The Human Testis

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The Human Testis

Proceedings of the Workshop Conference held at
Positano, Italy, April 23-25, 1970

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PREFACE

This volume describes the proceedings of the Workshop Conference on The Human Testis which was held at Positano, Italy, April 23-25, 1970.

The format of the book has been arranged according to topics discussed during the Conference. Each chapter includes individual contributions followed by discussion. Thus, this volume provides a current critical evaluation of the subjects discussed. The Editors assume responsibility for any shortcomings and wish to thank all participants for their unprecedented cooperation in making this publication possible.

The Editors are indebted to Miss Barbara Martin for her able secretarial and administrative assistance and to Mrs. Griff T. Ross who supervised the secretarial staff during the conference. Recognition is also due to Mrs. M. Flack for editorial assistance.

The Workshop Conference could not have taken place but for the Serono Foundation, which supported this Meeting as well as the publication of the Proceedings of this Workshop. The physical as well as the technical arrangements were under the careful direction of Mr. Cesare Florimonte of the Serono Foundation. The support provided by the Serono Foundation is another proof of its generosity in stimulating scientific exchanges and a demonstration of its continuous efforts to support basic and applied studies in the field of human reproduction.

We express our thanks to our Publisher, Plenum Press, for their fine cooperation and for ensuring the rapid publication of this volume.

May, 1970

Eugenia Rosenberg

C. Alvin Paulsen

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FOREWORD

During the past twenty years many meetings concerning the reproductive process have taken place. Both structure and function of female and male gonads have been major topics at these gatherings. However, in only a few instances has the male gonad, particularly the human, been the main subject of discussion. This Conference was designed to focus attention on the human testis. A group of investigators representing various scientific disciplines was invited to this Workshop to discuss this subject from a morphologic, physiologic, biochemical, genetic and pathologic point of view. In some areas, especially that related to embryology, basic human data are lacking, thus relevant animal studies were also presented. Effort was made in these comparative studies to illuminate rather than complicate the understanding of fundamental phenomena in human reproductive physiology.

This volume contains the Proceedings of this Workshop which served as a forum for interexchange of ideas which have enriched our knowledge of the human testis. If the topics discussed excited our interest for further research and have opened new and original lines of study, then the organization of this gathering was amply justified.

Roberto E. Mancini, M. D.

May, 1970

INTRODUCTORY REMARKS

Roberto E. Mancini, M. D.

Since its creation, mankind has been concerned with problems related to reproduction. Most of the ancient religions clearly exhorted the people to multiply, as this was considered the main if not the only object of marriage. Although this preoccupation seemed from the beginning to involve both the female and male aspects of the pair, a preferential and unbroken thread of attention was paid to the knowledge of the ovary and female genital tract. From the earliest writers to modern researchers, this interest in the female sexual function has also been reflected in the continuous recommendation to seek a reliable method for the control of fertility applicable only to women. In consequence a considerable amount of data has been accumulated on the biology of the ovary as compared with the smaller quantity on the testis. However, the importance and significant symbolism of the untouchable male gonad appeared reinforced in the ancient Assyrian times, when a woman or even a physician who consciously or unconsciously caused an injury to the testis of a man, could be punished by having their hands cut off. Yet, the shadows of this rather superstitious concept has persisted until today, where in some countries, it is more difficult to get a biopsy of the testis than to perform a similar one on the endometrium or even on the ovary.

It was not before the decade following 1940 that our cognizance of the human testis, thanks to the introduction of surgical biopsies, became a reality and so the mysterious aura which had surrounded the male gonad began to vanish. The biopsy was rapidly incorporated by endocrinologists and urologists as a diagnostic tool. A few years later, studies on the normal and abnormal histology of the different structures of the testis corroborated and amplified previous necropsy findings, and the pathological background of more than one endocrine or non-endocrine disease of this gland was established. A pioneer group of well-known North American, European and Latin American authors have greatly contributed to the opening of this new field of investigation. To all of them, dead or alive, we convey on this

special occasion our feelings of sympathy and admiration. Since then, the development of laboratory research and biochemical techniques has led to further progress in important areas of testicular biology. Thus incontestable histophysiological evidence of some basic mechanism operating in the male gonad has been elucidated. This is with special reference to the cellular and subcellular morphology of germinal epithelium and interstitial Leydig cells, and to the final products of both structures, sperm cells and male hormones and the feedback phenomena with the hypophysis.

Apart from the advanced studies on the relationship between Leydig cells and steroidogenesis, we are just at the beginning of our understanding of: a) the dynamics of the human spermatogenic process which is replacing the old wavecycle concept of classical cytologists; b) the sustentacular and nutritional function of Sertoli cells related to germinal cells and spermatozoa; c) the functional significance of the physico-chemical composition of seminiferous tubular wall structures; d) the development and fate of sex chromosomes in the germinal cells; e) some histochemical aspects of spermatogenesis; f) the effects of follicle stimulating and luteinizing hormones and some steroids on the development of germinal and Sertoli cells and interstitial tissue.

Unfortunately, an extension of these approaches is restricted by the small quantity of tissue present in biopsies. However, it is eagerly hoped that more refined instrumentation and methodology will prove rewarding in a more profound analysis of human testicular structure and function, as has occurred with the animal testis. Tissue organ culture techniques, which permit an observation of the direct effect of different agents, molecular biological aspects of cell populations, the metabolic pathway of germinal and Sertoli cell function, the role of tubular wall structures and Sertoli cells in the intratubular diffusion of different molecules, the relationship between Leydig cell steroids and germinal epithelium, cellular and subcellular receptors for the gonadotropic hormones, hypothalamus-hypophyseal-testicular interrelation, radioimmunoassays for FSH and LH, and hemodynamic aspects of testicular function are some of the topics which urgently need the attention of investigators.

This is precisely what this Workshop Conference is intended to do. It is not an exhaustive review of what is known today about the physiology and pathology of the human testis, but is to add a new dimension to our knowledge of this gland by outlining new evidence and provoking additional thoughts and inspiration for further studies. This is the reason why other pathological disorders of the testis, such as inflammation, congenital abnormalities, infections and tumors have been deliberately excluded. On the other hand some other recent approaches which are beginning to contribute to the elucidation of disturbances in the mechanism of spermatogenesis have been added,

i.e., immunological factors, chromosomal anomalies of germinal cells, and other topics concerning the significance of seminal plasma chemical composition as an indicator of the adnexal gland function. It was also fully realized that the introduction of a subject related to the assessment of gonadotropin therapy in the still debatable field of male sterility, should be at present of paramount importance. This appears more than justified when it is considered that almost half of infertility in couples is due to the male factor.

It is our intention that all these topics will form a solid guide for present and future fundamental studies, which in turn will provide a better understanding of why and how testicular structure and function may become abnormal. Needless to say the benefit of this view will lead to a rational approach in the study of the heterogeneous group of sterile patients, or what today is considered equally important, as a counterpart, to new tools for male contraception.

Finally, the aim of this Workshop Conference was not only to have the pleasure of meeting experts on a subject of common interest, but also to demonstrate that the integrated efforts of embryologists, biologists, geneticists, biochemists, pathologists and endocrinologists will be of great help in substantially increasing the information at present available on the physiology and pathology of the human testis.

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