

**TEMPERATURE AND  
ENVIRONMENTAL  
EFFECTS ON THE TESTIS**

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**TEMPERATURE AND ENVIRONMENTAL EFFECTS ON THE TESTIS**

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# TEMPERATURE AND ENVIRONMENTAL EFFECTS ON THE TESTIS

Edited by

**Adrian W. Zorngiotti**

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**For Diane-Marie**

## PREFACE

*It must be considered that there is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things.*

*Machiavelli: The Prince (1513)*

These are the Proceedings of a Conference on Temperature and Environmental Factors and the Testis which took place at New York University School of Medicine, December 8th and 9th, 1989. There is good reason to believe that this was the first of its kind to address, exclusively, the implications of temperature for this highly thermosensitive organ and its precious genetic cargo. The organizers of the Conference hoped to stimulate interest in this area which, paradoxically, has a considerable literature but which has received scant attention and sometimes outright opposition from clinicians expert in male infertility.

There have been studies of the relationship of temperature to reproduction starting in the mid-18th Century with observations of the relationship of water temperature to spawning of fish. There is also a vast literature on the deleterious effects of externally applied heat upon spermatogenesis but little study of the possibility that intrinsic heat may be an important etiologic factor in subfertile semen. Today, fertility research has largely ignored this in favor of research in areas which have not produced successes, in terms of live births, comparable to what can be obtained by varicocelectomy (when appropriate) or scrotal hypothermia: viz.

1. Concentration upon the endocrine aspects of testicular function and its relation to spermatogenesis.
2. Gamete manipulation to solve problems of male infertility.

The attitude of a large segment of the scientific community toward temperature and testis function is exemplified by an opinion expressed by leaders such as the Manns<sup>1</sup> with regard to application of cooling to the subfertile testis: "There are numerous (but not necessarily well-founded) statements concerning spectacular improvement in sperm output and fertility resulting from changing tight for loose clothing; by the same token, cold irrigations of the scrotal area is said to have a miraculous influence on the performance of subfertile men. *Se non é vero, ben trovato.*"

It has been established that application of minimal heat to the scrotum can affect spermatogenesis and epididymal maturation. This observation becomes increasingly relevant when we observe a decline in fertility and confront imminent global climatologic changes.

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<sup>1</sup>Mann, T. and Lutwak-Mann, C. 1981. Male reproductive function and semen. Springer-Verlag, Berlin, p. 89.

Some of the matters addressed by the Conferees were:

- Basic temperature physiology of the testis and scrotum.
- Testis thermometry.
- The heat exchanger function of the pampiniform plexus.
- The thermodynamics of heat loss by the testis and scrotum.
- Feedback thermoregulation in the testis.
- The effect of temperature on the biochemistry of the testis.
- Temperature effects on the epididymis.
- Evidence that environmental temperature elevation affects sperm output and fertility.
- Evidence that infertile men have significantly higher intrascrotal temperature than normals.
- Treatment of subfertile semen by altering temperature.

Hopefully, these Proceedings will persuade the reader that intrinsic and extrinsic temperature alterations do play a major role in testis physiology and male fertility and are worthy of study. Areas which still remain largely unexplored are the possible implications for genetic alteration, fetal wastage and possibly testicular cancer. Investigators who do not incorporate the study of temperature into their research run the risk of finding their efforts rendered naught if, indeed, temperature is central to testicular function and male fertility.

I am grateful to Maria S. Chan and Charles O. Chan for their editorial work on this book.

Adrian W. Zorziotti  
Conference Chairman

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