Endocrinology and Diabetes

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Editors

THE THIRTIETH HAHNEMANN SYMPOSIUM

The Thirtieth Hahnemann Symposium

Endocrinology and Diabetes

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The Thirtieth Hahnemann Symposium

Endocrinology and Diabetes

Preface

This volume results from the Thirtieth International Symposium, conducted by the Hahnemann Medical College and Hospital in May 1973. Like the symposium itself, the book covers recent advances in endocrinology and diabetes, and offers rational approaches in the application of these advances to clinical practice.

The content of the book can be divided into two broad categories: endocrinologic disorders and diabetes. The first segment begins with a discussion of hormone action. A systematic review follows of some problems confronting physicians in the care of patients with disease of the endocrine glands.

The segment on diabetes, which is similarly structured, deals with difficulties encountered by clinicians in treating difficult diabetic patients and in handling the complications of diabetes. The differential diagnosis and the treatment of patients with hypoglycemia are considered in great detail.

We were honored to participate in the symposium with such distinguished experts, and would like to thank them for their authoritative and scholarly contributions.

We also wish to thank Robert J. Schaefer, Jane Krumrine and their staff for their part in the organization and conduct of the symposium.

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PART I

Hormonal Action and Control Mechanisms

Howard Rasmussen, M.D., Ph.D.

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Mechanisms of Hormone Action

Great progress has been made in the past decade in elucidating the mechanisms of hormone action. From these studies, two general models have been developed: the one dealing with the mechanism of action of peptide and amine hormones; the other with that of steroid hormones.

PEPTIDE AND AMINE HORMONE ACTION

The most widely used model to account for the action of this class of hormones is the second-messenger hypothesis, as developed by Sutherland and coworkers.[1] As depicted in Figure 1-1, this hypothesis proposes that the first messenger, or hormone, interacts with a specific receptor site upon the cell surface, leading thereby to activation of the membrane-bound enzyme adenylate cyclase. The activation of this enzyme leads, in turn, to a rise in the intracellular concentration of 3′,5′-cyclic adenosine monophosphate (cAMP), which activates a class of enzymes,[2,3] protein kinases, that have the property of utilizing other proteins (enzymes) as substrates and catalyzing their phosphorylation by adenosine triphosphate (ATP)

$$\mathrm{Pr} + \mathrm{ATP} \xrightarrow[\text{kinase}]{\text{protein}} \mathrm{ADP} + \mathrm{Pr} - \mathrm{Pi}$$

There is an impressive and continually growing list of cells in which activation by one or more extracellular or first messengers leads to an increase in [cAMP] within that particular cell type. This evidence has been taken as support for the universality of the second-messenger hypothesis. However, it is evident that there are certain important exceptions to the universal involvement of cAMP as second messenger. Most notable among these are insulin[4] and acetylcholine.[5]

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