

In Memoriam of

Jan van de Geijn:

A session on Knowledge-Based Planning

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Jan van de Geijn, phys drs

3-D Planning Before You Were Born  
planning – including 3D treatment planning in 1965!

J van de Geijn, BJR 38: 369-377, 1965: Computation of Two + Three Dimensional Dose Distributions in <sup>60</sup>Cobalt Teletherapy

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Varik, the Netherlands



Jan, born 1930, with Agatha

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The extended van de Geijn family, in 1945.

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Jan, his parents, and his 11 siblings, 1950. He left the farm to study physics at the Rijksuniversiteit Utrecht

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Jan and soon-to-be-wife Sophia (one of the first Dutch doctors to specialize in nuclear medicine) in 1954.

Jan got his PhD in Experimental Physics and Astronomy at the University of Utrecht in 1957

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After military service as a first lieutenant in the Dutch army reserves. . .

Jan worked at Westeinde Hospital in the Hague until 1974.

Working very independently, Jan pioneered the use of computers in radiation therapy treatment planning at the hospital along with his mentor and colleague Dr. Geert Kok, radiation oncologist.

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1965, *Brit. J. Radiol.*, 38, 369-377

MAY 1965

### The computation of two and three dimensional dose distributions in cobalt 60 teletherapy

By J. van de Geijn, Phys. Drs.

H. Joannes de Deo Hospital, The Hague, Holland (Originally received November, 1963, and in amended form September, 1964)

In recent years, several papers have been published on the application of modern computers to radiation dosimetry in radiotherapy (Tien, 1955, 1958; Sterling, Perry and Baker, 1961; Sterling, Perry and Wickham, 1962; Wood, 1962). In general, all these methods are adaptations of the traditional isodose chart summing methods, dealing only with the dose distributions in one plane in co-planar techniques. A serious obstacle to their widespread use, especially in the smaller institutions, is the great amount of preparatory work involved. In the present paper a theoretical model is introduced by which the computation of two and three dimensional distributions in water equivalent media, obtained with both stationary and moving beam techniques with <sup>60</sup>Co radiation, becomes possible.

In a pre-vious paper (van de Geijn, 1964) it was shown that inside the field size of a teletherapy unit, the dose distribution can be written as a function of the coordinates  $(x, y, z)$  where  $D(x, y, z)$  is the dose at the point  $(x, y, z)$ . For all points along the z-axis, the dose distribution is parallel to the z-axis. The function  $D(x, y, z)$  for a normal



IBM 1620. 200 multiplications/sec, 10<sup>6</sup> slower than now. Memory: ~ 20K (decimal digits)

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Drs. Kok and van de Geijn, showing 3-D treatment planning at the 2<sup>nd</sup> AER Congress in Amsterdam, 1971

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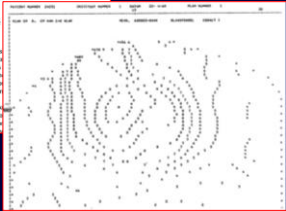
COMPUTER PROGRAMS IN BIOMEDICINE 1 (1978) 47-57. NORTH-HOLLAND PUBLISHING COMPANY, AMSTERDAM

### A COMPUTER PROGRAM FOR 3-D PLANNING IN EXTERNAL BEAM RADIATION THERAPY, EXTDD55

J. van de CREEK  
Rijksman de Eerste Hospital, The Hague, The Netherlands

In radiation therapy, external beams of ionizing radiation are used in complex cases where distribution of absorbed energy is being treated. For a given configuration to be 4 to be satisfied. The present program applies to rectangular beams of high energy X-rays. Involving with each density layer. It is designed to simulate radiation techniques parallel planes of a patient, thus enabling the radiologist to obtain quantitative individual dose distribution.

The central problem is the computation of the contribution of one beam to the absorption in the irradiated volume, in dependence of beam dimensions, tilting and shape of plane of a semi-empirical generating function for this purpose, which was described previously elsewhere.



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Philips TSS, 1973  
The Hague



Philips Treatment Planning System, 1974

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Jan and Jack Cunningham, Japan 1981, discussing beam models yet again

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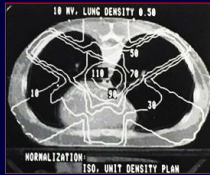
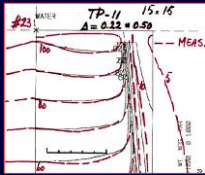
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Head, Radiation Physics and Computer Automation  
Section, Radiation Oncology Branch,  
NCI, Bethesda MD  
1980 - 1995



Dose Calculation Modeling and CT-Based Treatment Planning

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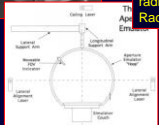
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APPENDIX A: SUMMARY OF THE MODEL  
For  $d(t)$   
 $NFD(d(t)) = G(d(t)) \exp[-\alpha(d(t) - d_{50})]$  (A1)  
where  
 $\alpha(d) = \alpha_0 - \alpha_1 \exp(-\beta d)$  (A2)  
 $G(d(t)) = H(d(t) - d_{min}) \exp[-\alpha(d(t) - d_{50})]$  (A3)  
 $\alpha(d) = \alpha_0 + \alpha_1 \exp(-\beta d)$  (A4)  
 $\exp[-\beta d] = \exp(-\beta d_{50}) \exp(-\beta (d - d_{50}))$  (A5)  
(alternatively)



J van de Geijn: Time-dose response  
of human tumors and normal tissues  
during and after fractionated  
radiation treatment. A new model.  
Radiother Oncol 12: 57-78, 1988



NCI Radiation Oncology  
Branch, 1980 - 1995



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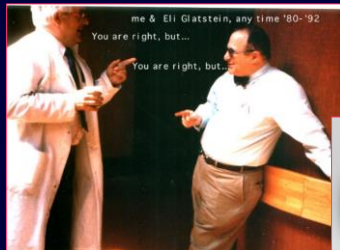
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Jan and Eli Glatstein  
any time between 1980 and 1992



Presented by Dr. Glatstein  
any time between 1980 and 1992

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The van de Geijn family, 1984

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- Stichting Koningin Wilhelmina Fonds award, presented by Queen Juliana
- Roentgen Plaque (Drs. van de Geijn + Kok), 2<sup>nd</sup> A.E.R. Congress
- AAPM Fellow, 1997

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Jan van de Geijn was one of the pioneers of computerized treatment planning, and worked to improve it for more than 35 years. He would definitely want us to get on with the talks so we can learn something new about treatment planning!

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