Disorders of the Human Adrenal Cortex

Volume Editors

Christa E. Flück Bern
Walter L. Miller San Francisco, Calif.

39 figures, 7 in color, and 8 tables, 2008
Contents

VII Preface
Flück, C.E. (Bern); Miller, W.L. (San Francisco, Calif)

1 Steroidogenic Enzymes
Miller, W.L. (San Francisco, Calif)

19 Disorders of Adrenal Development
Ferraz-de-Souza, B.; Achermann, J.C. (London)

33 Adrenal Androgens in Humans and Nonhuman Primates:
Production, Zonation and Regulation
Nguyen, A.D.; Conley, A.J. (Davis, Calif)

55 Clinical Implications of Androgen Synthesis via 5α-Reduced Precursors
Ghayee, H.K.; Auchus, R.J. (Dallas, Tex)

67 P450 Oxidoreductase Deficiency – A New Form of Congenital Adrenal Hyperplasia
Flück, C.E.; Pandey, A.V. (Bern); Huang, N.; Agrawal, V.; Miller, W.L. (San Francisco, Calif)

82 Long-Term Outcome of Prenatal Treatment of Congenital Adrenal Hyperplasia
Lajic, S.; Nordenström, A.; Hirvikoski, T. (Stockholm)

99 Adrenocorticotropin Resistance Syndromes
Cooray, S.N.; Chan, L.; Metherell, L.; Storr, H.; Clark, A.J.L. (London)

117 Cushing Syndrome Caused by Adrenocortical Tumors and Hyperplasias (Corticotropin-Independent Cushing Syndrome)
Stratakis, C.A. (Bethesda, Md)

133 The Role of Adrenal Steroidogenesis in Arterial Hypertension
Mohaupt, M.G. (Bern)
Fetal Programming of Adrenal Androgen Excess: Lessons from a Nonhuman Primate Model of Polycystic Ovary Syndrome
Dumesic, D.A. (Madison, Wisc./Woodbury, Minn.); Conley, A.J. (Davis, Calif.)

Author Index
Subject Index
Preface

The human adrenals are large and relatively unimportant during fetal life but small and important postnatally. During development, the adrenal cortex undergoes morphological and functional changes that are still not fully understood and may lead to adrenal disease when disordered.

In this volume, the series *Endocrine Development* covers diseases of the human adrenal cortex for the second time. In 2000, volume 2 of this series, edited by Ieuan A. Hughes and Adrian J.L. Clark, brought together a group of experts reviewing clinical and molecular aspects in the volume *Adrenal Disease in Childhood*. Substantial further advances in our understanding of adrenal development, steroid biosynthesis and adrenocortical disorders now necessitate another look at this small but complex organ. Studies of families with adrenal hypoplasia congenita have broadened our knowledge on specific factors involved in the adrenal development. Novel insights into the zonation of the adrenal cortex and adrenal androgen production throughout life have been gained from studies of nonhuman primates. Detailed studies of steroidogenesis in the tammar wallaby pouch young revealed an alternate (‘back-door’) pathway to dihydrotestosterone production that is relevant to P450 oxidoreductase deficiency, polycystic ovarian disease, and congenital adrenal hyperplasia (CAH). Finding that mutations in the gene for P450 oxidoreductase cause a complex defect of 17\alpha-hydroxylase and 21-hydroxylase deficiency has defined a new form of CAH and highlighted the pivotal role of electron transfer partners in the activities of steroidogenic enzymes. Critical review of the long-term outcome of prenatal dexamethasone treatment of fetuses at risk for CAH has revealed a potential risk for adverse effects on metabolism, cognitive functions and behavior in later life. Genetic studies of ACTH resistance syndromes and adrenal Cushing’s syndrome have determined the causes in some more patients, but have also shown us that there are many more unsolved cases that apparently represent disorders in unknown genes. Finally, showing
that adrenal steroidogenesis is widely important, two experts summarize novel aspects of adrenal steroid production in arterial hypertension and the polycystic ovary syndrome.

This book combines ten review chapters written by basic, translational and clinical scientists. Although we tried to cover the newest information gained in the past 5–10 years, there certainly are other developing areas of research concerning the human adrenal cortex. The series *Endocrine Development* does not intend to replace standard endocrine textbooks, and allows the editors to pick a limited number of topics and permits the authors to express their personal opinions.

We thank Primus E. Mullis for inviting us to design this new book on the development and disorders of the human adrenal cortex. Also, we would like to thank all the co-authors for their enthusiasm and effort in sharing their invaluable expertise. Finally, we thank Karger Publishers for bringing this book to the community.

*Christa E. Flück*

*Walter L. Miller*