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# Introductory Chapter: The Newest Research in Corticosteroids

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Additional information is available at the end of the chapter

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## 1. Introduction

The adrenal glands (which lie just above the kidneys) secrete over 50 different steroids, including precursors to other steroid hormones. However, the most important hormonal steroids produced by the adrenal cortex are aldosterone and hydrocortisone [1].

A number of steroidal active principles were isolated and their structures were elucidated by Kendall and his coworkers in the 1930s [2].

In 1956, N.N. Suvoroviy with his colleagues (All-Union Scientific Research of Chemical and Physical Institute) shown the ability of obtaining cortisone from solasodin from the plant *Solanum* [3].

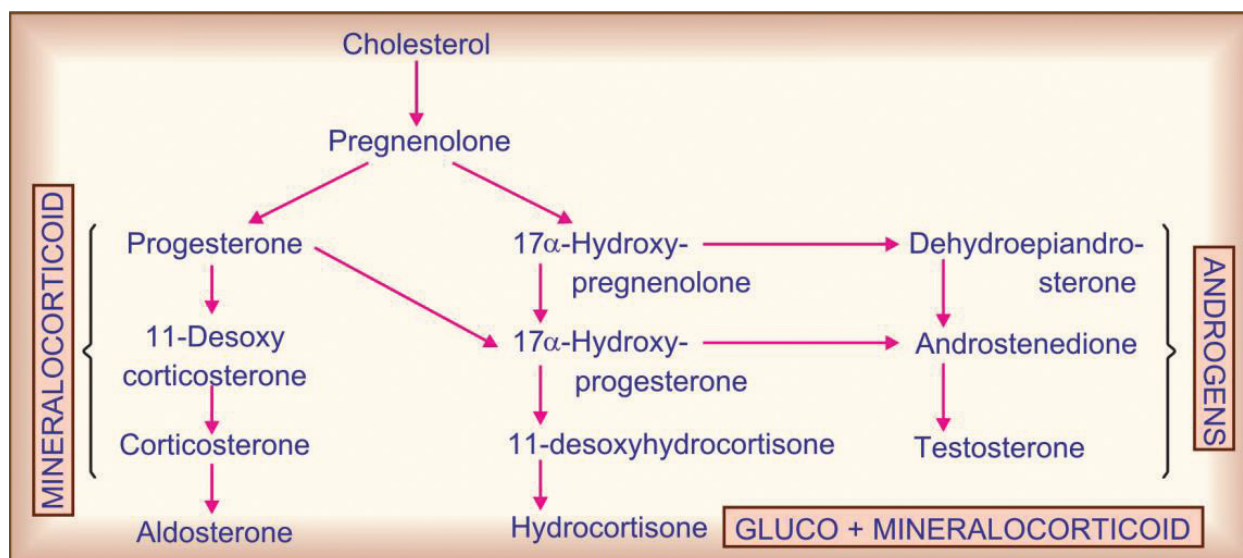
The corticoids (both gluco and mineralo) are 21 carbon compounds having a cyclopentanoperhydrophenanthrene (steroid) nucleus. They are synthesized in the adrenal cortical cells from cholesterol. A simplified version of the biosynthetic pathways is presented in **Figure 1** [2].

### 1.1. Biochemical activities of corticosteroids

Aldosterone increases sodium reabsorption in the kidneys. An increase in plasma sodium concentration, in turn, will lead to increased blood volume. Aldosterone also increases potassium ion excretion. Deficiency gives rise to Addison's disease.

Glucocorticosteroids stimulate glycogen storage synthesis by inducing the synthesis of glycogen synthase and stimulate gluconeogenesis in the liver (formation of glucose from proteins).

They have catabolic effect on muscle tissue, stimulating the formation and transamination of amino acids into glucose precursors in the liver. The catabolic action in Cushing's syndrome



**Figure 1.** Simplified depiction of the pathways of adrenal steroid hormone biosynthesis.

is demonstrated by wasting of tissues, osteoporosis, and reduced muscle mass. Lipid metabolism and synthesis are significantly increased in the presence of glucocorticosteroids.

Glucocorticosteroids also protect the body from stress. High glucocorticosteroid production in response to stress can lead to a decrease in the size of the thymus gland by up to 95%. The mechanism of protection against stress (by glucocorticoid stimulation) is, as yet, not fully delineated [1].

### 1.2. Anti-inflammatory actions by glucocorticoids

- Glucocorticoids inhibit the transcription of cytokines and other mediators of inflammation.
- Glucocorticoids also block the synthesis of some cytokine receptors.
- Glucocorticoids may also increase the synthesis of lipocortin1\_ a protein that inhibits the production of prostaglandin and platelet-activating factor\_ in some cells.
- They can very effectively inhibit collagenase, an important enzyme involved with inflammation.
- They also appear to inhibit the permeability of capillaries at inflammation sites.
- Equally fascinating is the glucocorticoid's role in activating some part of the immune system, but depressing others [1].

### 1.3. Therapeutic uses

Mineralocorticoids are used only for the treatment of Addison's disease. Hydrocortisone (glucocorticoid) is used during postoperative recovery after surgery for Cushing's syndrome—excessive adrenal secretion of glucocorticoids.

Abrupt withdrawal of glucocorticoid therapy may result in adrenal insufficiency showing clinical symptoms similar to Addison's disease. For that reason, patients who have been on long-term glucocorticoid therapy must have the dose gradually reduced.

The glucocorticoids are used in the treatment of collagen vascular diseases, including rheumatoid arthritis, disseminated lupus erythematosus, and dermatomyositis.

They also usually produce relief from the discomforting symptoms of many allergic conditions—intractable hay fever, exfoliative dermatitis, generalized eczema, and others.

They are also used to treat acute asthmatic symptoms unresponsive to bronchodilators (in aerosol preparations) [4].

Our aim is to focus on minimizing side effects, to monitor and sensitize the population on the potential adverse effects of misuse, to reduce inflammation, and to affect the immune system. The major objective of this book will be to present the information in a lucid, condensed and cohesive form, and to specially cater the needs of readers in medicine and pharmacy.

This book covers eight chapters in which authors participate from over the world including the following topics:

- Introductory Chapter: The Newest Research in Corticosteroids.
- Action Mechanisms and Physiopathological Characteristics of Cortisol in Horses.
- Twenty-first Century Glucocorticoid Receptor Molecular Biology.
- Cortisol in Correlation to Other Indicators of Fish Welfare.
- Glucocorticoid-Mediated Regulation of Circadian Rhythms: Interface with Energy Homeostasis and Reproduction.
- Corticosteroids and Their Use in Respiratory Disorders.
- 60 Years of Corticosteroids in Dentistry – And We Are Still at a Cross Road?
- Management of Atopic Dermatitis in Children: A Pediatrician State of the Art.

This is the first edition of this book that includes eight chapters of the newest research in corticosteroids.

A lot of thanks to all authors for their valuable, interested, and important topics in corticosteroids.

This book covers the newest research in corticosteroids. The cooperation of publisher, Intech for Science, Technology, and Medicine and the publisher is very much appreciated in bringing out this book. The contribution that I received by sustained cooperation of Ms. Dajana Pemac Publishing Process Manager cannot be ignored.

Any suggestions, comments, and criticism on the subject matter of the book will be gratefully acknowledged, to improve future editions of the book. Our hope that this work will prove to be as benefit to students and teachers of pharmacy, science, and medical scientists.

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### References

- [1] Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry. 11th ed. New York; 2004. p. 980
- [2] Tripathi KD. Essentials of Medical Pharmacology. 7th ed. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd; 2013. p. 1020
- [3] Belikov VG. Pharmaceutical chemistry. Pyatigorsk. 2003;3:720
- [4] Bennett PN, Brown MJ. Clinical Pharmacology. 9th ed. Spain; 2003. p. 789