alpha-1-antichymotrypsin (ACT) (Dako PAP Kit, K534, Lot. 126-1), S-100 protein (Dako PAP Kit, K524, Lot. 114-2), alkaline phosphatase (Alkaline phosphatase conjugated Strept-Avidin: Bio Genex Laboratories, Lot. 126A; Naphtol AS-MX phosphate: Sigma Chemical Company, N-4875, Lot. 85F-5046; Fast Red TR Salt: Sigma Chemical Company, F-1500, Lot. 114F-0262), and acid phosphatase (Bio Genex Laboratories PAP Kit, Lot CMR-2057).

Results

Yellow-brown bodies were diffusely present in the sinusoids of the lymph nodes, and located within the cytoplasm of histiocytes. The larger bodies were within the cytoplasm of histiocytes. These bodies were stained intensely black with Fontana-Masson's silver method (Fig. 1) which could be suitable for rapid screening and identification of yellow-brown bodies. The structures were stained with periodic acid Schiff (PAS).

Histiocytes without yellow-brown bodies were strongly stained with lysozyme (Fig. 2), alpha-1-antichymotrypsin (Fig. 3), S-100 protein (Fig. 4), and alkaline phosphatase (Fig. 5). These bodies were weakly stained with acid phosphatase. On the other hand, histiocytes with yellow-brown bodies were not stained with lysozyme (Fig. 2), alpha-1-antichymotrypsin (Fig. 3), S-100 protein (Fig. 4), alkaline phosphatase (Fig. 5), and acid phosphatase.

Discussion

The lysozyme and alpha-1-antichymotrypsin for histiocytes of mononuclear phagocytic system origin and S-100 protein for those belonging to Langerhans' cells and T-zone histiocytes have been reported (Meister et al., 1980; Carbone et al., 1981; Watanabe et al., 1983; Aoyama et al., 1984; Ducatman et al., 1984; Ide et al., 1984; Weiss et al., 1966; Flint et al., 1986; Wakuya, 1987; Miettinen et al., 1987). The immunocytochemical detection of lysozyme and alpha-1-antichymotrypsin activity has been considered to be helpful confirmatory test in malignant histiocytosis and benign histiocytic proliferative disorders. Watanabe and coworkers (1983) suggested the hypothesis that lysozyme negative, but S-100 protein positive histiocytes such as Langerhans' cells and interdigitation reticulum cells, may constitute a subgroup independent of the ordinary mononuclear phagocytic system. They used S-100 protein as a valuable marker and proposed the concept of neoplasms of T-zone histiocytes with S-100 protein. Ide and colleagues (1984) stated that immunohistochemical study for S-100 protein in histiocytosis X cells and Langerhans' cells, they observed the presence of this protein in both cells. The presence of S-100 protein in histiocytosis X cells seems to be supported the possible origin of Langerhans' cells. Therefore, the immunohistochemical demonstration of S-100 protein in routine histologic sections is of great value in the identification of Langerhans' cells and histiocytosis X cells.
Immunoreactivity of phagocytic histiocytes is clearly different from non-phagocytic histiocytes. A possible explanation may be that some enzyme are released from phagocytic histiocytes, or immunologically active sites are marked as a result of phagocytosis. Moreover, immunological nature of histiocytes varies in different organs, different disease, and sub-population of histiocytes. Further study from this point of view might lead to a significant contribution.

Yellow-brown bodies must be distinguished from hemosiderin pigments which show yellowish color in hematoxylin-and-eosin stained sections. There is difference between yellow-brown bodies hemosiderin pigments. Hemosiderin pigments react with iron stain and not autofluorescent under ultraviolet illumination. Yellow-brown bodies are mainly located in sinusoids of lymph nodes, but hemosiderin pigments are not.

References


Explanation of Figures

Plate I

Fig. 1. Varying sizes and shapes of yellow-brown bodies are seen in the sinusoids of the lymph node and in the histiocytes. Fontana-Masson's silver stain × 400.
Plate I
Plate II

Fig. 2. Histiocytes without yellow-brown bodies are stained red with lysozyme, but histiocytes with yellow-brown bodies are not stained. Yellow-brown bodies are seen in the sinusoids of the lymph node. Immunoperoxidase stain for lysozyme × 400.

Fig. 3. Histiocytes without yellow-brown bodies are stained red with alpha-1-antichymotrypsin, but histiocytes with yellow-brown bodies are not stained. Yellow-brown bodies are seen in the sinusoids of the lymph node. Immunoperoxidase stain for alpha-1-antichymotrypsin × 400.

Fig. 4. Histiocytes without yellow-brown bodies are stained red with S-100 protein, but histiocytes with yellow-brown bodies are not stained. Yellow-brown bodies are seen in the sinusoids of the lymph node. Immunoperoxidase stain for S-100 protein × 400.

Fig. 5. Histiocytes without yellow-brown bodies are stained red with alkaline phosphatase, but histiocytes with yellow-brown bodies are seen in the sinusoids of the lymph node. Stain for alkaline phosphatase × 400.