



Nikolai N. Korpan (ed.)

Atlas of Cryosurgery

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Dedication

'Per aspera ad astra'

This Atlas is dedicated to surgeons and the many medical specialists throughout the world, who have contributed their knowledge, efforts and creativity towards developing modern, twenty-first century cryosurgery.

I also dedicate this book to my 'alma mater', the National Medical University of Kiev, as well as to all my teachers, who provided me with the best possible knowledge in the field of tradi-

tional medicine, and who greatly shaped my life and paved the way for me to become a doctor and a surgeon.

This book is further dedicated to my dear wife, Dr. Marta Korpan, and my daughter, Irina, who witnessed the emergence of the modern era of cryosurgery in the 1980s and the 1990s.

Nikolai N. Korpan

Foreword by Omar Maiwand

The therapeutic effects of low temperatures have been known for many years and the first successful treatment of malignant disease with cold was reported in 1855. Despite the enormous advances that have been made in medical science, the full potential of the use of extreme cold has not been fully explored. Dermatology was the first area to benefit substantially from the extensive use of cryosurgery, and cure rates of over 90% have been achieved for skin cancer. There is little doubt that low temperature treatment will destroy the cancer cells with excellent healing of the surrounding tissues. As a therapeutic agent cryosurgery is here to stay.

The use of cryosurgery for internal organs such as the trachea and bronchi, the prostate and the liver developed later. This is because of the difficulty of the controlled delivery of a low temperature to the treatment site without damaging the surrounding healthy tissue. For effective tissue destruction a temperature of at least -30°C must be applied to the core and also to the extremities of the tumor. The future success of cryosurgery depends on the development of suitable probes, improved temperature monitoring techniques, and, more importantly, the use of new cryo-

gens will be needed to provide practicable units delivering controllable lower temperatures.

Further laboratory and clinical research is required in the use of different cryogens and standardization of local temperature without damaging the surrounding tissues. Detailed study of the cryo-sensitivity of various tissues must be undertaken. Examination of the immunological effects of freezing may lead to improvements in tumoricidal responses of the host.

There is a lack of scientific literature on the subject and the publication of this book is greatly welcomed. I congratulate Professor Nikolai Korpan on the production of this much needed volume and have no doubt that it will be of enormous benefit to the international cryosurgery community.

Dr. Omar Maiwand

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Foreword by Jean-Paul Homasson

Cryosurgery is a therapeutic method using freezing temperatures for the purpose of destroying tissues in selected target areas. The hemostatic, analgesic and anti-inflammatory properties of ice have been known to man since the days of the Egyptian pharaohs; however the use of freezing techniques began in the mid-1850's, when iced saline solutions were used to treat carcinomas of the breast and of the uterine cervix. After an initial infatuation for the technique in different branches of medicine at the beginning of the 20th century, some uses of cryosurgery have fallen into disfavor, mostly because of alternative effective therapeutic methods. In other branches of medicine, cryosurgery has become an integral part of standard medical practice. Experimental studies over the past decade have provided improved knowledge of the mechanisms of injury to tissue as a result of freezing. Cryosurgery experienced a revival in the 1990's, due to important improvements in cryosurgical equipment, including the development of thin cryosurgical probes, which have widened out the potential scope and therapeutic uses of cryosurgery. New uses of cryosurgery, for example in treating liver tumors, and a renewed interest in its use in combating prostatic cancer, have been made possible by means of real-time intraoperative ultrasound; this new method of monitoring the freezing process guarantees precision of cryosurgical treatment. The scope of cryosurgery continues to widen out. The use of cryosurgery to treat dermatological benign or malignant lesions is well documented, and favorable results are

regularly gotten in comparison to other techniques. Cryosurgery is widely used when lesions are easily accessible (proctology, gynecology, ophthalmology, ENT, maxillofacial surgery...). In other branches of medicine, the use of cryosurgery has been relatively recent, having been dependent on the miniaturization of the cryoprobes, which must be of a sufficiently narrow diameter in order to pass through the operative channel of the endoscopes (pulmonology). Other tumor sites, including those of the kidney, pancreas, brain, bones are relatively new indications, and an evaluation of the therapy is yet to be realized. Most commonly used as a palliative treatment of cancer, and at times of advanced external cancer, cryosurgery may also be medically indicated for the treatment of benign disorders. Some interesting works suggest a more intensive or synergistic effect if coupled with radiotherapy or chemotherapy, but the local immunological response to cryosurgery is still unclear and more experimental and clinical studies will be required to evaluate this response after freezing. The atlas of cryosurgery offers physicians an extensive overview of the different uses of cryosurgery, that should be regarded as one of the tools that may be chosen to treat a variety of benign or malignant lesions.

Dr. Jean-Paul Homasson
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Editor's Preface



This is the first time that a book of this kind has ever been published in the history of global medicine and surgery. The *Atlas of Cryosurgery* is the first fundamental publication to document the modern era of cryosurgery which dawned in the mid-1960s. The revival of cryosurgery in the 1990s stimulated cryosurgical research. The use of sub-zero temperatures to destroy abnormal tissue, which is the basis of cryosurgery, is now successfully applied in many branches of medicine, especially to treat different malignancies. The aim of this Atlas is to present the fundamental aspects of modern cryosurgery and the advantages it offers cancer patients compared with conventional surgical approaches.

The Atlas lists definitions of the most frequently used terms, a short description of the historical and scientific background of cryosurgery, and gives an oversight of cryosurgical equipment and techniques. Moreover, the whole spectrum of experimental and clinical cryosurgery is outlined. For the first time, the results of the cryosurgical treatment of tumors of the liver, rectum, pancreas, lung, prostate, breast, uterus, oral cavity, bone, lymph nodes, heart and brain, as also of the veins and skin, are shown. Over 1200 illustrations, mostly in color, collected from a wide variety of international sources, serve to demonstrate the cryosurgical approach.

Each section contains a brief introductory text and a series of illustrations

accompanied by clinical summaries and descriptive legends. Some of the slide collections contain a wide variety of selected light microscope micrographs from the authors' and other researchers' collections. They have been included to clarify pathological details. Particular attention has been given to the selection of illustrations that will be of great value to the student. They also contain sufficient cryosurgical detail to be of use to surgeons in training.

What is particularly important is that the Atlas reflects the wide experience gained by specialists in the twentieth century in the following fields: abdominal cryosurgery, cryosurgical proctology, cryosurgical dermatology, cryosurgical urology, cryosurgical gynecology, pulmonary cryosurgery, neurosurgery, cryosurgical otorhynolaryngology, cryosurgery for breast cancer, orthopedic cryosurgery, plastic cryosurgery and cardiovascular cryosurgery. This publication is the first to cover the fundamental aspects of modern cryosurgery, which will appear at the beginning of the third millennium, and will prove to be a vital contribution towards the further development of this particular branch of medicine, one that in future will come to be regarded as indispensable.

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