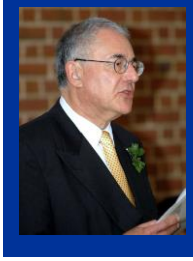
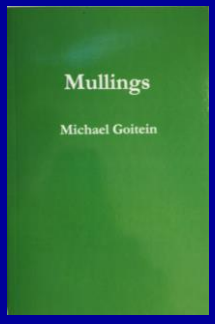
“Mulling” over the early Contributions of M Goitein



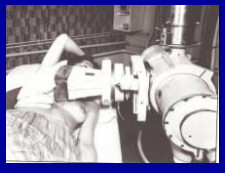
C Clifton Ling

Varian Medical Systems
Stanford U (Adj. Prof. Rad Onc)
Memorial Sloan Kettering (Emeritus)

Michael Goitein, PhD



250 kVp x-ray



Co-60 55 cm SAD 源轴距

Harvard / Mass Gen Hosp, 1974

2 MV van de Graff

Flexible Beam-Shaping Device[1]

Michael Goitein, Ph.D.

Radiology 1974

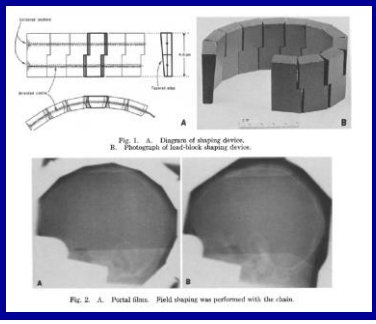


Fig. 1. A. Diagram of shaping device.
B. Photograph of lead-block shaping device.

Fig. 2. A. Portal films. Field shaping was performed with the chain.

PRECISE POSITIONING OF PATIENTS FOR RADIATION THERAPY

Red Journal 1981

LYNN J. VERHEY, PH.D., MICHAEL GOITEIN*, PH. D., PATRICIA MCNULTY, R.N., JOHN E. MUNZENRIDER, M.D. AND HERMAN D. SUIT, M.D.
The Department of Radiation Medicine, Massachusetts General Hospital, Boston, MA 02114

Fig. 2. A patient in position for lateral treatment for chordoma of the sphenoid sinus and base of skull. A thermoplastic mask is used for immobilization.

Fig. 3. A seated patient in position for an anterior treatment to the nasal septum.

The first use of perforated aquaplast

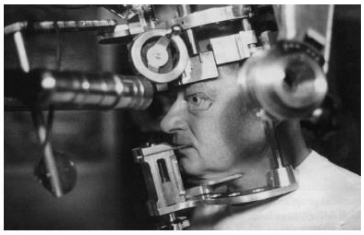


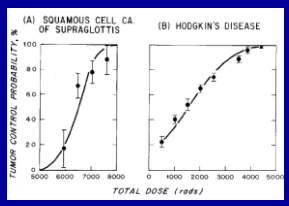
Fig. 3. Immobilization setup for proton irradiation of a uveal melanoma (1976).

Perhaps the most accurate (sub-mm) Image-guided Stereotactic Radiation Treatment

Immobilization Error: Some Theoretical Considerations[1]

Michael Goitein, Ph.D., and Joel Busse, M.D.[2]

Radiology 117:407–412, November 1975



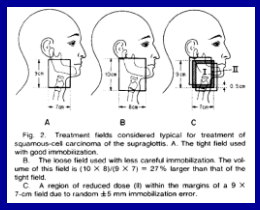
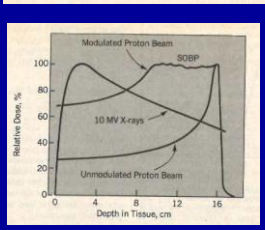


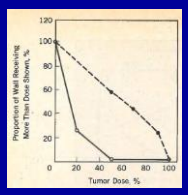
Fig. 2. Treatment fields considered typical for treatment of squamous-cell carcinoma of the supraglottis. A. The tight field used with good immobilization.
B. The loose field used with less careful immobilization. The volume of this field is (10 × 8)/(9 × 7) = 27 % larger than that of the tight field.
C. A region of reduced dose (8) within the margins of a 9 × 7-cm field due to random ±5 mm immobilization error.

Proton Radiation as Boost Therapy for Localized Prostatic Carcinoma

JAMA1979

William U. Shipley, MD; Joel E. Tepper, MD; George R. Prout, Jr, MD; Lynn J. Verhey, PhD; Oscar A. Mendiondo, MD; Michael Goitein, PhD; Andreas M. Koehler, PhD; Herman D. Suit, MD





The first use of DVH

DOSE-VOLUME HISTOGRAMS

Red Journal 1991

R. E. Drzymala, Ph.D.,[1] R. Mohan, Ph.D.,[2] L. Brewster, M.S.,[2] J. Chu, Ph.D.,[3] M. Goitein, Ph.D.,[4] W. Harms, B.S.[1] and M. Urie, Ph.D.[4]

[1]Mallinckrodt Institute of Radiology, Washington University School of Medicine, St. Louis, MO 63110; [2]Memorial Sloan-Kettering Cancer Center, New York, NY 10021; [3]University of Pennsylvania School of Medicine and the Fox Chase Cancer Center, Philadelphia, PA 19111; and [4]Massachusetts General Hospital, Department of Radiation Medicine, Boston, MA 02114 and Harvard Medical School

A plot of a cumulative dose-volume frequency distribution, commonly known as a dose-volume histogram (DVH), graphically summarizes the simulated radiation distribution within a volume of interest of a patient which would result from a proposed radiation treatment plan. DVHs show promise as tools for comparing rival treatment plans for a specific patient by clearly presenting the uniformity of dose in the target volume and any hot spots in adjacent normal organs or tissues. However, because of the loss of positional information in the volume(s) under consideration, it should not be the sole criterion for plan evaluation. DVHs can also be used as input data to estimate tumor control probability (TCP) and normal tissue complication probability (NTCP). The sensitivity of TCP and NTCP calculations to small changes in the DVH shape points to the need for an accurate method for computing DVHs. We present a discussion of the methodology for generating and plotting the DVHs, some caveats, limitations on their use and the general experience of four hospitals using DVHs.

Editorials by M Goitein

COMPUTED TOMOGRAPHY IN PLANNING RADIATION THERAPY

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Red Journal 1979

POTENTIAL FOR IMPROVEMENT IN RADIATION THERAPY

HERMAN D. SUIT, M.D. D.PHIL.,* JAMES BECHT, M.D., JOSEPH LEONG, PH.D., MICHAEL STRACHER, B.SC., WILLIAM C. WOOD, M.D.,† LYNN VERHEY, PH.D., AND MICHAEL GOITEIN, PH.D.

Radiation Medicine Service, Massachusetts General Hospital Cancer Center, Harvard Medical School, Boston, MA 02114

Red Journal 1988

THE INVERSE PROBLEM

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Division of Radiation Biophysics, Department of Radiation Therapy, Massachusetts General Hospital, Boston MA 02114, and Harvard Medical School

Red Journal 1990

The Comparison of Treatment Plans

Michael Goitein

Sem Rad Onc 1992

Organ and Tumor Motion: An Overview

Michael Goitein

Sem Rad Onc 2004

Limitations of two-dimensional treatment planning programs

Michael Goitein

Med Phys 1982

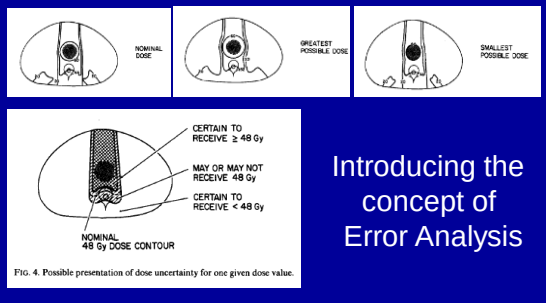


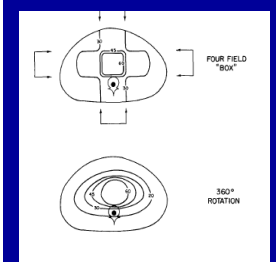
FIG. 4. Possible presentation of dose uncertainty for one given dose value.

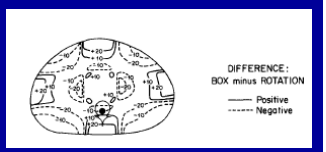
Introducing the concept of Error Analysis

Limitations of two-dimensional treatment planning programs

Michael Goitein

Med Phys 1982

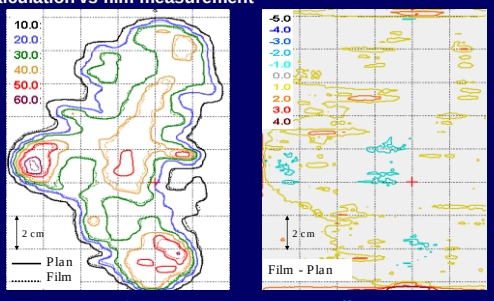




Introducing the concept of Dose Differences

DMLC lung field calculation vs film measurement

Tom LoSasso in IMRT Book 2003



Overlay

Difference

1983 Int J Rad Oncol Biol Phys

MULTI-DIMENSIONAL TREATMENT PLANNING: I. DELINEATION OF ANATOMY

MULTI-DIMENSIONAL TREATMENT PLANNING: II. BEAM'S EYE-VIEW, BACK PROJECTION, AND PROJECTION THROUGH CT SECTIONS

MICHAEL GOITEIN, PH.D.[1,3] AND MARK ABRAMS, M.S.[1]

Division of Radiation Biophysics, Department of Radiation Medicine, Massachusetts General Hospital, Boston, MA 02114 and Harvard Medical School

Major Components of MD Tx Pl System

I. Delineation of Anatomy

- Synthesis of diagnostic information
  - *CT, US, scintigram etc.*
- Appreciation & delineation of anatomy
  - *Display and Markup*
- Simulation of therapy
  - *BEV, non-coplanar tx*
- Dose distrib. calcul. and evaluation
  - *3D display, inhomogen., uncertainties*
- Verification of treatment
  - *Input for 'record/verify', 'sim' film*

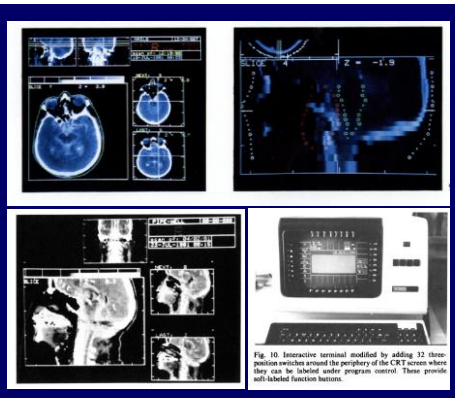


Fig. 10. Interactive terminal modified by adding 32 three-position switches around the periphery of the CRT screen where they can be labeled under program control. These provide soft-labeled function buttons.

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II. BEV, Back Projection, & Proj thru CT

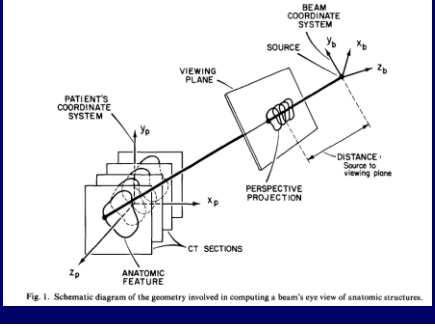

Fig. 1. Schematic diagram of the geometry involved in computing a beam's eye view of anatomic structures.

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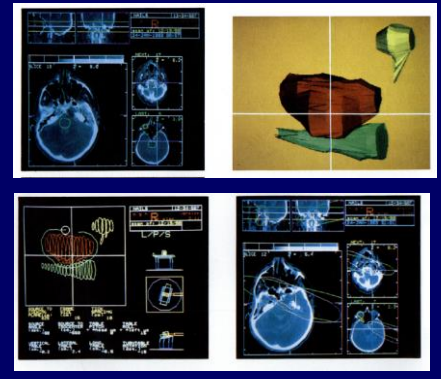

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Back Projection - DRR

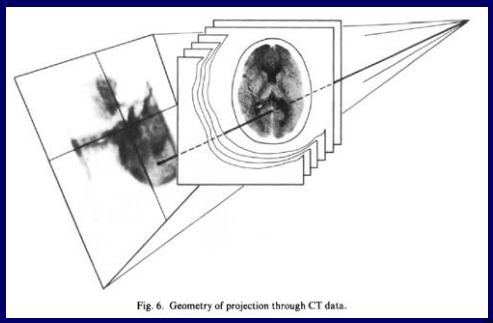
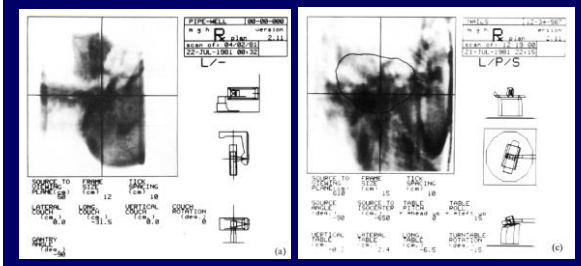
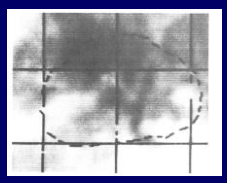


Fig. 6. Geometry of projection through CT data.

DRR with LINAC Orientation



Comparison of DRR and Portal Film



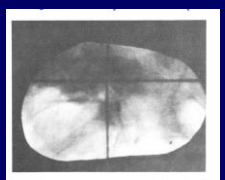


Fig. 8. Actual alignment situation from the viewpoint of a backpointing X ray tube. (a) Computer simulation (magnified); (b) Alignment film from one of the patient's treatments.

"Mulling" over the early Contributions of M Goitein

Critical Review

In Press – Int J Rad Onc Biol Phys 2017

Empowering Intensity Modulated Proton Therapy Through Physics and Technology: An Overview

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Thank you for your attention!