Radiation protection and ALARA in radiation oncology - the ESTRO perspective

Dag Rune Olsen

past-chair of physics & board member - ESTRO

Professor of medical physics & Dean of Science – University of Bergen

ESTRO mission:

- to advance all aspects of radiation oncology through a range of activities for its members and the wider healthcare and patient communities.
- to promote excellence through education, professional development, promotion of research and dissemination of outcomes, courses and conferences.
- to improve all aspects of patient care and supports the role of radiation oncology in the multimodality treatment of cancer.

ALARA in RT

Optimization:

”For all medical exposure of individuals for radiotherapeutic purposes, exposures of target volumes shall be individually planned; taking into account that doses of non-target volumes and tissues shall be as low as reasonably achievable and consistent with the intended radiotherapeutic purpose of the exposure.”

Directive 97/43/EURATOM, Article 4.

ALARA in RT

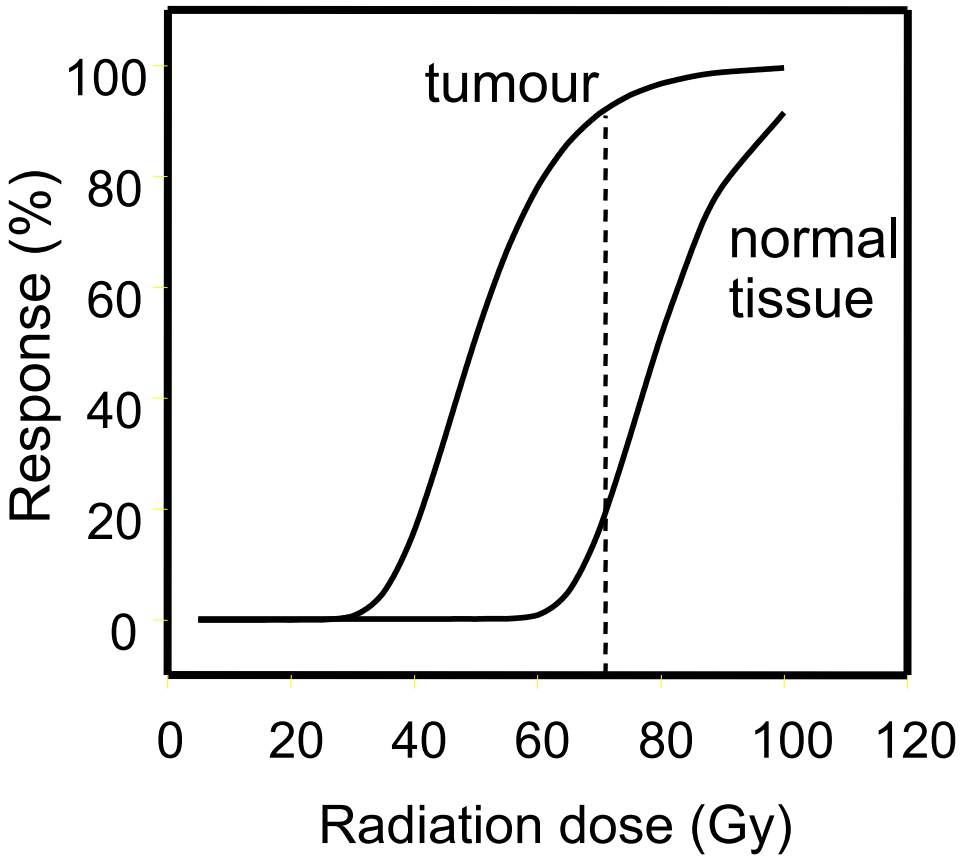
Optimization:

”The optimization process shall include the selection of equipment, the consistent production of adequate diagnostic information or therapeutic outcome as well as the practical aspects, quality assurance including quality control and the assessment and evaluation of patient doses or administered activities, taking into account economic and social factors.”

Directive 97/43/EURATOM, Article 4.

Optimization

The balance between treatment related, i.e. radiation induced, adverse effects and local tumour control.



Safe and optimal utilization of radiation in the treatment of cancer:

- Technology development & new irradiation techniques
- Health technology assessment HTA & Evidence based medicine
- Risk assessment – long term follow up
- Education
- Risk management
- Individualized and adapted therapy

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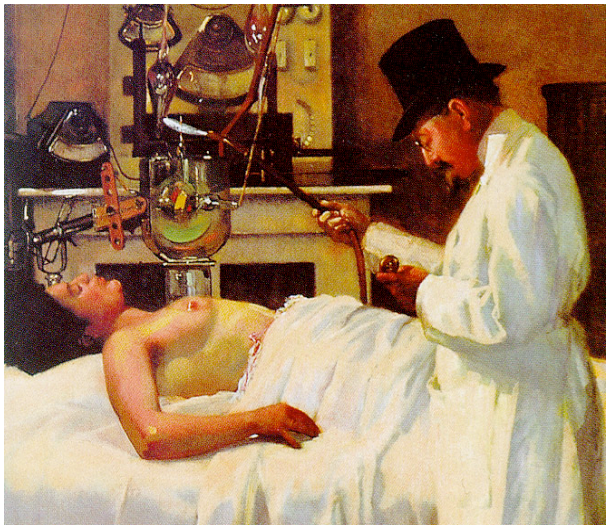
Technological development

New irradiation techniques enables more confined irradiation



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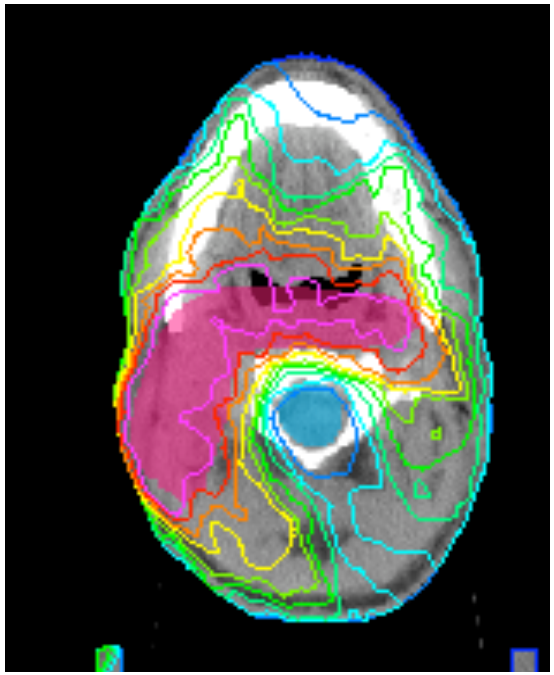
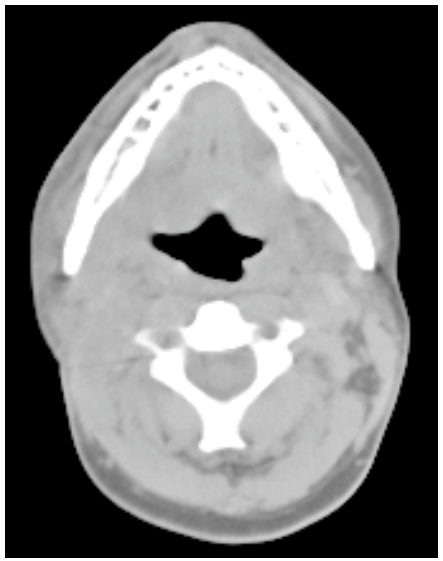
Reduced adverse effects

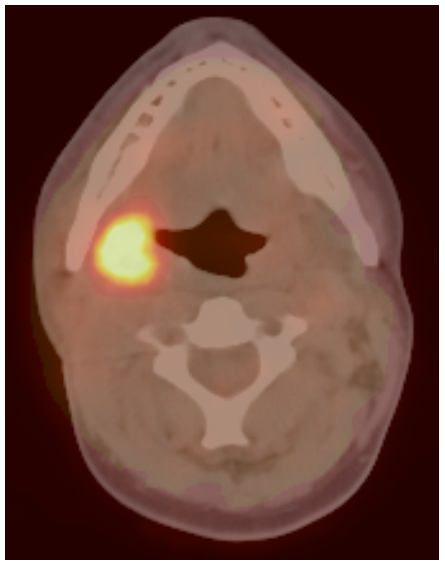


Technological development

Modern imaging technology can identify the volume that needs treatment with a higher accuracy



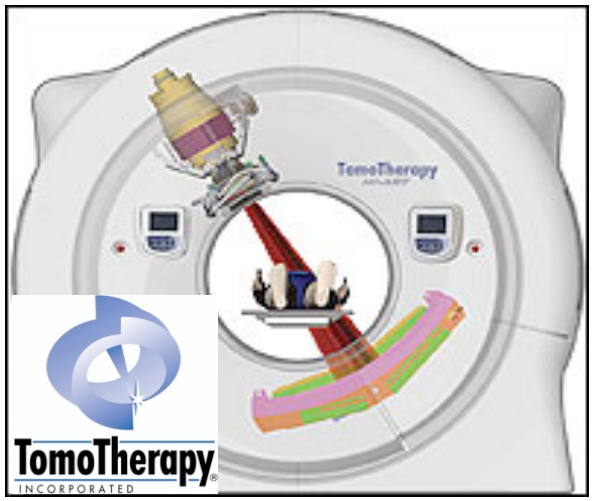
CT

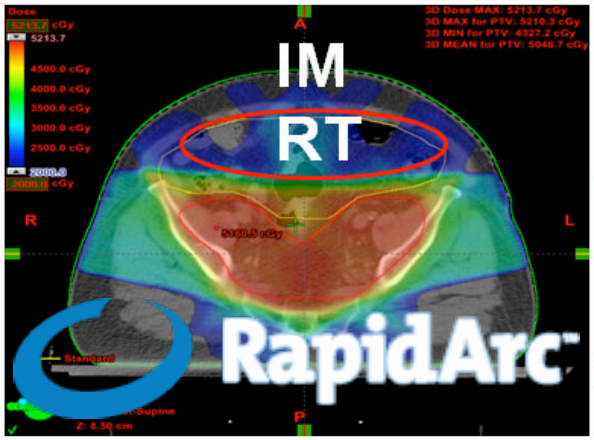


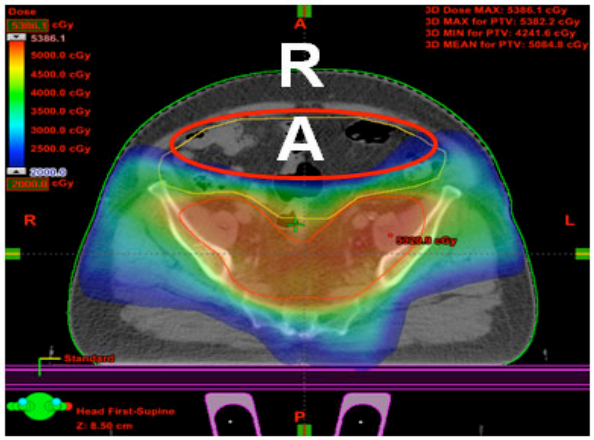
CT+PET

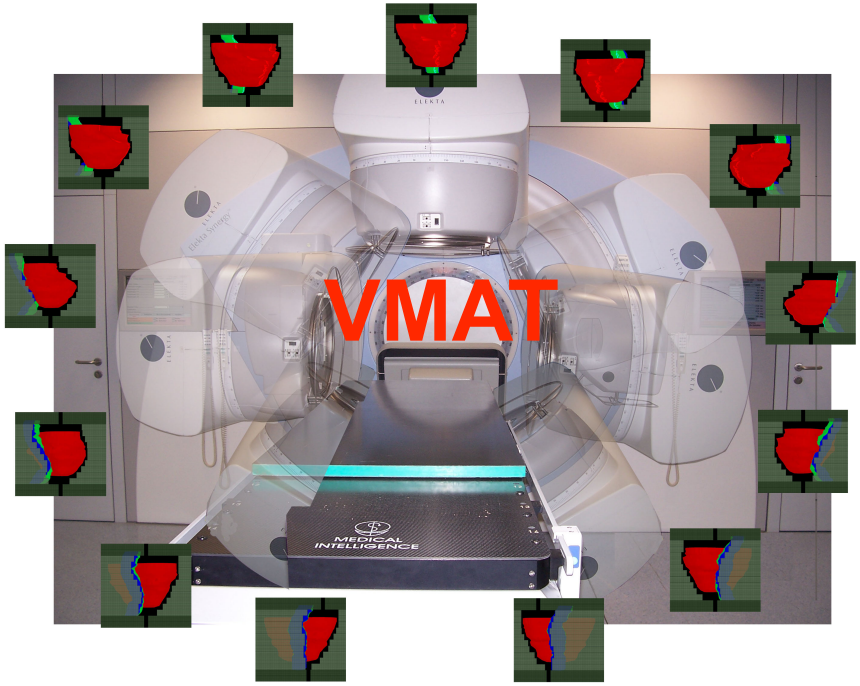
Confined & accurate irradiation

Technological development

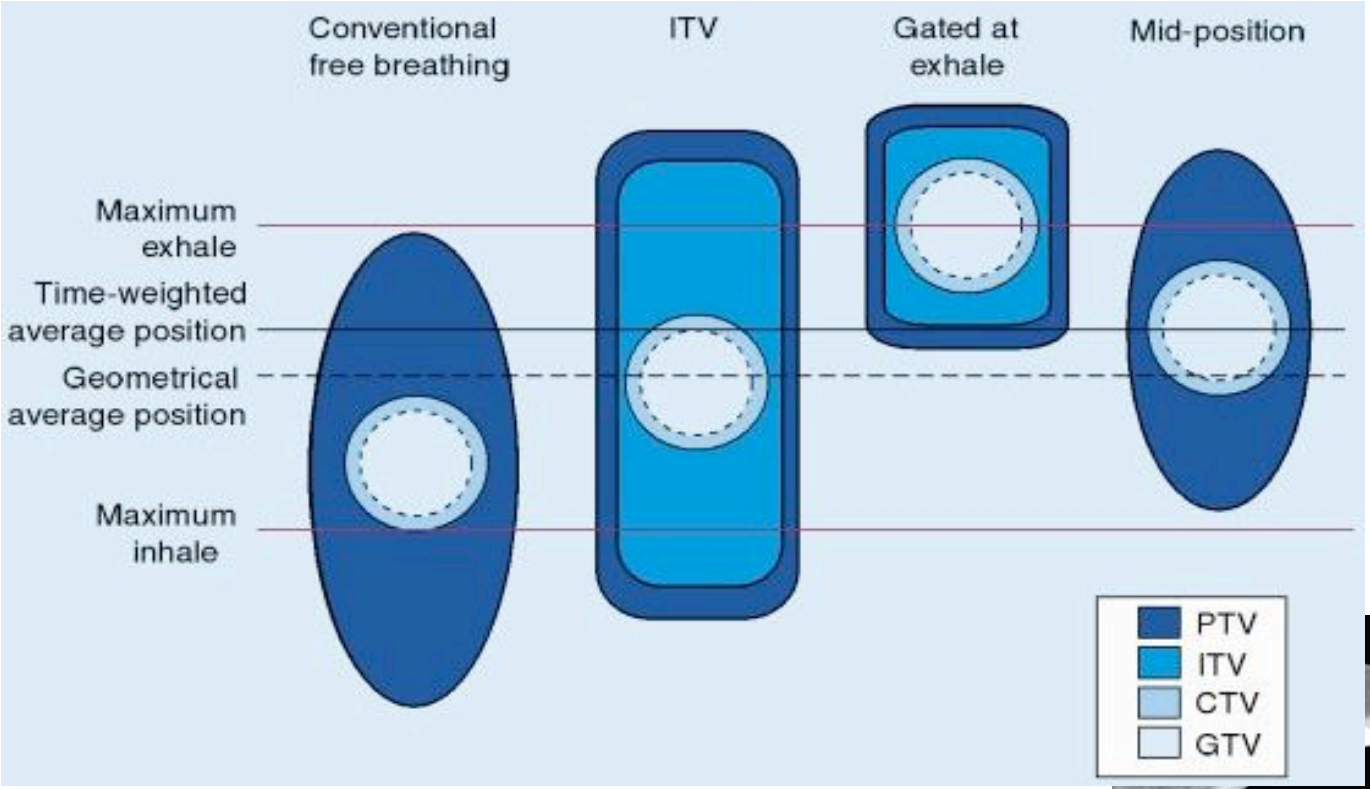


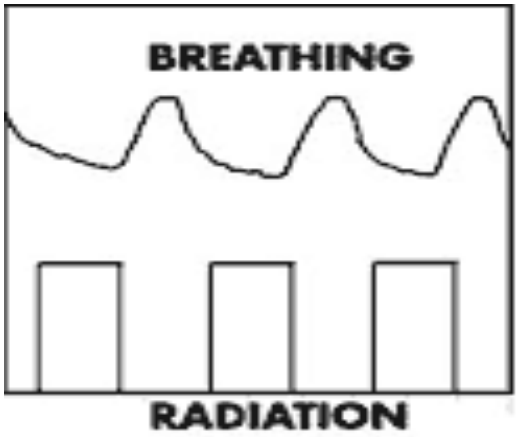


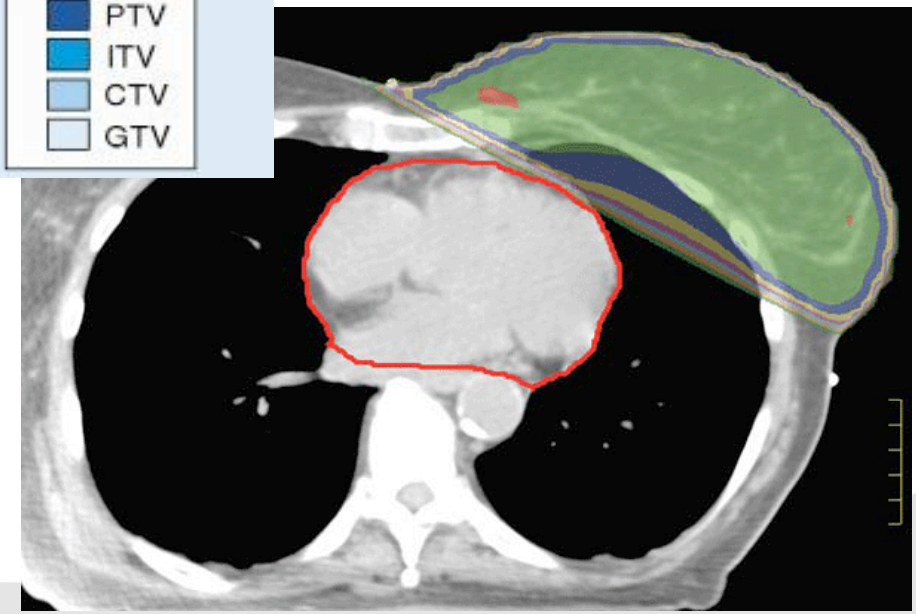


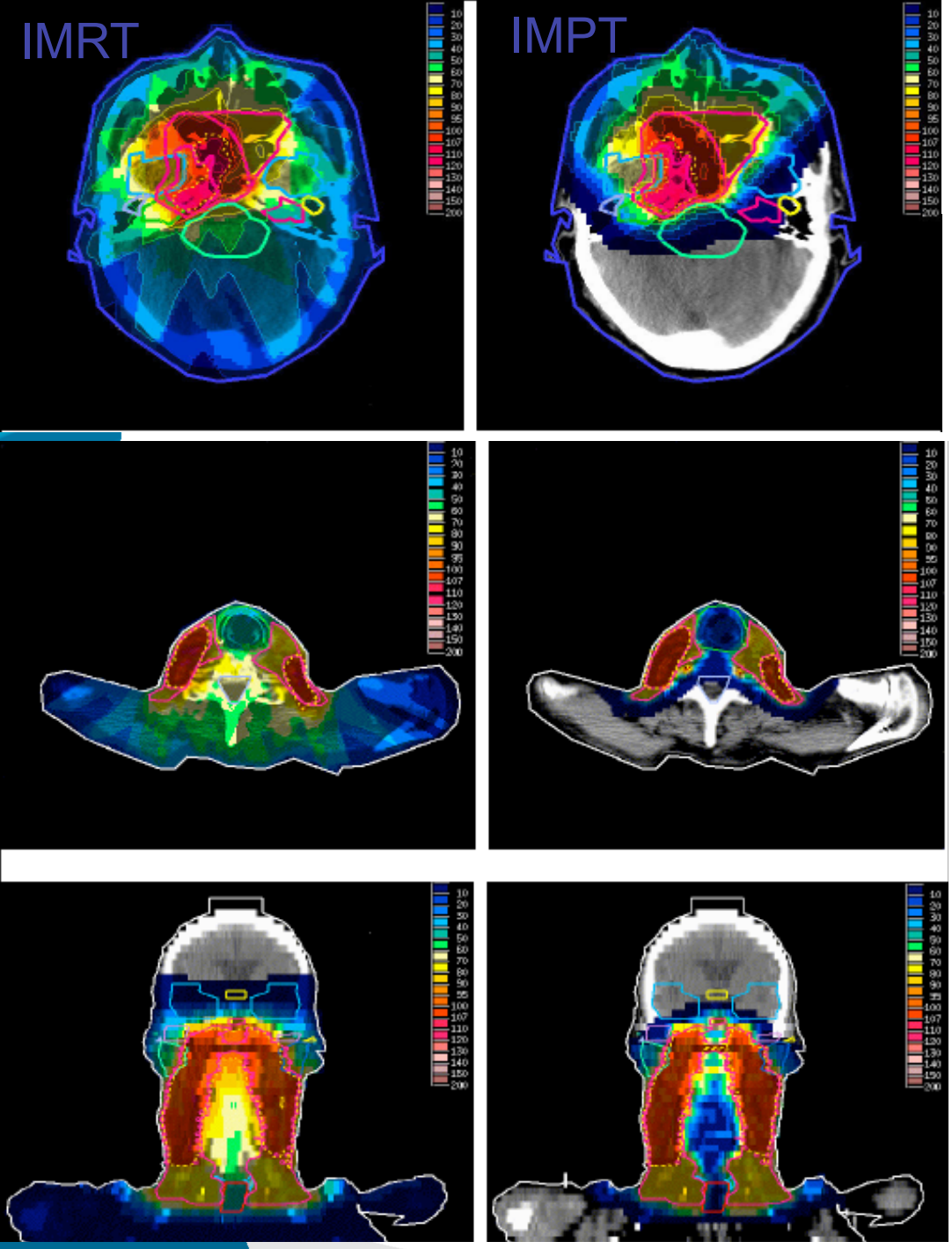


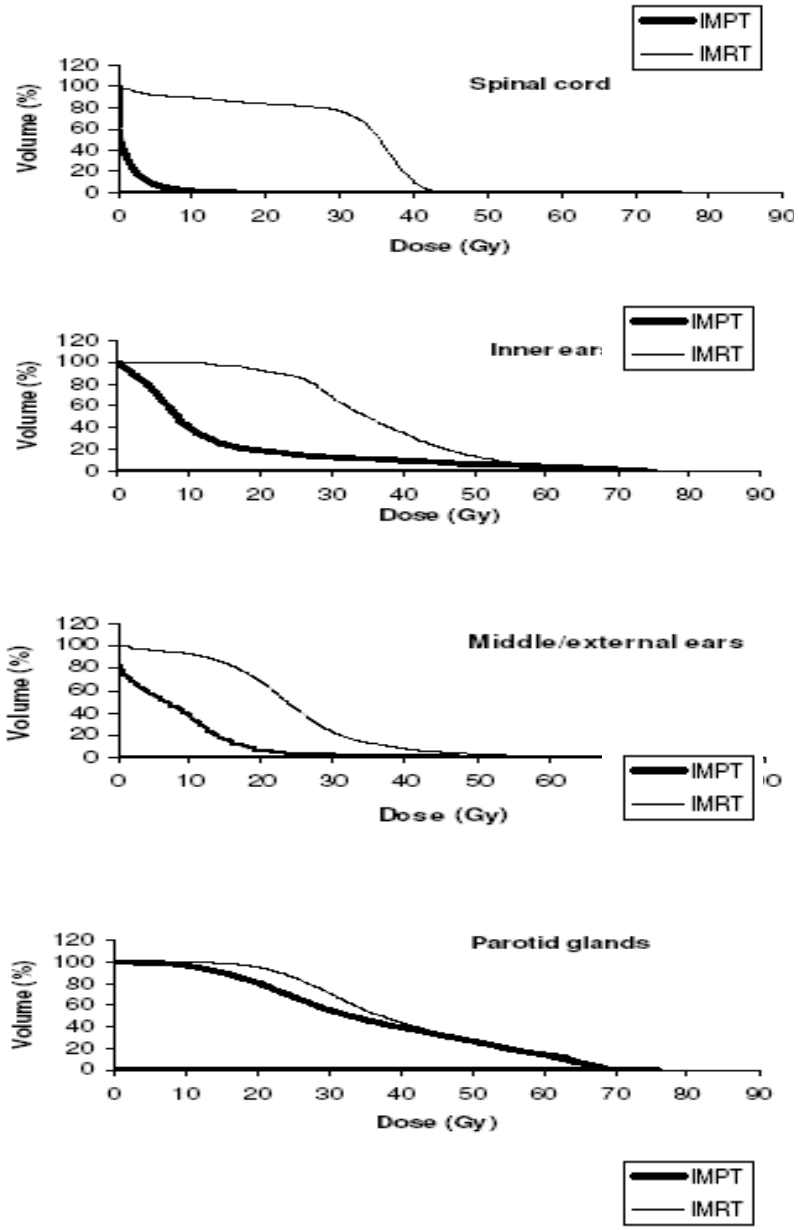
Technological development





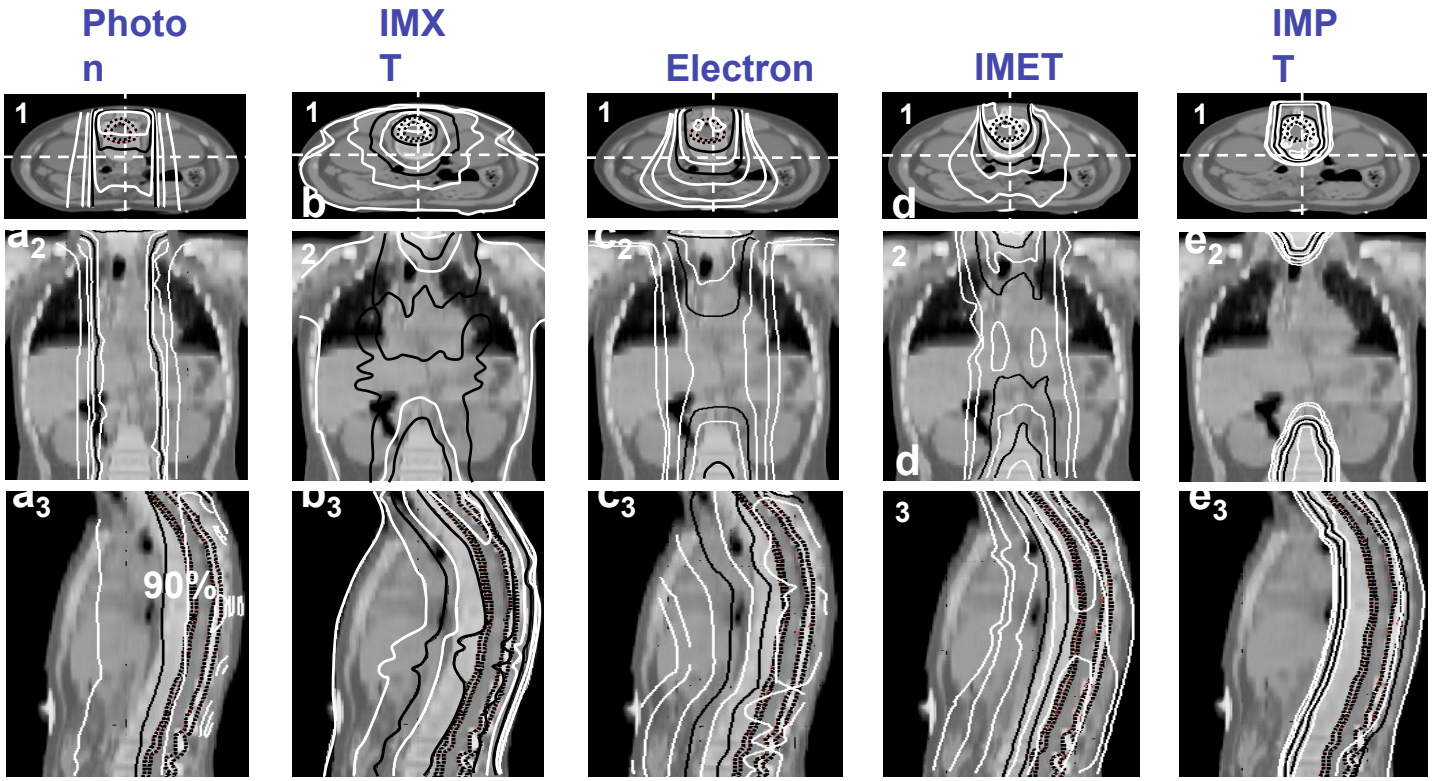






Zahra Taheri-Kadkhoda et al. *Radiation Oncology* 2008, **3**:4

Technological development



Effective dose (Sv)	**1.76**	**2.70**	**1.86**	**1.33**	**0.3**
Total risk of SC	**20%**	**30%**	**21%**	**15%**	**3%**

Mu, X et al *Acta Oncol 2005;44:554-62*

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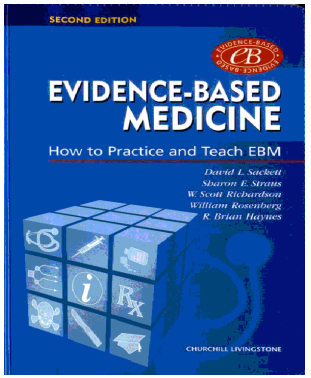
HTA & EBM



David L. Sackett

"Even the best proven prophylactic, diagnostic, and therapeutic methods must continuously be challenged through research for their effectiveness, efficiency, accessibility and quality."

The Helsinki declaration, article 6

HTA & EBM

"The lack of available evidence in favor of protons does not mean that protons may not be useful in selected tumors.

It should be a stimulus for more research, particularly in the form of appropriately designed and powered prospective studies."

JOURNAL OF CLINICAL ONCOLOGY

REVIEW ARTICLE

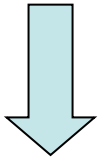
Proton Therapy in Clinical Practice: Current Clinical Evidence

Michael Brada, Madelon Pijls-Johannesma, and Dirk De Ruysscher

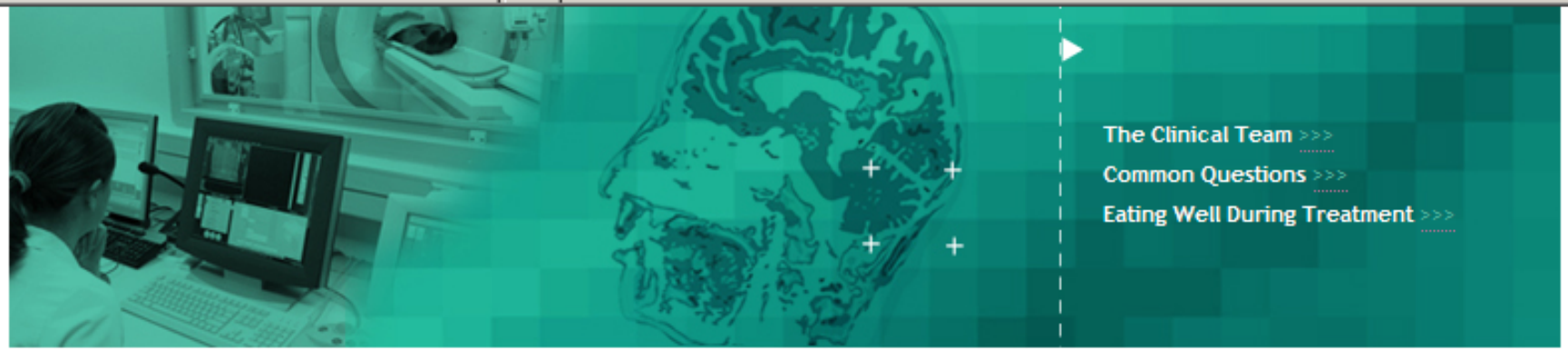
HTA & EBM

HTA is a tedious procedure, as it relies on randomized clinical trials, meta-analyses and systematic reviews.

New technologies emerge rapidly in radiation oncology



We are left with today's evidence on yesterday's technology



Welcome to the ESTRO Radiotherapy Information Centre

Radiotherapy is used in the treatment of many forms of cancer. The ESTRO Radiotherapy Information Centre provides easily accessible, up to date information about radiation oncology and the benefits of treatment.

This is an open access resource but to help you find the information most useful for you, it is set out in sections for patients, health professionals, and the media.

There is also a section on Facts and Figures where you will find details of the frequency of the different cancers in each country and the resources available in different parts of Europe.

MEMBER LOGIN

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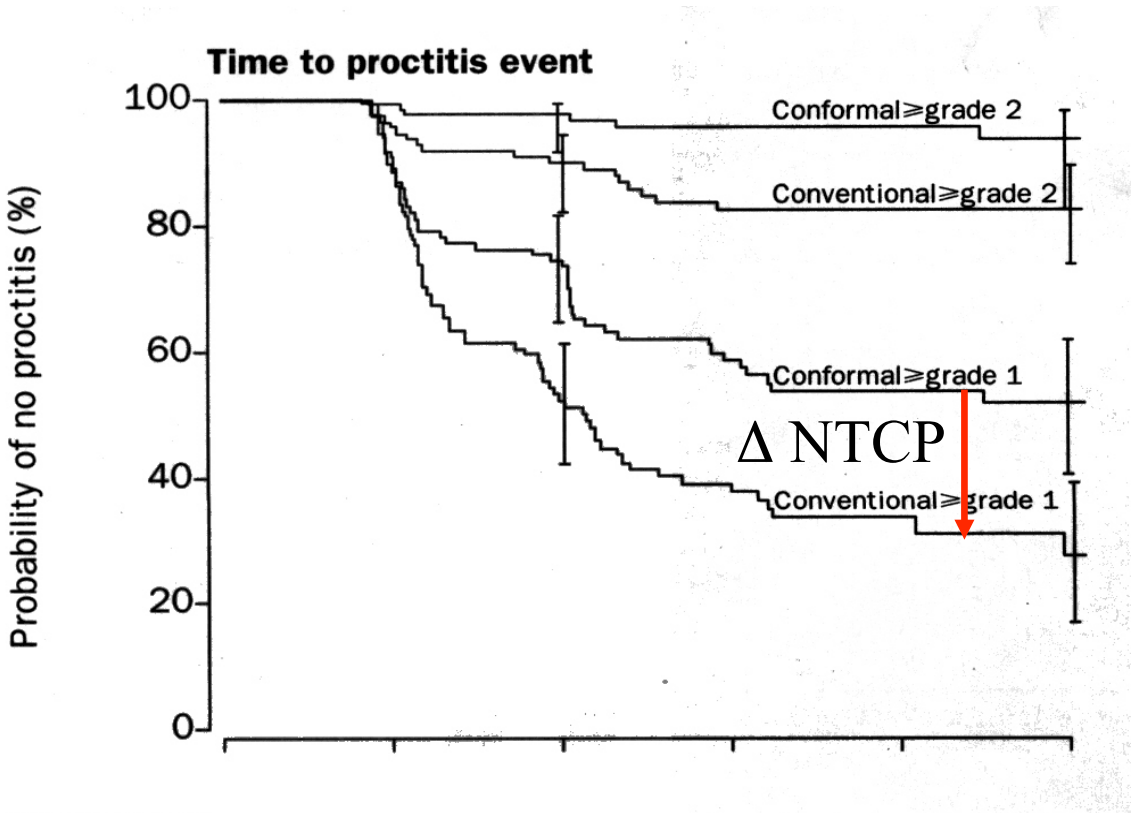
Risk assessment – long term follow up

Conventional vs conformal RT of prostate cancers lowers late rectal toxicity.



D. Dearnaley at al. Lancet 1999

Risk assessment – long term follow up

Int. J. Radiation Oncology Biol. Phys., Vol. 76, No. 3, Supplement, pp. S3–S9, 2010

0360-3016/10/$–see front matter

ELSEVIER

doi:10.1016/j.ijrobp.2009.09.040

INTRODUCTORY PAPER

QUANTITATIVE ANALYSES OF NORMAL TISSUE EFFECTS IN THE CLINIC (QUANTEC): AN INTRODUCTION TO THE SCIENTIFIC ISSUES

SØREN M. BENTZEN, PH.D., D.SC.,* LOUIS S. CONSTINE, M.D.,† JOSEPH O. DEASY, PH.D.,‡ AVI EISBRUCH, M.D.,§ ANDREW JACKSON, PH.D.,‖ LAWRENCE B. MARKS, M.D.,¶ RANDALL K. TEN HAKEN, PH.D.,§ AND ELLEN D. YORKE, PH.D.‖

From the *Departments of Human Oncology, Medical Physics, Biostatistics and Medical Informatics, University of Wisconsin School of Medicine and Public Health, Madison, WI; †Department of Radiation Oncology, University of Rochester Medical Center, Rochester, NY; ‡Department of Radiation Oncology, Washington University, St. Louis, MO; §Department of Radiation Oncology, University of Michigan, Ann Arbor, MI; ‖Department of Medical Physics, Memorial Sloan Kettering Cancer Center, New York, NY; ¶Department of Radiation Oncology, University of North Carolina at Chapel Hill, NC

Advances in dose–volume/outcome (or normal tissue complication probability, NTCP) modeling since the seminal Emami paper from 1991 a[illegible]review. There has been some progress with an increasing number of studies on large patient samples with three-dimensional dosimetry. Nevertheless, NTCP models are not ideal. Issues related to the grading of side effects, selection of appropriate statistical methods, testing of internal and external model validity, and quantification of predictive power and statistical uncertainty, all limit the usefulness of much of the published literature. Synthesis (meta-analysis) of data from multiple studies is often impossible because of suboptimal primary analysis, insufficient reporting and variations in the models and predictors analyzed. Clinical limitations to the current knowledge base include the need for more data on the effect of patient-related cofactors, interactions between dose distribution and cytotoxic or molecular targeted agents, and the effect of dose fractions and overall treatment time in relation to nonuniform dose distributions. Research priorities for the next 5–10 years are proposed. © 2010 Elsevier Inc.

QUANTEC, Normal tissue complications, Overview, Modeling.

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Education

ANNOUNCEMENTS

ESTRO Course Calendar 2009 now available >>>

ESTRO Technology Transfer Grants - next deadline 31 March 2009 >>>

e-Learning at ESRO >>>

Welcome to ESRO
The ESTRO School of Radiotherapy and Oncology

Since our first teaching course in 1985, ESTRO has become an internationally recognised provider of high quality education to meet the need for basic training and continuing professional development in radiotherapy and oncology.

ESRO promotes multidisciplinary education in oncology, with the objective of standardising knowledge and clinical practice, whilst recognising the diversity of radiation oncology practice in different parts of the world.

We look forward to welcoming you to one of our programmes!

MEMBER LOGIN

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Education

PHYSICS FOR CLINICAL RADIOTHERAPY

Chengdu, China, May 22 - 26, 2011

2011 courses

Location: Chengdu

Accommodation

Programme

Download the flyer and forward it to your friends

Venue

Course Director

Ben Heijmen, Physicist, Erasmus Medical Centre, Rotterdam (NL)

Teachers

Edwin Aird, Physicist, Mount Vernon Hospital, Northwood (GB)
Alber to Bossi, Radiation Oncologist, Institut Gustave Roussy, Villejuif (FR)
Ann Henry, Radiation Oncologist, Cookridge Hospital, Leeds (GB)
Trine Juhler-Nottrup, Radiation Oncologist, University Hospital Herlev (DK)
Mischa Hoogeman, Physicist, Erasmus Medical Centre, Rotterdam (NL)
Dag Rune Olsen, Physicist, Faculty of Mathematics and Natural Sciences University of Bergen (NO)
José Alfredo Rubio Polo, Radiation Oncologist, Hospital Ramon y Cajal, Madrid (ES)

Course Aim

For the lectures, the aims are:

1. to provide basic physics knowledge relevant to clinical radiother
2. to provide overviews of imaging and volume concepts in radioth
3. to provide introductions to modern dose delivery techniques, su

stereotactic treatment, IGRT, and brachytherapy

ADVANCED TECHNOLOGIES

Singapore, December 4 - 8, 2011

2011 courses

Location: Singapore

Accommodation

Programme

Download the flyer and forward it to your friends

Course Directors

Coen Rasch, Radiation Oncologist, The Netherlands Cancer Institute, Amsterdam (NL)

Teachers

Renaud de Crevoisier, Radiation Oncologist, Centre Eugène Marquis, Rennes (FR)
Rianne de Jong, RTT, The Netherlands Cancer Institute, Amsterdam (NL)
Tom Depuydt, Physicist, UZ Brussel (VUB) (BE)
Matthias Guckenberger, Radiation Oncologist, Julius-Maximilians University, Wuerzburg (DE)
Claudio Fiorino, Physicist, Instituto Scientifico San Raffaele, Milano (IT)
Uwe Oelfke, Physicist, German Cancer Research Center (DKFZ), Heidelberg (DE)
Marco Schwarz, Physicist, ATreP, Agenzia Provinciale per la Protonterapia, Trento (IT)
Jan-Jakob Sonke, Physicist, The Netherlands Cancer Institute, Amsterdam (NL)

Local organiser

BASIC CLINICAL RADIOBIOLOGY

Nijmegen, The Netherlands, May 1 - 5, 2011

2011 courses

Location: Nijmegen

Accommodation: Word - PDF

Programme

Download the flyer and forward it to your friends

Course Director

Albert van der Kogel, Radiation Biologist, Radboud University Nijmegen Medical Center (NL)

Teachers

Wolfgang Dörr, Radiation Biologist, UK Carl Gustav Carus, Dresden (DE)
Vincent Grégoire, Radiation Oncologist, UCL Cliniques Universitaires St Luc, Brussels (BE)
Michael Joiner, Radiation Biologist, Karmanos Cancer Institute Wayne State University, Detroit (USA)
Marianne Koritzinsky, Radiation Biologist, University Health Network, Toronto (CA)
Marianne Nordsmark, Clinical Oncologist, Aarhus University Hospital (DK)

31 courses in 2011

2800 participants in 2010

European Core Curriculum

Education

Based on the ability to adequately perform a professional act

- Practical skills and theoretical knowledge is not separated

Provide guidelines for core curriculum items

Provide a list of recommended literature

- Extent
- Level

Provide guidelines for the length of training

Provide guidelines for assessment of competency

Provide electronic log-book

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ROSIS
Radiation Oncology Safety Information System

username Password Login

Home | About Us | ROSIS Safety Information | Learn about Safety in RO | Spotlight Cases | Registering Your Clinic | ROSIS Publications | Submitting A Report

About ROSIS

ROSIS, an acronym for Radiation Oncology Safety Information System, is a patient safety tool specific to radiation oncology. It was established in 2001 under the auspices of the professional body □European Society of Therapeutic Radiology and Oncology□ (ESTRO), and has successfully established an international voluntary incident and near incident reporting system, a supporting website and an annual teaching course on Patient Safety in Radiation Oncology.

The establishment of ROSIS was visionary and timely. Worldwide, organisations began to appreciate the burden caused by iatrogenic injury. The potential of incident reporting systems to detect, monitor, and reduce the occurrence of incidents was recognised. Despite this, authorities doubted that anyone would voluntarily report incidents to an international system. Slightly ahead of its time, ROSIS succeeded in capturing the imagination and support of individuals and received reports on incidents in RO. More recently, countries are beginning to require individual hospitals to put reporting systems in place, and countries are beginning to collect reports on a national basis. ROSIS is still a leader in terms of having developed a discipline-specific, international reporting system.

The main aims of ROSIS are to:
Establish an international reporting system in radiation oncology
Use this system to reduce the occurrence of incidents in radiation oncology

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Individualized and adapted therapy

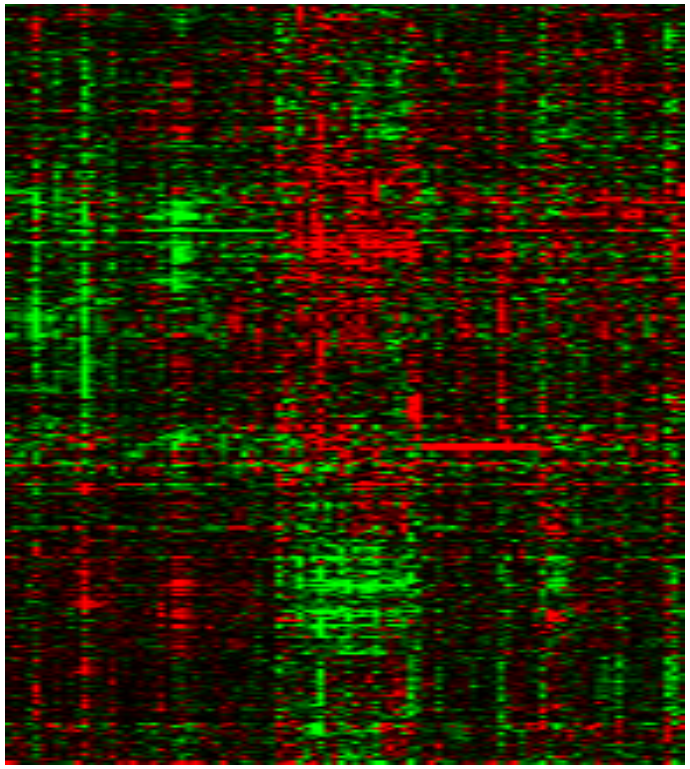
Today's Scientific Advances Are Tomorrow's Medicine

"We can envision a time when we will be able to precisely target treatment on a *personalized* basis to those who need it, avoiding treatment to those who do not."

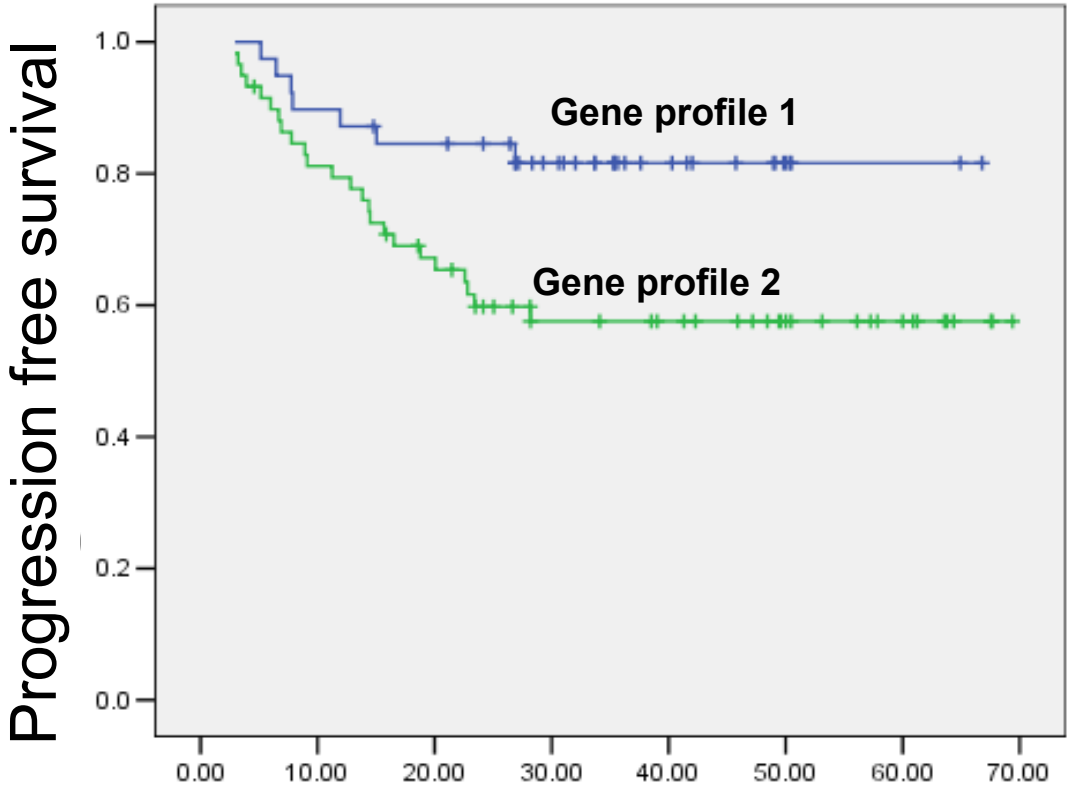
U.S. Department of Health & Human Services
National Institutes of Health
The Nation's Medical Research Agency

Dr. Elias A. Zerhouni,
Director,
National Institutes of Health
March 5, 2008

Individualized and adapted therapy



Gene profile



Follow up time in months