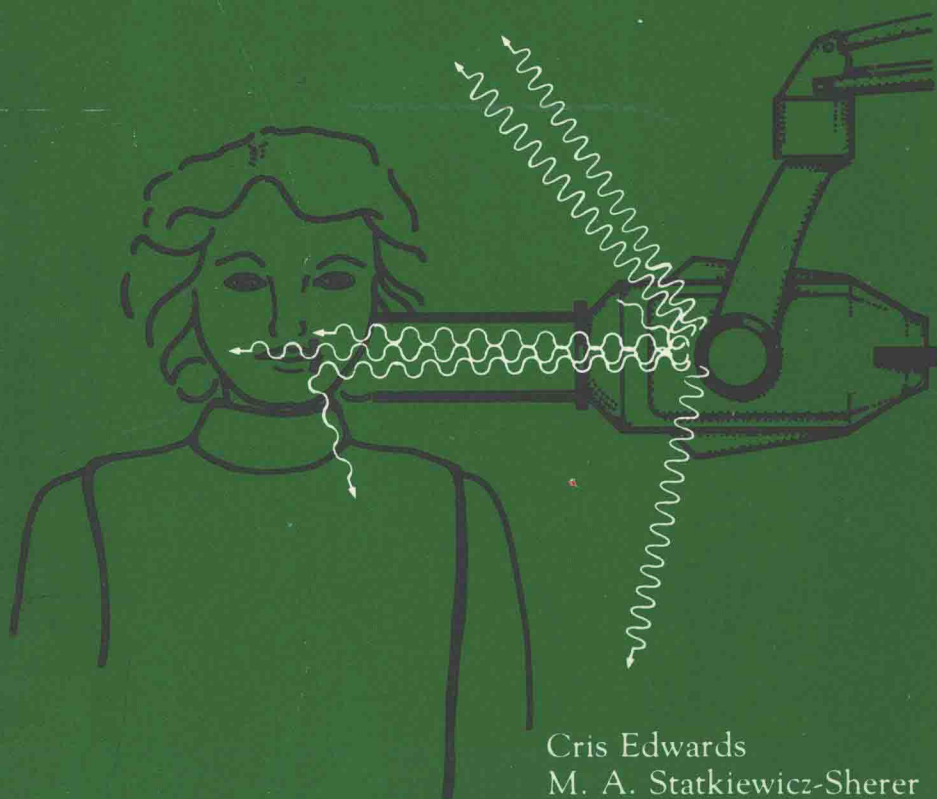


RADIATION PROTECTION

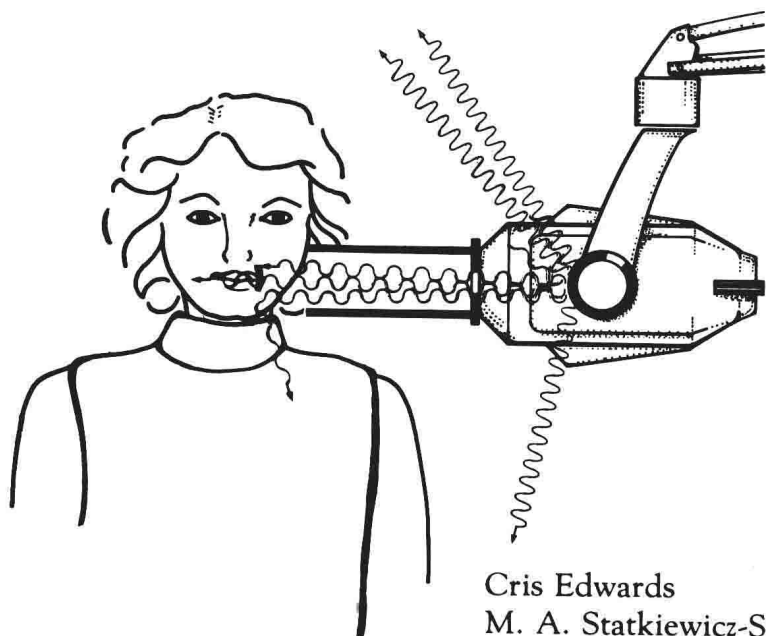
For
Dental
Radiographers



Cris Edwards
M. A. Statkiewicz-Sherer
E. Russell Ritenour

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The C. V. Mosby Co./
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RADIATION PROTECTION

For
Dental
Radiographers

To my husband, Richard, and to those doctors
and auxiliaries who strive to make dentistry so
enjoyable in a safe and pleasant environment.

C.E.

About the Authors

Carol M. Edwards, C.D.A., worked as a dental assistant in private practice for ten years and as a management consultant for twelve years. The two-year associate degree program offered by Community College of Denver, now renamed Front Range Community College, was designed and coordinated for 15 years by Mrs. Edwards, who also designed the dental facility on the new solar campus in Westminster, Colorado, which opened in 1975. Educational background includes business classes in Washington, D.C. and Maryland, as well as teacher education classes in Utah and Colorado. Mrs. Edwards has written and lectured on radiography for continuing education workshops and clinics. She was involved in reviewing and editing the Multi-Media Dental Radiography Series and is currently updating and revising that series. She served on the C.O.N.C.E.P.T. advisory committee, as well as several other regional boards. She is an active member of her local professional organization and serves as Chairman of the Aurora Public Schools Vocational Technical Center's Advisory Committee. Her latest appointment is to serve as the Dental Assistant on the Colorado State Board of Dental Examiners in an advisory capacity on matters concerning dental assisting.

Mary Alice Statkiewicz-Sherer, A.S., R.T. (R), L.R.T., is Program Director of the Medical Radiography Program, Memorial Hospital of Burlington County in Mount Holly, New Jersey. After earning her ARRT certification in 1965, Ms. Statkiewicz-Sherer filled several technical and teaching positions in the New Jersey area and graduated with an Associate in Science degree from the College of Allied Health Professions, Hahnemann Medical College and Hospital of Philadelphia in 1980. Ms. Statkiewicz-Sherer has been an active and leading member of several professional organizations, having served on ASRT committees and task forces, as President of the Mid-Eastern Conference of Radiologic Technologists, and as President and Chairman of the Board of Directors of the New Jersey Society of Radiologic Technologists.

E. Russell Ritenour, Ph.D., was a post-doctoral fellow in medical physics before assuming his current position as an assistant professor in the Department of Radiology at the University of Colorado School of Medicine in Denver. Dr. Ritenour received a Ph.D. in physics in 1981 from the University of Virginia in Charlottesville,

where he served as a teaching assistant for introductory physics courses and a research assistant in the division of radiobiology and biophysics. During his stay in Colorado Dr. Ritenour has pursued research interests in diagnostic image enhancement, radiation therapy treatment planning, and the use of computers in radiology. He has written and lectured widely on the subject of the health effects of low level radiation and has been heavily involved in the teaching of medical physicists, radiology residents, and student technologists. Dr. Ritenour is a member of the American Association for the Advancement of Science, the American Association of Physicists in Medicine, the Society of Nuclear Medicine, and the Health Physics Society. He is currently president-elect of the Central Rocky Mountain Chapter of the Health Physics Society.

Foreword

Wilhelm Conrad Rontgen (1845-1923), a German physicist, discovered roentgen rays in 1895 and received the 1901 Nobel Prize in physics. The discovery of the X ray was truly a milestone in medical-dental diagnosis. Health care, as we know it today, relies on roentgenology as one of the cornerstones of diagnosis. In the years since Rontgen's discovery, great changes have taken place in the design and manufacture of roentgenographic equipment and the techniques and methods of its use.

The three authors of this book have excellent credentials and great dedication; the book is truly a magnificent atlas of knowledge. The "dental radiographers" referred to in the title should include the dentist, dental hygienist, and dental assistant. As a textbook, it will be valuable in teaching at all levels; as a resource text used to update knowledge and for review, it is a must. The publication of the book is most opportune. Our patients demand excellence in the delivery of dental care; the public has become very sophisticated and may now question what, why, when, and how they are treated by health professionals.

Health and consumer protection is of concern not only to the federal government and public health agencies, but to many other groups within our society. Radiation protection laws have already been written and enforced by some states. Anyone and everyone taking diagnostic roentgenograms in dental offices must have a level of knowledge and expertise that will protect the health, safety, and welfare of the patients. They must know the sources of natural background ionizing radiation and the various sources of man-made or "artificial" ionizing radiation. There are many medical-legal considerations in the use of radiological equipment. Ultimately, dentists are responsible for their own actions and the performance of their office staffs in the treatment of patients.

The mechanics and correct techniques of dental radiography and the physiological considerations of its use are addressed in a most astute and thorough manner here. Only one phrase is suitable in describing this book — par excellence.

Kudos to the authors! They have created a book whose time has come. It covers the entire gamut of radiation protection, and dental radiographers will treasure it for many years to come.

Roy H. Reger, D.D.S., M.P.H.
Colorado Department of Health

Preface

Study of the history of radiology reveals both the beneficial and the destructive potential of ionizing radiation. If this powerful form of energy is to be used in the healing arts to benefit mankind, then all who share the responsibility for administering ionizing radiation to human beings for diagnostic or therapeutic purposes must possess the knowledge and clinical skills necessary to insure safety.

Dental radiographers must gain and maintain a working knowledge of the principles of radiation protection. It is not in the patient's best interest to obtain formal education and neglect continuing education. Each dental radiographer needs to seek out current information, techniques, and equipment that will allow dental radiography to be performed in the safest manner possible. Study materials for this purpose should be sophisticated enough to be true to the complexity of the subject, yet simple and concise enough to permit adequate and efficient comprehension.

This text has been designed to meet this need. The book can be used in a classroom, but it is just as beneficial to the practicing dental radiographer who wants, and needs, to obtain the most current information on radiation protection. Each chapter begins with a list of learning objectives and ends with a set of multiple-choice review questions with which the reader can measure the knowledge acquired. Answers to all test questions and a glossary of terms are contained within appendices for quick reference.

This presentation does not presume that the reader has a strong background in physics. However, some knowledge of simplified mathematics, units of measurement (English and metric), basic atomic structure, the physical concept of energy, electric charge, subdivision of matter, electromagnetic radiation, X ray production (quantity and quality), and ionization is essential.

By mastering the material covered in this monograph and by applying this knowledge in the performance of radiologic procedures the reader will help to insure both the safety of patient and the operator.

—Cris Edwards
Mary Alice Statkiewicz-Sherer
E. Russell Ritenour

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A special thank you to our model, Lisa Szabo, R.D.H., for demonstrating the use of both dental instruments and dental x-ray equipment in this book.

To my daughter, Rachel Baldon, and her children, Jason and DeAnna, a big thank you for posing in many different positions, allowing pictures to be presented from the best possible viewpoint.

Special thanks go to all the students in my dental radiography courses in the past 15 years who have challenged me to find easier ways to present the required course material. They strived to be among the best dental radiographers — protecting their patients from unnecessary radiation.

To my friends and family I am thankful for the times they encouraged me to get my writing done — and for the times they allowed me to study or postpone my household chores and entertaining schedules.

To practicing dentists who have insisted on well-trained auxiliaries on their dental teams and who are so concerned about the radiologic health and welfare of their patients that they participate in workshops and continuing education seminars, I am most grateful. You are the reason for the search for more knowledge and understanding about radiography and radiation protection.

Special acknowledgment is given to the professional staff of Multi-Media Publishing, Inc., for all their help and encouragement. A special thank you is extended to Greg Bestick for his gentle nudges, instead of harsh shoves to keep me moving.

Appreciation is extended to those who have given permission to reproduce illustrations, diagrams and pictures from their work. This material enhances this manuscript.

Last, but certainly not least, I wish to extend my deepest appreciation to my co-authors, Mary Alice Statkiewicz-Sherer and E. Russell Ritenour. Without their willingness to share their time and technical knowledge of radiation protection, this book would not have been possible.

—Carol M. 'Cris' Edwards

RADIATION PROTECTION

For
Dental
Radiographers

Contents

About the Authors	vi
Foreword	ix
Preface	xi
Acknowledgments	xiii
Chapter One—Introduction to Radiation Protection	1
Objectives	2
Introduction	3
Justification and Responsibility for Radiologic Procedures	3
Ionizing Radiation	4
Definition	4
Biological Damage Potential	5
Sources	5
Magnitude of Medical Radiation Exposure	6
Summary	9
Review Questions	9
Chapter Two—Basic Interactions of X-Radiation with Matter	13
Objectives	14
Introduction	15
X-Ray Beam Production and Energy	15
Attenuation	17
Probability of Photon Interaction with Matter	18
Processes of Interaction	20

Coherent Scattering	20
Photoelectric Absorption	20
Compton Scattering	22
Pair Production	24
Summary	25
Review Questions	26
Chapter Three—Radiation Quantities and Units	31
Objectives	32
Introduction	33
Historical Evolution of Radiation Quantities and Units	33
Radiation Quantities	35
Exposure	35
Absorbed Dose	35
Dose Equivalent	37
Radiation Units	38
roentgen (traditional unit of exposure)—coulomb per kilogram (SI unit)	38
rad (traditional unit of absorbed dose)—gray (SI unit)	38
rem (traditional unit of dose equivalent)—seivert (SI unit)	40
Summary	42
Review Questions	45
Chapter Four—Maximum Permissible Dose	49
Objectives	50
Introduction	51
Regulatory Agencies	51
Terminology	52
ALARA Concept	52
Consumer-Patient Radiation Health and Safety Act of 1981	52
Current Radiation Protection Philosophy	53
Formula for Determining Maximum Permissible Dose Equivalent	53
Occupational and Non-Occupational Dose Limits	55
Special Precautions Employed in Radiography to Protect the Pregnant or Potentially Pregnant Patient	58
Summary	61

Chapter Five—Radiation Biology

Objectives	68
Introduction	69
The Cell	69
Cell Constituents	70
Protoplasm	70
Organic Compounds	70
Proteins	71
Carbohydrates	72
Lipids	72
Nucleic Acids	72
Inorganic Compounds	76
Cell Structure	77
Cell Membrane	78
Cytoplasm	79
Cytoplasmic Organelles	79
Endoplasmic Reticulum	79
Golgi Apparatus	79
Mitochondria	79
Lysosomes	80
Ribosomes	80
Centrosomes	80
Nucleus	80
Cell Division	81
Mitosis	81
Interphase	82
Prophase	82
Metaphase	82
Anaphase	82
Telophase	83
Meiosis	84
Ionizing Radiation	85
Linear Energy Transfer (LET) and its Relationship to Biological Damage	86
Molecular Effects of Irradiation: Interaction with Molecular Structure	86
Direct Effect	87

Radiolysis of Water	89
Indirect Effect	91
Target Theory	93
Cellular Effects of Irradiation	95
Instant Death	95
Reproductive Death	95
Interphase Death	95
Mitotic or Genetic Death	96
Mitotic Delay	96
Interference of Function	96
Chromosome Breakage	96
Cell Radiosensitivity	97
The Law of Bergonié and Tribondeau	98
Effects of Ionizing Radiation on Various Types of Cells	98
Blood Cells	98
Epithelial Tissue	101
Muscle Tissue	101
Nervous Tissue	101
Reproductive Cells	103
Organic Damage from Ionizing Radiation	104
Radiation Dose-Response Relationship	104
Factors upon which the Amount of Somatic and Genetic Damage Depend	104
Somatic Effects	105
Short-Term Somatic Effects	106
Acute Radiation Syndrome	106
Hematopoietic Syndrome	107
Gastrointestinal Syndrome	107
Central Nervous System Syndrome	108
LD 50/30	108
Repair and Recovery	109
Long-Term Somatic Effects	109
Carcinogenesis	109
Radium-Dial Painters	109
Uranium Miners	110
Early Medical Radiation Workers	110
Thyroid Nodules and Carcinoma	111
Japanese Atomic Bomb Survivors	111
Cataractogenesis	112
Life Span Shortening	112
Embryological Effects	113

Genetic Effects	114
Summary	116
Review Questions	117

Chapter Six—Protection of the Patient During Diagnostic Radiologic Procedures 123

Objectives	124
Introduction	125
Effective Communication	125
Immobilization	129
Beam Limitation Devices	129
Aperture Diaphragm	130
Cones	131
Collimators	137
Filtration	142
Shielding Devices	145
Exposure Factors	150
Radiographic Processing	150
Film-Intensifying Screen Combinations	152
Radiographic Film	152
Intensifying Screens	152
Radiographic Grids	154
Repeat Radiographs	158
Minimum Source-Skin Distance for Mobile Radiography	158
Summary	161
Review Questions	161

Chapter Seven—Protection of the Dental Radiographer During Diagnostic Radiologic Procedures 167

Objectives	168
Introduction	169
Protective Structural Shielding	172
Primary Protective Barrier	173
Secondary Protective Barrier	174
Protective Barrier Thickness Considerations	174
Distance	175
Occupancy	175

Workload	177
Use	177
Diagnostic-Type Protective Tube Housing	177
Protection During Mobile Radiographic Examinations	178
Distance	180
Protective Devices	182
Patient Restraint	183
Summary	184
Review Questions	185
Chapter Eight—Radiation Monitoring	191
Objectives	192
Introduction	193
Personnel Monitoring	193
Characteristics of Personnel Monitoring Devices	197
Types of Personnel Monitoring Devices	197
Film Badges	197
Pocket Ionization Chambers (Pocket Dosimeters)	201
Thermoluminescent Dosimeters	204
Radiation Survey Instruments for Area Monitoring	208
Radiation Survey Instrument Requirements	209
Types of Gas-Filled Radiation Survey Instruments	210
Ionization Chamber-Type Survey Meter (Cutie Pie)	210
Proportional Counter	211
Geiger-Muller (G-M) Detector	211
Calibration Instruments	212
Victoreen Condenser R-Meter	212
Summary	213
Review Questions	213
Appendix A—Answers to Review Questions	223
Appendix B—Metric System Equivalents for Length	227
Appendix C—Consumer-Patient Radiation Health and Safety Act of 1981	231
Glossary	239
References	277
Index	289