

BASIC ENDOCRINE PATHOLOGY

NANCY E. WARNER



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by

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DEDICATED

to my mentors in

endocrinology and endocrine pathology

DR. ALLAN T. KENYON

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DR. NATHAN B. FRIEDMAN

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Preface

In response to a variety of pressures, the medical curriculum in schools throughout the United States lately has been in a state of ferment and change. In a good many schools, the aim of newly developed curricula has been to present to the student body as a whole a condensed core of fundamental information considered essential for all physicians, irrespective of their ultimate specialty. With the core as a point of departure, each student then is scheduled to pursue individually a specialized track to arrive at his chosen field of practice.

Medical teachers in all disciplines have been called upon to collect such basic information in their specialties—material to which every student should be exposed. In response to a request of this kind, I prepared a core in endocrine pathology. In mimeographed "handout" form, this material met with a certain success, and I have been motivated to publish an expanded version. I have illustrated the text extensively to increase its usefulness as a bench manual and to clarify the subject matter. A selected bibliography has been appended. This list is not intended to be comprehensive; rather, its purpose is to provide a key to the literature. Since it is crucial for a student to learn to keep abreast of new advances on his own, a list of pertinent journals, abstracts, indices and periodical volumes also is included.

The aim of this text, then, is to present a concise, illustrated version of basic endocrine pathology. The book is intended for medical students, but I hope it will be useful to any student who seeks an introduction to basic information in the field.

Acknowledgments

It is a pleasure to acknowledge the contributions of the many colleagues, friends, teachers and students whose cooperation and help made this volume possible.

Most of the specimens were collected at The University of Chicago Hospitals and Clinics (designated UCHC in the legends to the figures), King County Hospital (KCH), Seattle, a University of Washington affiliated

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hospital, and the Los Angeles County-University of Southern California Medical Center (LAC-USCMC). Over the years, a host of friendly residents and fellow staff members at these hospitals have helped me to locate examples of various lesions.

Some of the photomicrographs were prepared from slides which represent accessioned cases of the Armed Forces Institute of Pathology (AFIP), Washington, D.C., and I am grateful for permission to use this material. The files of the California Tumor Tissue Registry (CTTR)—supported by the American Cancer Society, California Division, the California Medical Association, the Los Angeles County-University of Southern California Medical Center, and member pathologists—were invaluable in preparing the illustrations, and I thank its executive director, Dr. W. K. Bullock, and his staff for their help. Dr. Dorothy Tatter referred numerous cases from the autopsy service of the Los Angeles County-University of Southern California Medical Center, and I am grateful for her consideration and effort. Dr. Ronald L. Goldman, Dr. Seth L. Haber, Dr. Robert L. Peters, Dr. Francis H. Straus II, Dr. James L. Bennington and Dr. N. Leonard Morgenstern all loaned valuable slides from personal collections, which aided immeasurably in preparing the illustrations.

All photomicrographs are the work of I. Lloyd Matlovsky, F.B.P.A., and his staff at the Los Angeles County-University of Southern California Medical Center. Gross photographs from this institution also were prepared under his direction. To this outstanding photographer I owe a particular debt for warm interest in the project, and friendly and unfailing cooperation during the months required to complete it.

Gross photographs of specimens from The University of Chicago Hospitals and King County Hospital, Seattle, are enlargements of 35 mm. Kodachrome transparencies. To Maurice LeCover, F.B.P.A., and his staff at Cedars-Sinai Medical Center, Los Angeles, I am greatly indebted for excellence and skill in accomplishing this work.

The original version of the core was written under the aegis of Dr. Earl P. Benditt, Professor and Chairman, Department of Pathology, University of Washington, and to him I give special thanks. This segment of the work was supported in part by U.S.P.H.S. GM 00100. In the Department of Pathology, University of Southern California, under the leadership and direction of Dr. Hugh A. Edmondson, Professor and Chairman, I have had the facilities and encouragement needed to complete the book.

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1. The Thyroid

Embryology

The thyroid arises as a midline diverticulum of the floor of the pharynx and develops into a bilobed organ. Originally, the gland is attached to the buccal cavity by a narrow stalk, the thyroglossal duct, but this connection eventually is lost by rupture and resorption. The site of origin is marked by a permanent pit in the tongue, the foramen caecum. During development, the thyroid receives a small but significant contribution from the ultimobranchial (last) pharyngeal pouches, which is destined to give rise to the population of parafollicular cells. In lower vertebrates, these pouches develop into separate calcitonin-secreting organs, the ultimobranchial bodies.

Anatomy

The thyroid is a bilobed, bilaterally symmetrical, firm, smooth, reddish tan organ, located in the anterior neck: the two lobes are connected by the isthmus (Fig. 1). The name "thyroid" is derived from a Greek word meaning "shield." The surface of the gland may be faintly lobulated. Usually, the isthmus overlies the region of the second to fourth tracheal cartilages (tracheotomy at this level will cut the isthmus, but incision of the cricothyroid membrane will not). The pyramidal lobe, a midline superior projection from the isthmus which may arise from the caudal end of the thyroglossal duct,

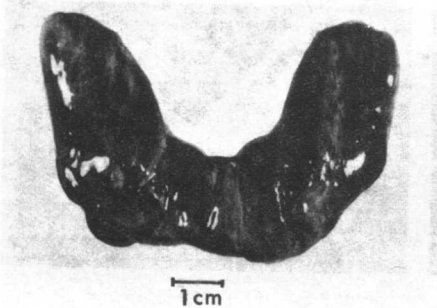


Fig. 1.—External surface, normal human thyroid. (KCH.)

is present as a normal variant in some individuals. Cut surfaces of the gland are firm and slightly sticky with colloid, the tan semisolid or thick fluid protein stored normally in the follicles. Some follicles may be just barely visible, since they may measure up to 500 μ in diameter normally and when abnormal may be considerably larger.

The weight of the "normal" thyroid varies from one region of the world to another and appears to be greater in areas of relative iodine deficiency. Within the United States, regional variations also are encountered (in Chicago, 25 Gm. is normal; in Los Angeles, 15 Gm. is normal). Since weight is an important criterion in the pathologic diagnosis of goiter, these regional variations must be recognized.

Histology and Functional Considerations

The thyroid is made up of follicles, little sacs filled with colloid. The follicles are lined by epithelium, which secretes colloid, and are surrounded by a rich network of capillaries. Iodide in the blood is captured by the thyroid epithelium, bound to protein and stored in the follicles as thyroid hormone. The gland does not distinguish stable and radioactive iodine, and it removes I^{131} or I^{125} just as avidly. When radioactive iodine has been taken up, the parenchyma will have residual radioactivity for a time (e.g., will be "hot"). A histologic section also will be radioactive, and an "autograph" can be made on unexposed film.

Situated singly and in small groups between follicles, and intercalated among follicular cells, are the parafollicular cells (Fig. 2). These elements, known also as "light cells" or "C cells" (C for calcitonin), are the source of calcitonin in man. They are quite inconspicuous in hematoxylin-eosin

Fig. 2.—Small cluster of clear cells (arrow) situated between two follicles, consistent with parafollicular cells in hematoxylin-eosin section. **A**, $\times 250$; **B**, $\times 500$. (LAC-USCMC.)

