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Preface

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Interferences in Hormone Immunoassays

George G. Klee

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Analytic interferences occur infrequently with immunoassays, but false positive or false negative results can have major clinical consequences. This article contrasts the differences between competitive and immunometric (sandwich) immunoassays and illustrates how various potential interferences, including heterophile antibodies, autoantibodies, rheumatoid factor, and cross-reacting substances, may cause problems with specific assay formats. Mechanisms to detect the interferences and correct the problems are outlined. The clinical significance of these interferences is illustrated by reviewing selected published cases.

Thyroid Disease: Pathophysiology and Diagnosis

Laurence M. Demers

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The thyroid is a butterfly-shaped gland that is located in the front of the neck just above the trachea; it weighs approximately 15 g to 20 g in the adult human. The thyroid produces and releases into the circulation at least two potent hormones, thyroxine (T_4) and triiodothyronine (T_3), that influence basal metabolic processes or enhance oxygen consumption in nearly all body tissues. Thyroid hormones also influence linear growth; brain function, including intelligence and memory; neural development; dentition; and bone development.

Thyroglobulin: A Specific Serum Marker for the Management of Thyroid Carcinoma

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Ronald J. Whitley and Kenneth B. Ain

Thyroid carcinomas of follicular cell origin are the most common endocrine neoplasms. Most tumors exhibit specific differentiated functions, including responsiveness to thyrotropin, concentration of iodide, and release of thyroglobulin. Although each of these functions can be used for diagnostic and therapeutic efforts, it is critical to discern the technical and clinical features that provide confidence in their diagnostic reliability. Thyroglobulin assays have unique and important characteristics that affect their clinical usefulness and interpretation. Likewise, diagnostic strategies that use them must reflect their strengths and limitations, including the common problem with antithyroglobulin autoantibodies. New approaches that use reverse transcription polymerase chain reaction detection of mRNA in circulating tumor cells have their own unique problems, which have prevented their widespread clinical adoption.

Diagnosis and Management of Medullary Thyroid Carcinoma

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Nicole Massoll and Ernest L. Mazzaferri

Medullary thyroid carcinoma (MTC) is a tumor that arises from thyroid C cells that secrete calcitonin. This article reviews the important landmarks in the history of MTC, its molecular genetics and clinical characteristics, hereditary and sporadic forms of the disease, its biochemical and molecular diagnosis, treatment, and follow-up.

Advances in Metanephrine Testing for the Diagnosis of Pheochromocytoma

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Ravinder J. Singh

Pheochromocytoma is a lethal tumor of chromaffin cells of the adrenal medulla that produces episodes of hypertension with the symptoms of palpitations, severe headaches, and sweating. The diagnosis of pheochromocytoma is a challenging one; autopsy series suggest that many pheochromocytomas are not clinically suspected, and the undiagnosed tumor can be associated with morbid consequences. The testing of catecholamines, metanephrines, and Vanillylmandelic acid commonly is used for screening of pheochromocytoma. The diagnostic value of various biochemical tests, as reported in recent Mayo and National Institutes of Health studies, have been compared and discussed in detail. The recent developments in the methodologies of metanephrines testing also are presented.

Steroid Hormones: Relevance and Measurement in the Clinical Laboratory 105

Jennifer P. Holst, Offie P. Soldin, Tiedong Guo, and Steven J Soldin

Steroid hormones are synthesized in the adrenal cortex, the gonads, and the placenta; are all derived from cholesterol and many are of clinical importance. This article addresses the relevance and methods of measurement of steroid hormones in the clinical laboratory.

Current Controversies in Testosterone Testing: Aging and Obesity 119

Ronald J. Elin and Stephen J. Winters

This article focuses on three tests that are related to Leydig cell function (testosterone, sex hormone-binding globulin, and luteinizing hormone) and their application to Leydig cell function as men grow older or become obese.

Rational Use of the Laboratory for Childhood and Adult Growth Hormone Deficiency 141

Raj Pandian and Jon M. Nakamoto

This article: (1) outlines the clinical features that are typical of childhood and adult growth hormone deficiency (GHD) syndromes; (2) describes the laboratory tests that are most useful to diagnose/manage GHD, including discussion of methodologic issues and controversies that complicate their routine use; and (3) summarizes the available information to create a simplified algorithm for the clinical and laboratory diagnosis of GHD.

The Use of Biochemical Markers in Osteoporosis 175

Catherine A. Hammett-Stabler

Osteoporosis is a skeletal disease in which there is a loss of, or decrease in, bone mass with a deterioration of the microarchitecture of bone tissue. The disease is progressive, taking place over a period of years, and involves derangements in the processes of bone turnover. These derangements can be classified as those in which osteoclast activity (resorption) is stimulated so that more bone is removed than formed or in which osteoblast activity (formation) is hindered such that refilling of the resorption cavity is incomplete. Regardless of the process, a key pathologic development is the net loss of bone mass. This article reviews the use of biochemical markers in osteoporosis.

Measurement of Parathyroid Hormone and Application of Parathyroid Hormone in Intraoperative Monitoring 199
Lori J. Sokoll

Parathyroid hormone (PTH), which regulates the extracellular calcium concentration, is measured in serum or plasma for the differential diagnosis of hypercalcemia and hypocalcemia and for the investigation and management of parathyroid function in disorders of mineral and bone metabolism and renal failure. This article focuses on PTH measurement and the application of PTH for intraoperative monitoring.

Adipocyte Biology and Adipocytokines 217
Wasim A. Haque and Abhimanyu Garg

Adipose tissue synthesizes and secretes a variety of substances, such as hormones, cytokines, and other peptides (called adipocytokines). Adipocytokines (eg, leptin, adiponectin, tumor necrosis factor- α , interleukin-6) have endocrine, autocrine, and paracrine effects on the brain, liver, skeletal muscles, and adipose tissue itself. They play an important role in the regulation of energy homeostasis and intermediary metabolism. Adipose tissue disorders (obesity and lipodystrophy) are associated with altered secretion of adipocytokines, which may underlie the metabolic complications (insulin resistance and dyslipidemia) that are associated with these disorders. Measurement of serum adipocytokine levels may be helpful in the diagnosis of adipose tissue disorders. In the future, adipocytokines may be beneficial in treating metabolic complications that are associated with these disorders.

The Role and Assessment of Ventricular Peptides in Heart Failure 235
William E. Winter and Ronald J. Elin

Although heart failure may be diagnosed readily in its advanced stages, it may be difficult to diagnose clinically in its early stages. Thus, there is a critical need for an inexpensive, simple, rapid, and objective test for heart failure. This article discusses the role and assessment of ventricular natriuretic peptides and related peptides in heart failure.

Endocrine Autoantibodies 275
Devasenan Devendra, Liping Yu, and George S. Eisenbarth

Autoantibodies are detected in many autoimmune endocrine disorders, such as type 1A diabetes. The autoantibodies detected are immune markers that are currently used in the prediction and differential diagnosis of these disorders. With these autoantibody assays and with improved immunogenetic and pathogenic understanding, many of the diseases are now predictable, and trials for prevention are under way.

Autoimmune Polyglandular Syndrome Type 1 and the Autoimmune Regulator

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Qing-Guo Ruan and Jin-Xiong She

The autoimmune polyglandular syndrome type 1 (APS1) is an autosomal recessive disorder that is characterized by chronic mucocutaneous candidiasis, multiple autoimmune endocrinopathies, and ectodermal dystrophies. The gene that is responsible for APS1 has been identified as autoimmune regulator (*AIRE*). More than 50 different mutations have been discovered in patients who have APS1 and the defects include nonsense and missense mutations, small insertions and deletions that lead to frameshift, and splice site mutations. The 545–amino acid protein that is encoded by *AIRE* contains several structural motifs that are suggestive of a transcriptional regulator. We provide an overview of the clinical and genetic features of APS1 as well as the structure and functions of the *AIRE* protein.

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