The "Lemmocyte" in Peripheral-Nerve Tumors

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Based on tissue-culture studies, Murray and Stout in 1940 demonstrated that the Schwann cell has an active role in the formation of primary tumors of peripheral nerves. They further suggested, and supported the suggestion with good evidence, that reticulin and collagen can be formed by Schwann cells as well as by fibroblasts. An extensive cytologic study of Schwann-cell tumors made by del Río-Hortega, using his method, prompted him to support the above views and to point out that the fibroblast is of secondary importance in the formation of these tumors. A recent electron-microscope description of tumors of the human acoustic nerve led to the conclusion that the principal cells in these tumors and those described by Murray and Stout, and by del Río-Hortega, were probably the same as those said to be of schwannian origin. Present submicroscopic observation of other peripheral-nerve tumors appears to provide more information regarding this subject. Current workers continue to examine and compare structures visualized by methods of metallic impregnation utilizing the light microscope and the electron microscope. Since few papers have dealt with this subject, the present report is based upon an extension of these studies and is designed to examine the structural aspects as seen by silver-carbonate techniques. Particular interest was focused upon the principal cell of these tumors, the lemmocyte, which term is used as synonym for derivatives of Schwann cells since these elements originate from embryonal cells, termed lemmoblasts by Antoni, of the neural crest.

No attempt has been made to discuss or examine the theoretical neuroectodermal origin of these cells, a subject of long controversy. Such origins will be discussed later when other ultrastructural aspects of these tumors, which favor this concept, will be presented. The works of Masson, Murray and Stout, del Río-Hortega, Kersting and Finkemeyer, and others appear to have provided satisfactory evidence for this hypothesis.

Material and Methods

Specimens of peripheral-nerve tumors were fixed in a solution of 10 per cent formalin with an alkaline-lithium reaction. Frozen sections, 20 to 25 μ, in thickness, were cut, impregnated by one or two passages through a solution of silver carbonate (employing both cold and heat methods) and reduced with 1 per cent neutral formalin. A double impregnation with a solution of 5 per cent silver nitrate and silver carbonate also was used. Some sections were passed through a brew of gold chloride, and all sections were exposed to a solution of 5 per cent hyposulphite. Preparations were dehydrated with alcohol at 95° and 100°, cleared with cresote and mounted. Additional paraffin-embedded sections were prepared and stained with hematoxylin and eosin, Bodian, Wilder and periodic-acid Schiff methods.

Observations

Grossly, the tumors presented a rubbery consistency and a white glistening appearance on their cut surface. Histologically, in all methods used, tumors consisted of numerous cellular elements of characteristic shape and form, with abundant intercellular substance. Ample fibers of collagen, crossing irregularly throughout the neoplastic tissue, were present.

The cellular component predominated in the tumors. The cells characteristically were thin or elongated in outline and contained large, small, oval or round nuclei. Some of these cells showed features indicating them to be fibroblastic or histiocytic elements (Fig. 1). Histiocyte-like cells were fewer in

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number. Their nuclei were rounded and smaller, resembling at times lymphocytic elements. Their cytoplasm was abundant.

A third cellular element, however, preponderated in the microscopic appearance of the tumors. These cells were oblong in shape and contained elongated nuclei often of bizarre conformation (Fig. 2). The poles of the cells were elongated and these extensions were easily confused within the collagentic substance when viewed in hematoxylin and eosin preparations. In other areas, cells were clearly outlined and were closely related to existing nerve fibers. Based on their morphological appearance alone, these cells often resembled the Schwann cells of the myelinated and unmyelinated neural axons (Fig. 9) and it is proposed that they are the principal cells of the peripheral-nerve tumor.

Principal Cells. The silver-carbonate preparation caused the principal cells to appear unusually clear-cut and demonstrated their cytoplasmic processes particularly well. The nuclei were usually elongated with a smooth

Fig. 1. The cells found in peripheral-nerve tumors present different sizes and shapes. The principal cell exhibits an elongated nuclear appearance. Bands of collagen can be seen crossing the field. Silver carbonate, cold method, \( \times 1350 \).

Fig. 2. The principal cell, the lemmocyte (1 arrow) has characteristic filiform processes (2 arrows) called neuritides. Silver carbonate, double impregnation, \( \times 1400 \).