

**III Jornada de residents de la Societat Catalana de Física Mèdica**

**2 de Novembre de 2015**

**Hospital Clínic de Barcelona**



# **MEDIDA DE DOSIS ABSORBIDA EN CBCT**

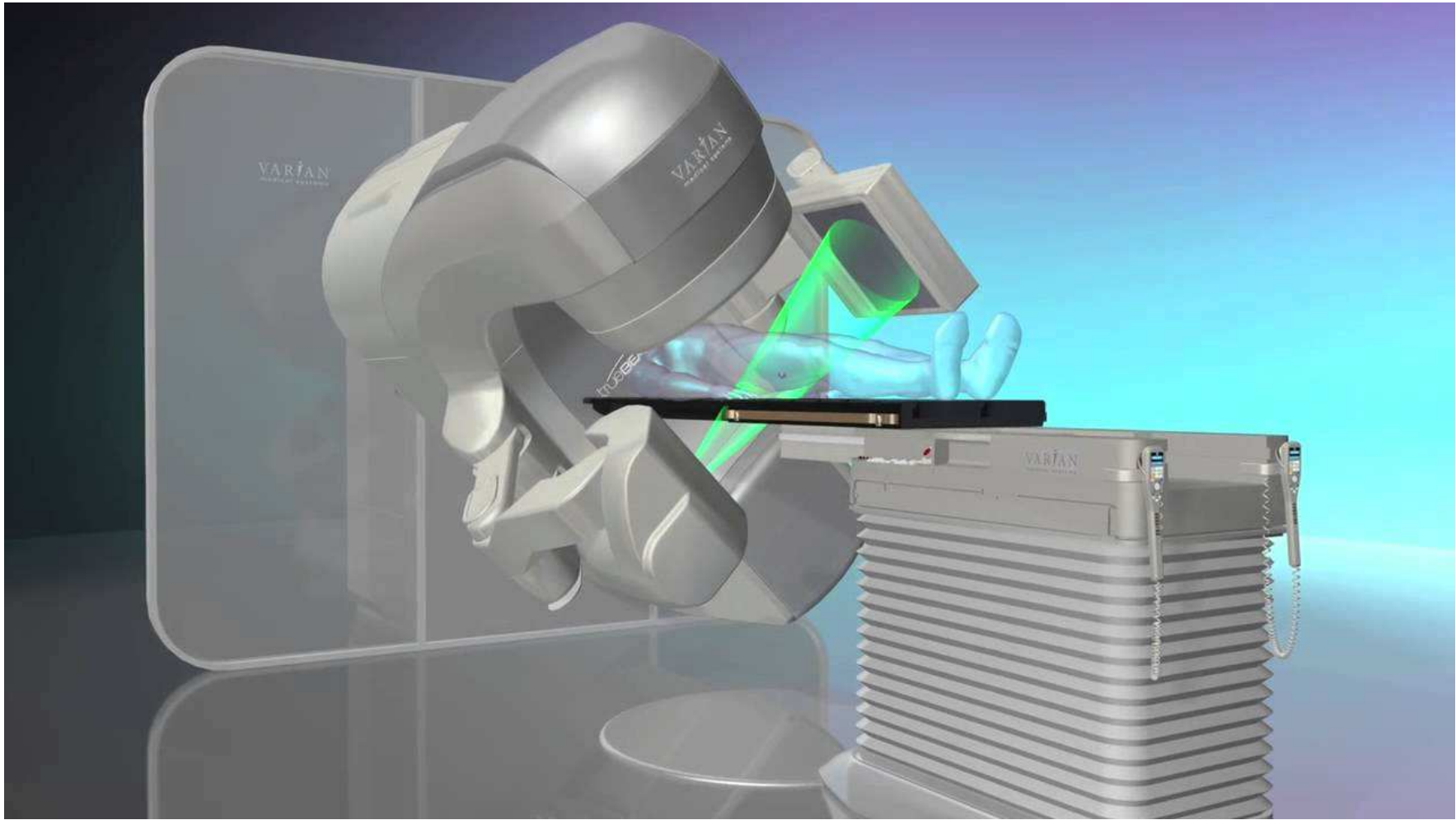
**Alberto Cano Herranz**

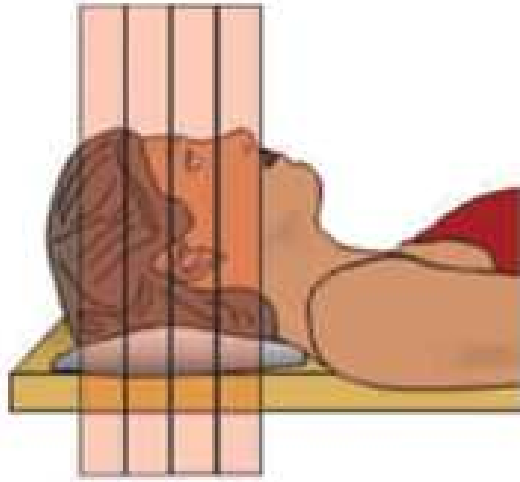
**Hospital Universitari Vall d'Hebron**



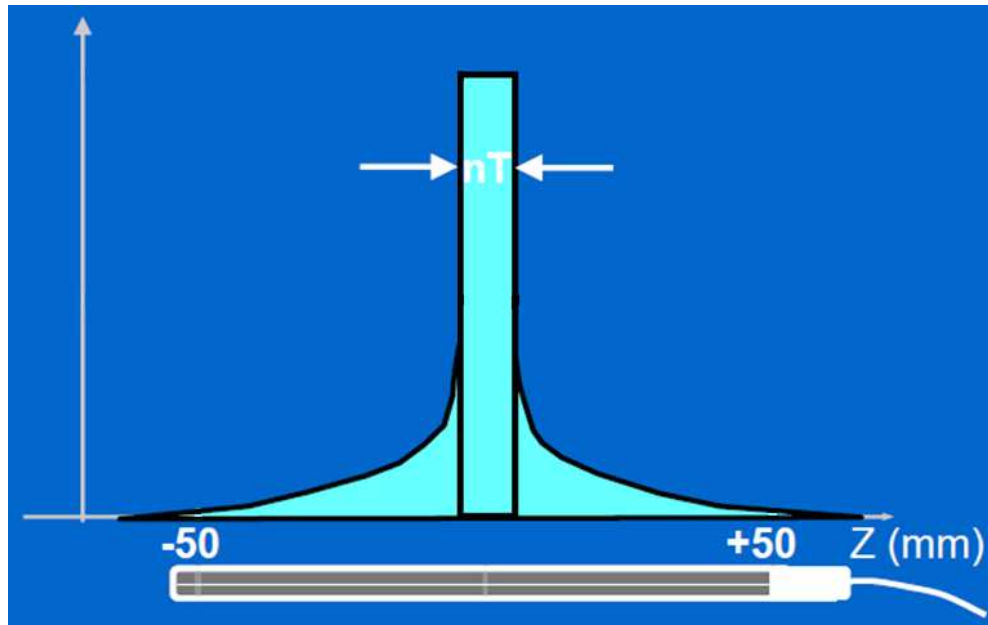
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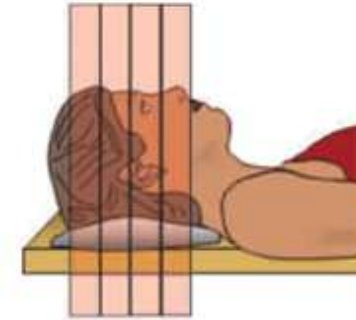




$$CTDI_{100} = \frac{1}{NT} \int_{-50mm}^{50mm} D(z) dz$$



$$\text{CTDI}_L = \frac{1}{nT} \int_{-L/2}^{L/2} f(z') dz'$$



$$f(z) \otimes \Pi\left(\frac{z}{L}\right)$$

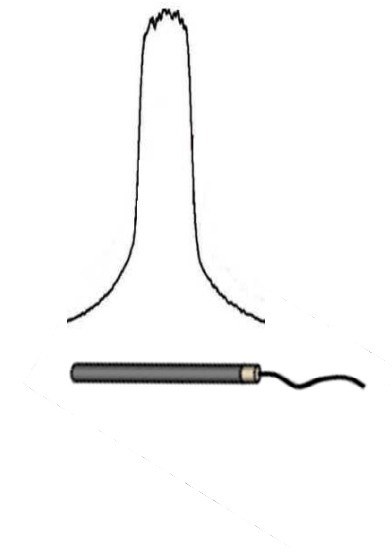
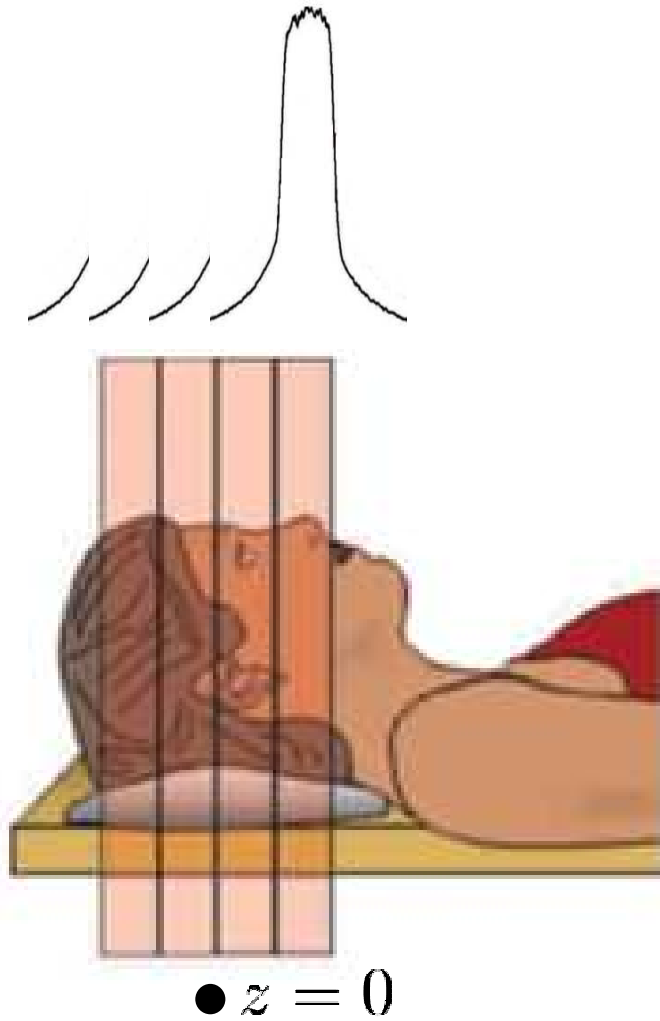
$$p = \frac{b}{nT} = 1$$

$$D_L(z) = \frac{1}{b} \int_{-L/2}^{+L/2} f(z - z') dz' \quad \xrightarrow{z=0}$$

$$D_L(0) = \frac{1}{b} \int_{-L/2}^{+L/2} f(z') dz'$$

$$p = \frac{b}{nT} = 1$$

$$D_L(0) = CTDI_L$$



Maniquí estándar cilíndrico

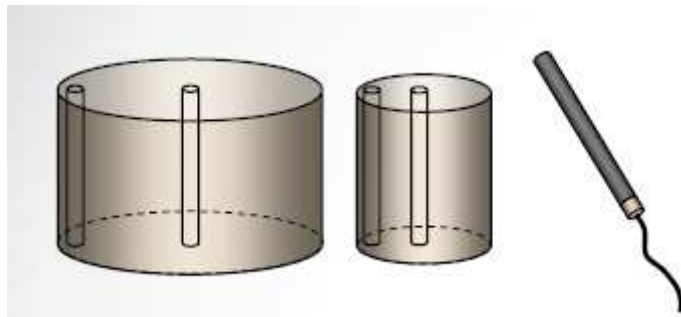


Longitud 15 cm

Diámetro

16 cm (cabeza)

32 cm (body)



Cámara ionización tipo lápiz

$$CTDI_w = \frac{1}{3} CTDI_{100}^{center} + \frac{2}{3} CTDI_{100}^{periphery}$$

$$CTDI_{vol} = \frac{CTDI_w}{pitch}$$



# CBCT



# Cone beam CT dosimetry: A unified and self-consistent approach including all scan modalities—With or without phantom motion

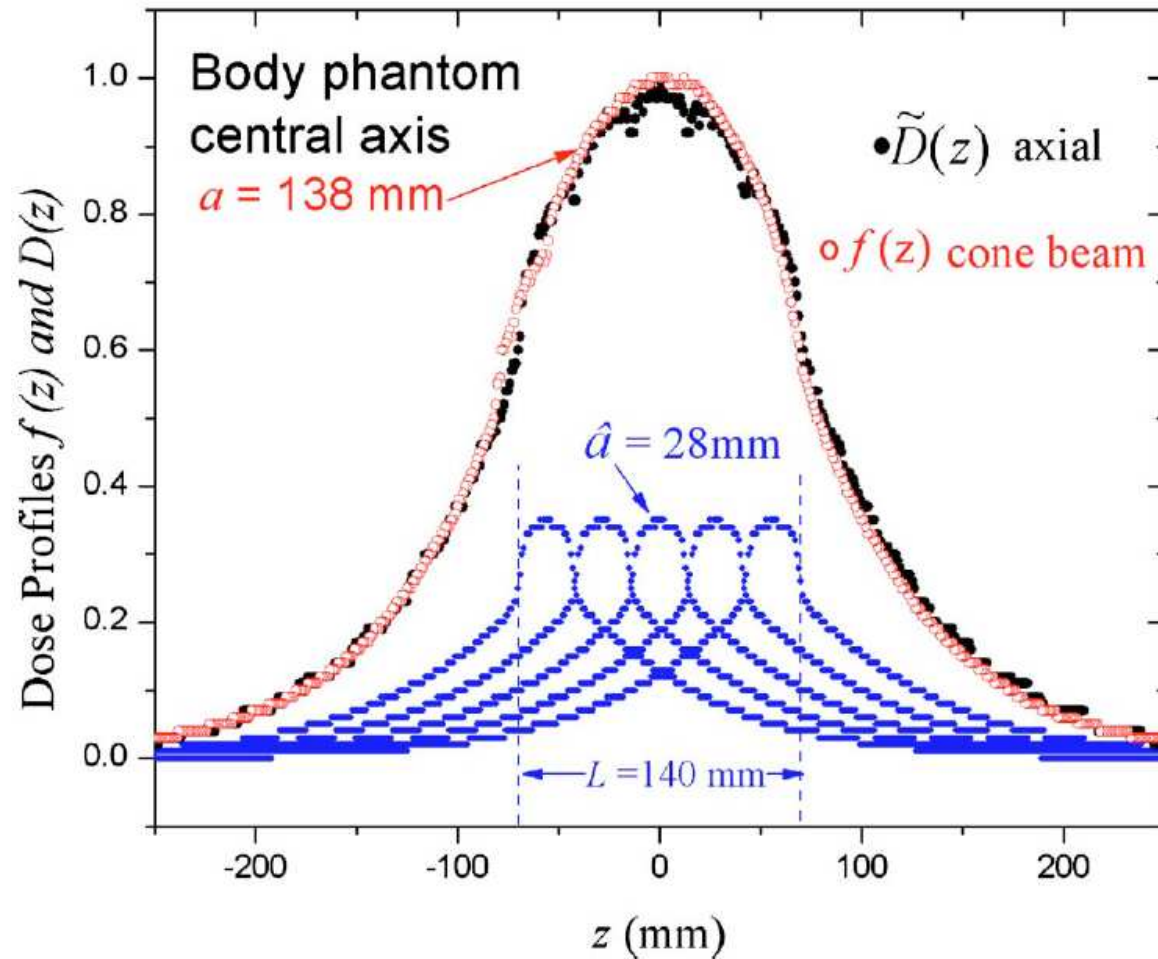
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Med. Phys. 37 (6), June 2010



CBCT anchura  $a \rightarrow f(z)$

CT anchura  $\hat{a}$

contigüidad

total escaneo  $a$

$\rightarrow D(z)$

$$f(z) \approx D_L(z)$$

$$f(0) \approx D_L(0)$$

$$D_L(0) = \text{CTDI}_L$$

## Dose and image quality for a cone-beam C-arm CT system

Rebecca Fahrig, Robert Dixon, Thomas Payne, Richard L. Morin,  
Arundhuti Ganguly, and Norbert Strobel

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Med. Phys. 33 (12), December 2006

- Cámara Farmer
- Medida central y periférica de manera análoga a CTDI en maniquí estándar, en corte  $z=0$ :

$$\bar{D}(0) = (1/3)D_0 + (2/3)\bar{D}_p$$

- Según Fahrig , da la dosis media en el plano central del maniquí, y puede ser comparada con el  $CTDI_w$  de un CT.



ICRP Publication 129



Radiological Protection  
in Cone Beam Computed Tomography (CBCT)

ICRP PUBLICATION 129

Approved by the Commission in January 2015

❖ Dosimetría para CBCT aún no estandarizada

**IGRP**  
**recomienda**

## Test de aceptación

CTDI

en maniquí

→ estándar interno

an aire

→ caracterizar haz

## QA rutina

en aire

→ estabilidad

## Dosis a paciente

sugiere uso de  $f(0)$

# Conclusiones

- CTDI en CT nos da la dosis acumulada en  $z=0$ .
- CTDI en CBCT no aplica.
- Estrategia de medida de dosis en CBCT:  $f(0)$ 
  - Comparable con CTDI en CT
- ICRP:
  - Dosimetría no estandarizada
  - Recomienda:
    - CTDI maniquí: estándar interno, comparar
    - CTDI aire: estabilidad
    - Dosis a paciente: uso de  $f(0)$

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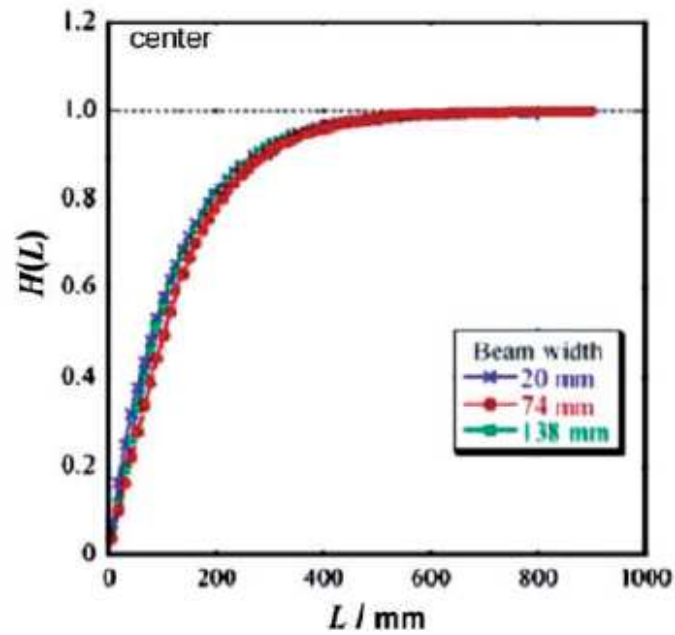
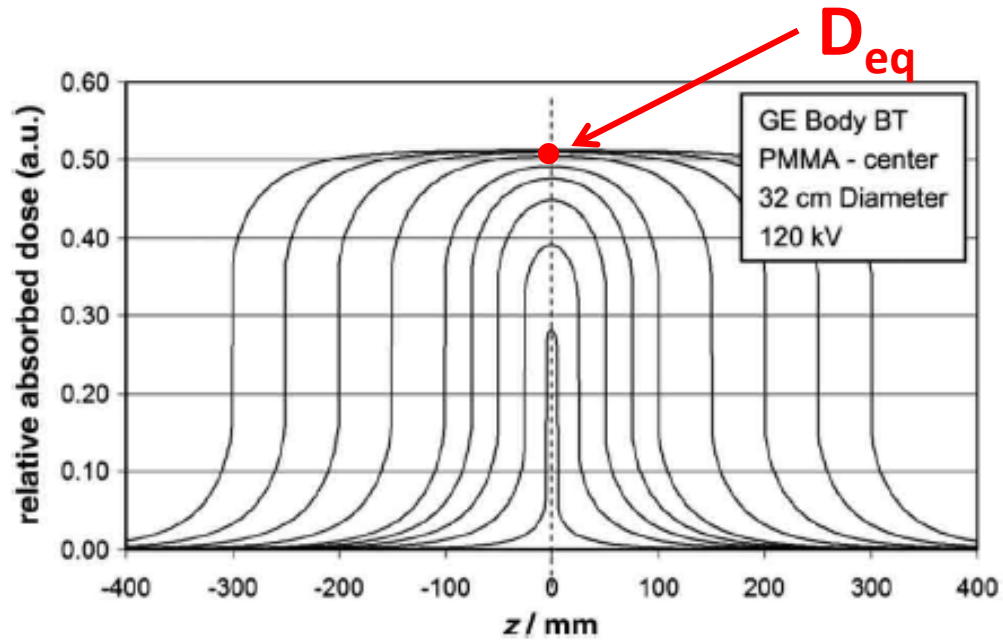
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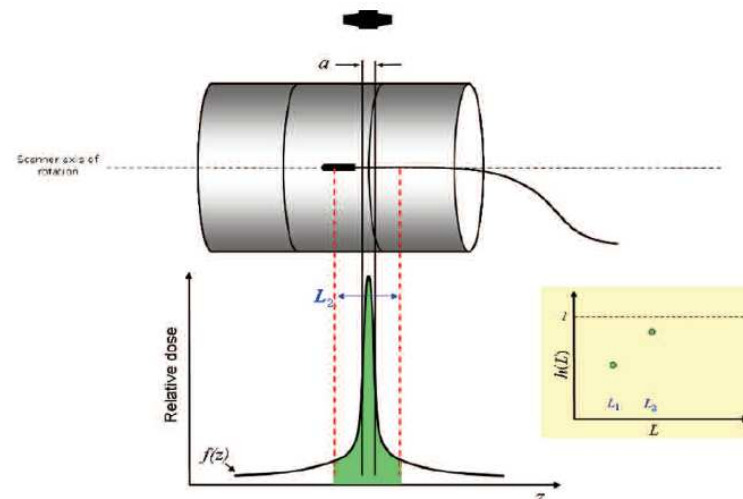
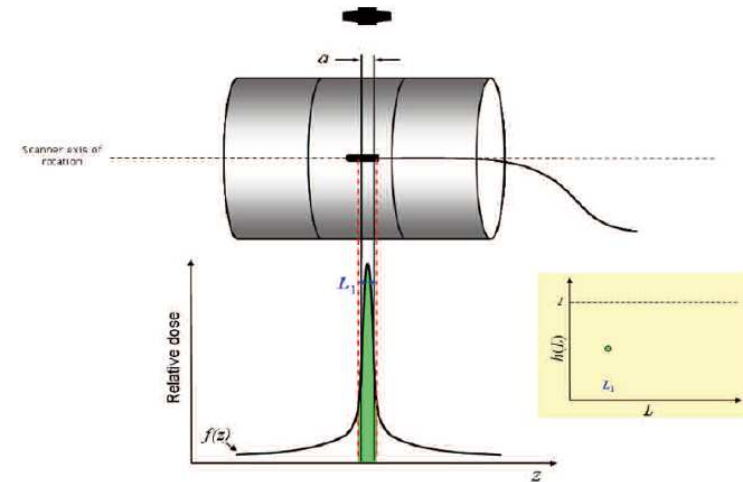
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$$H(L) = \frac{D_L(0)}{D_{eq}}$$



30 cm  $\emptyset$  y 60 cm de largo.

