

Herramientas para la evaluación de un plan de tratamiento

Planeación

1) Distribuir la dosis

2) **Analizar la calidad
de la distribución**

HISTOGRAMA

Gráfica que muestra los valores
de una o más variables trazadas
en función del tiempo o la
frecuencia de aparición

Histogramas

Volumen x Dosis

- Evaluación
- Comparación







Histogramas

Volumen x Dosis

- Acumulativo
- Diferencial
- Natural

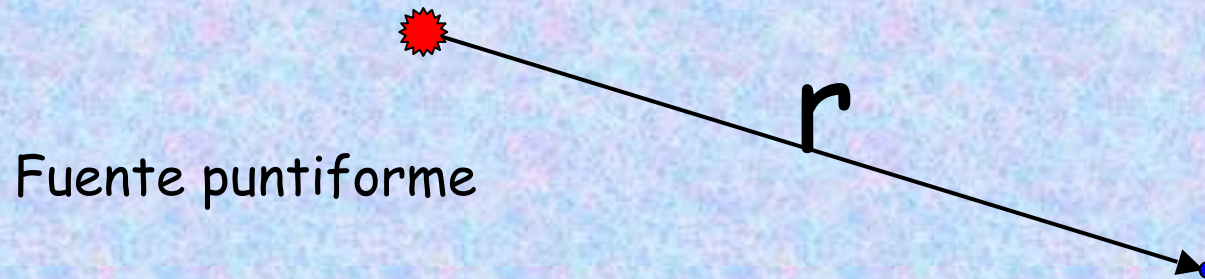
Histograma - Acumulativo

Volumen

x

Dosis

Histograma - Acumulativo



$$\text{Volumen} = \frac{4}{3} \pi r^3$$

Histograma - Acumulativo

$$V = \frac{4}{3} \pi r^3$$

$$\text{Dosis} = D_0 \left(\frac{r_0}{r} \right)^2$$

Histograma - Acumulativo

$$V = \frac{4}{3} \pi r^3$$

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Histograma - Acumulativo

$$V = \frac{4}{3} \pi r^3$$

$$D = D_0 \left(\frac{r_0}{r} \right)^2$$

Histograma - Acumulativo

$$V = \frac{4}{3} \pi r^3$$

$$r = \left(r_0^2 \frac{D_0}{D} \right)^{\frac{1}{2}}$$

Histograma - Acumulativo

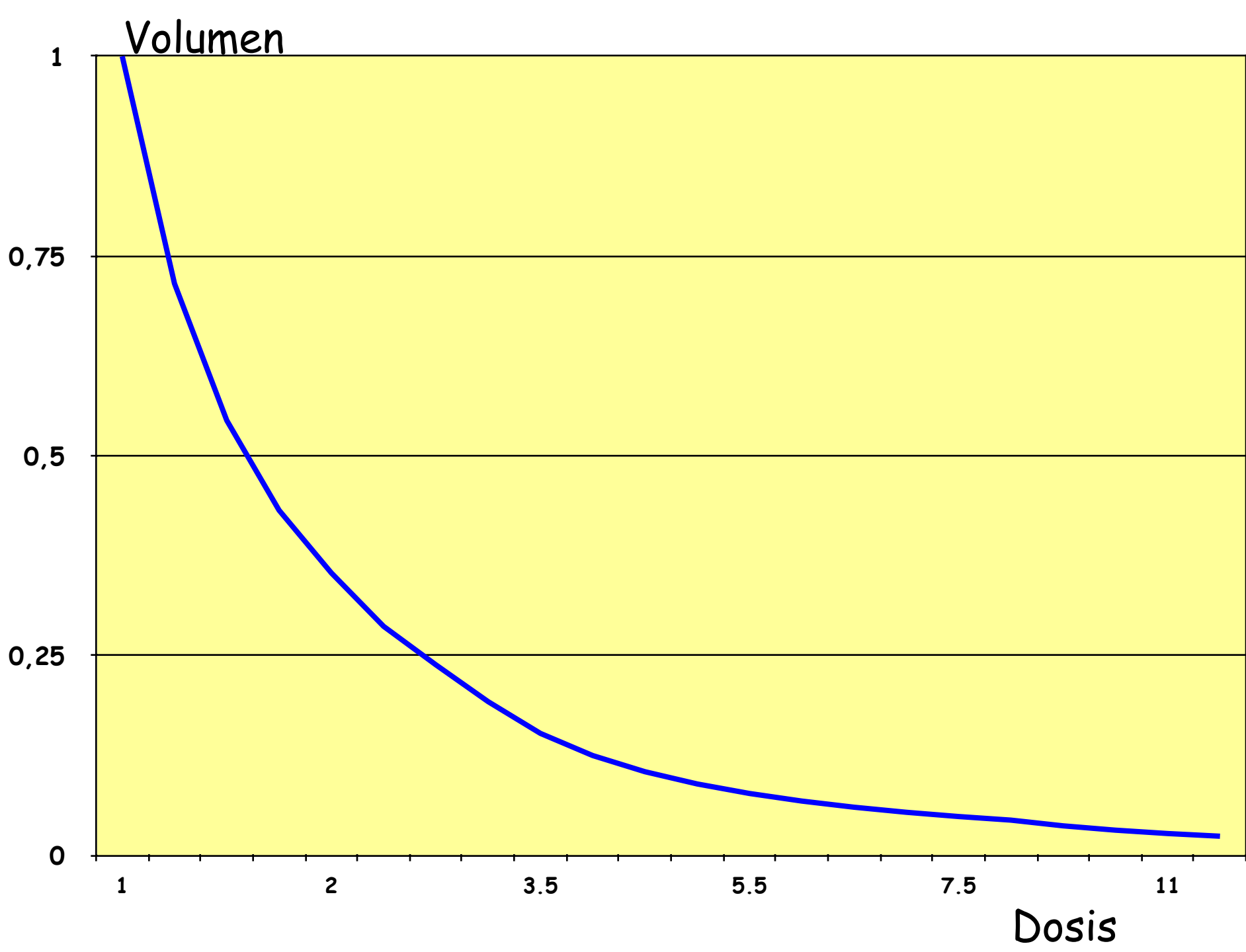
$$V = \frac{4}{3} \pi \left(r_0^2 \frac{D_0}{D} \right)^{\frac{3}{2}}$$

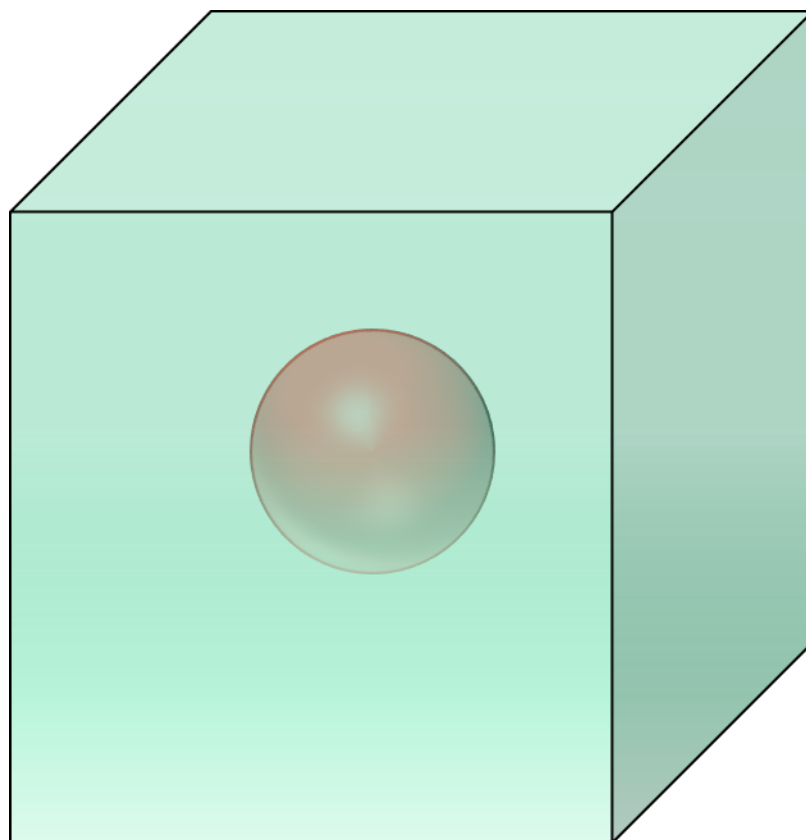
Histograma - Acumulativo

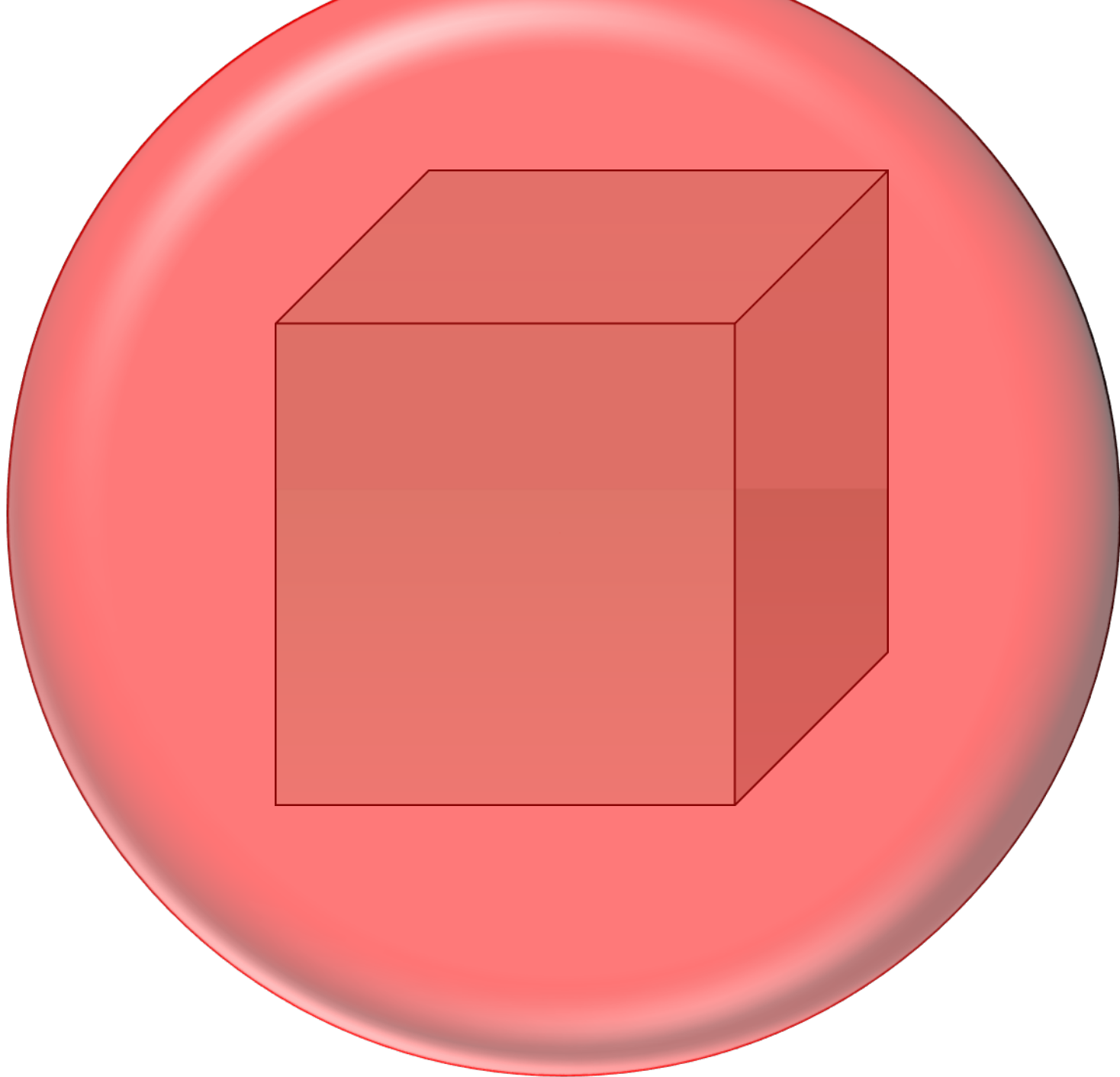
$$V = \frac{4}{3} \pi \left(r_0^2 \frac{D_0}{D} \right)^{\frac{3}{2}}$$

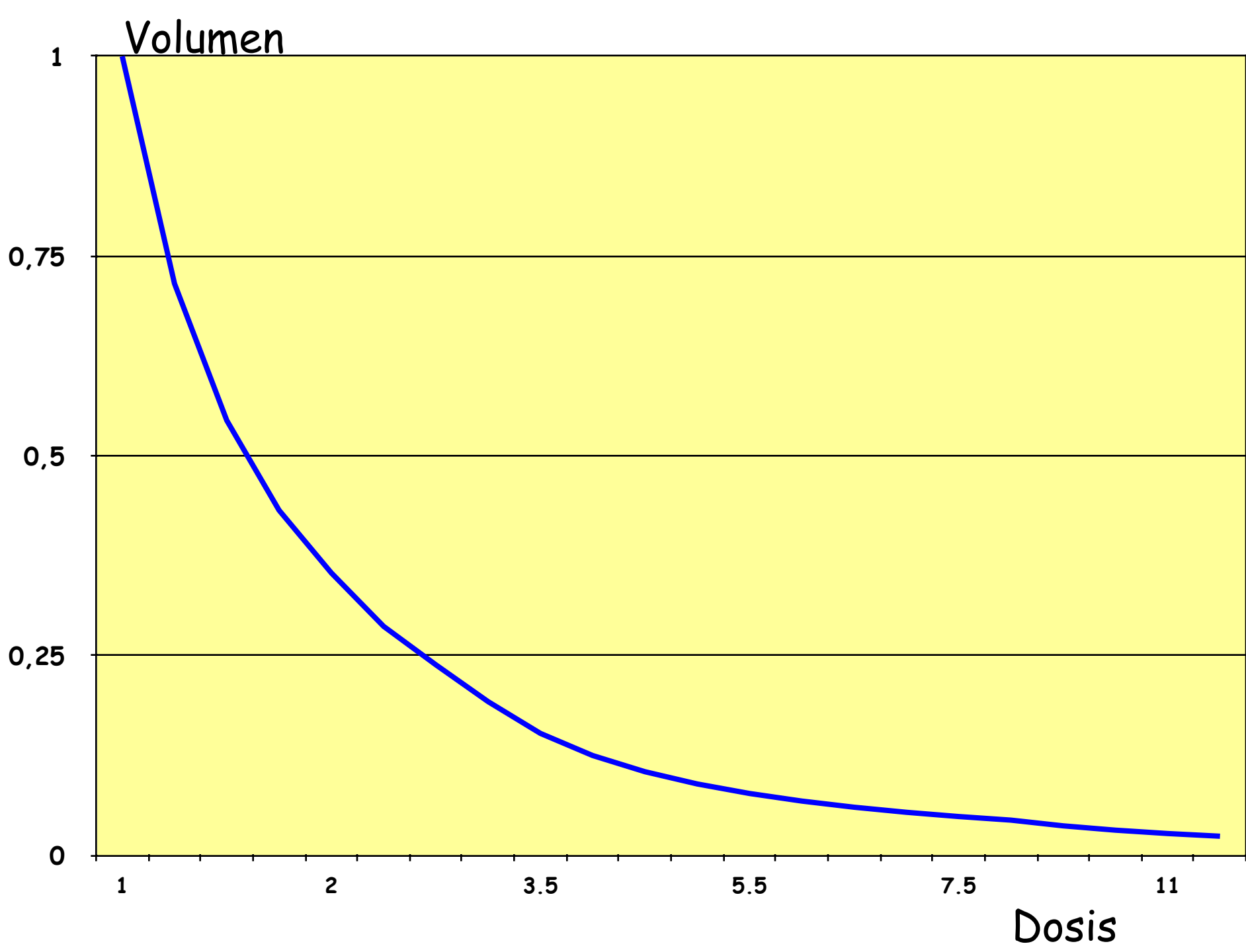
Histograma - Acumulativo

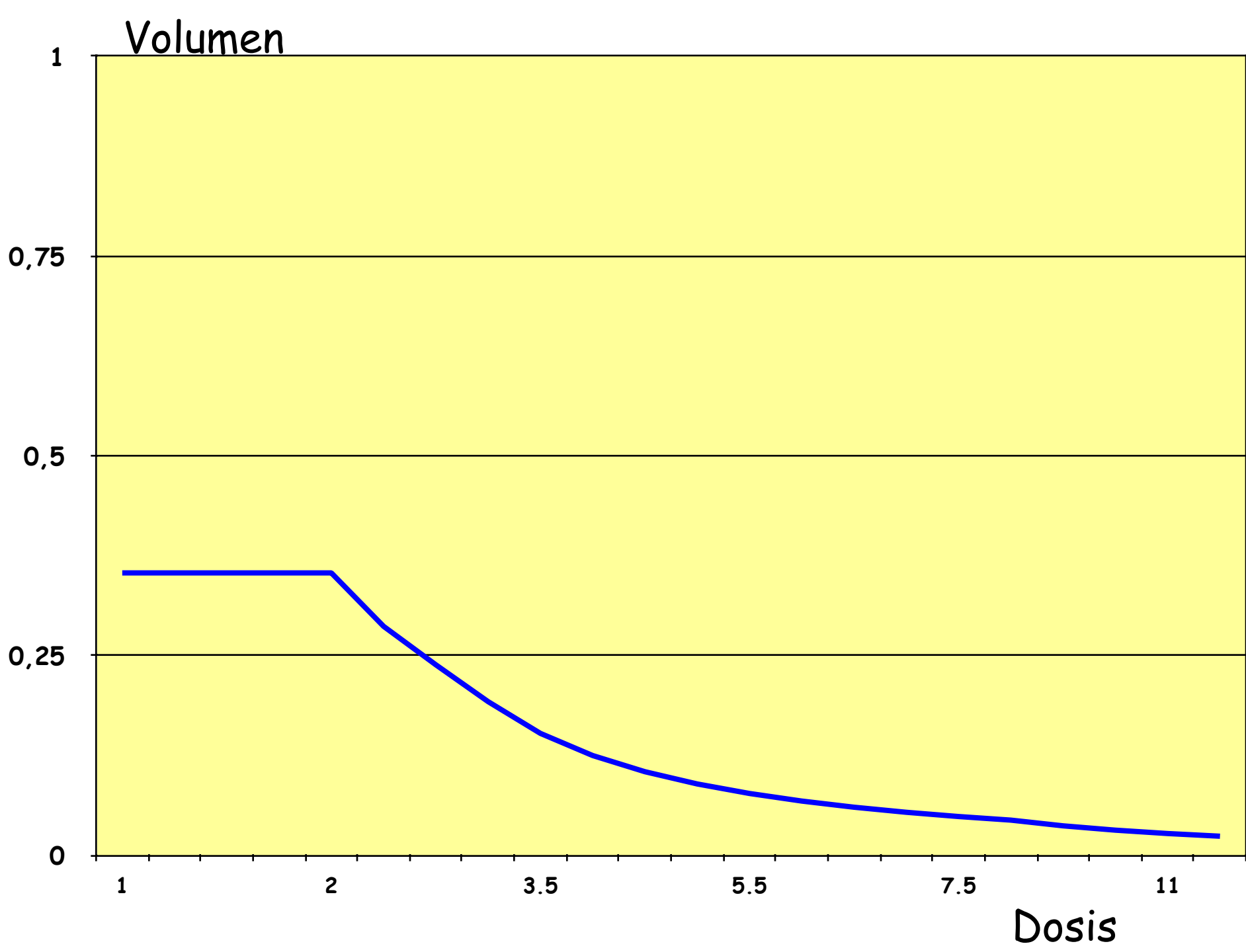
$$V = k D^{\frac{-3}{2}}$$











Histogramas

Volume x Dose

- Acumulativo
- Diferencial
- Natural

Histograma - Diferencial

Variação do Volume

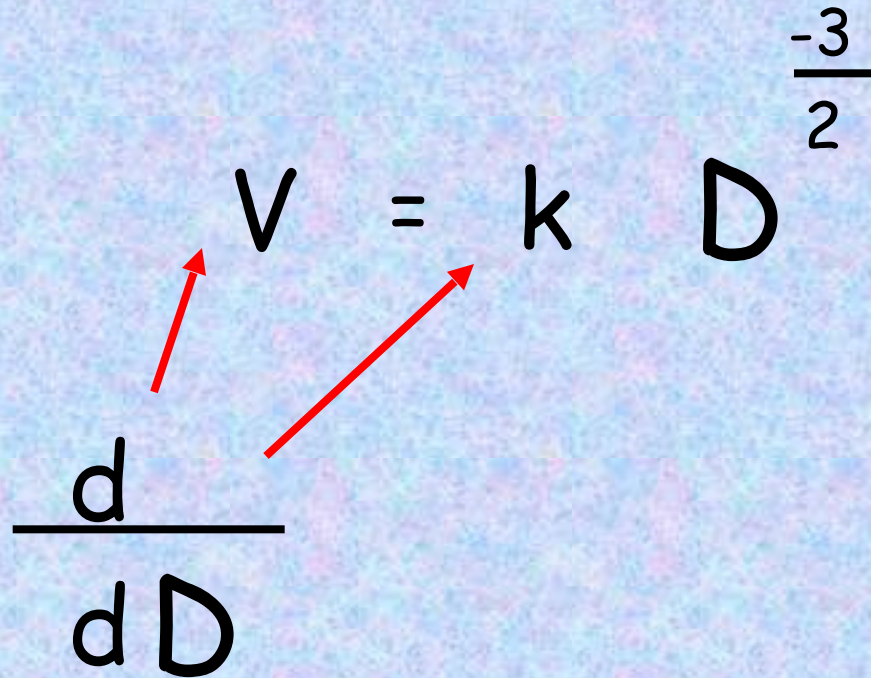
x

Dose

Histograma - Acumulativo

$$V = k D^{\frac{-3}{2}}$$

Histograma - Diferencial

$$\frac{d}{dD} V = k D^{-\frac{3}{2}}$$


Histograma - Diferencial

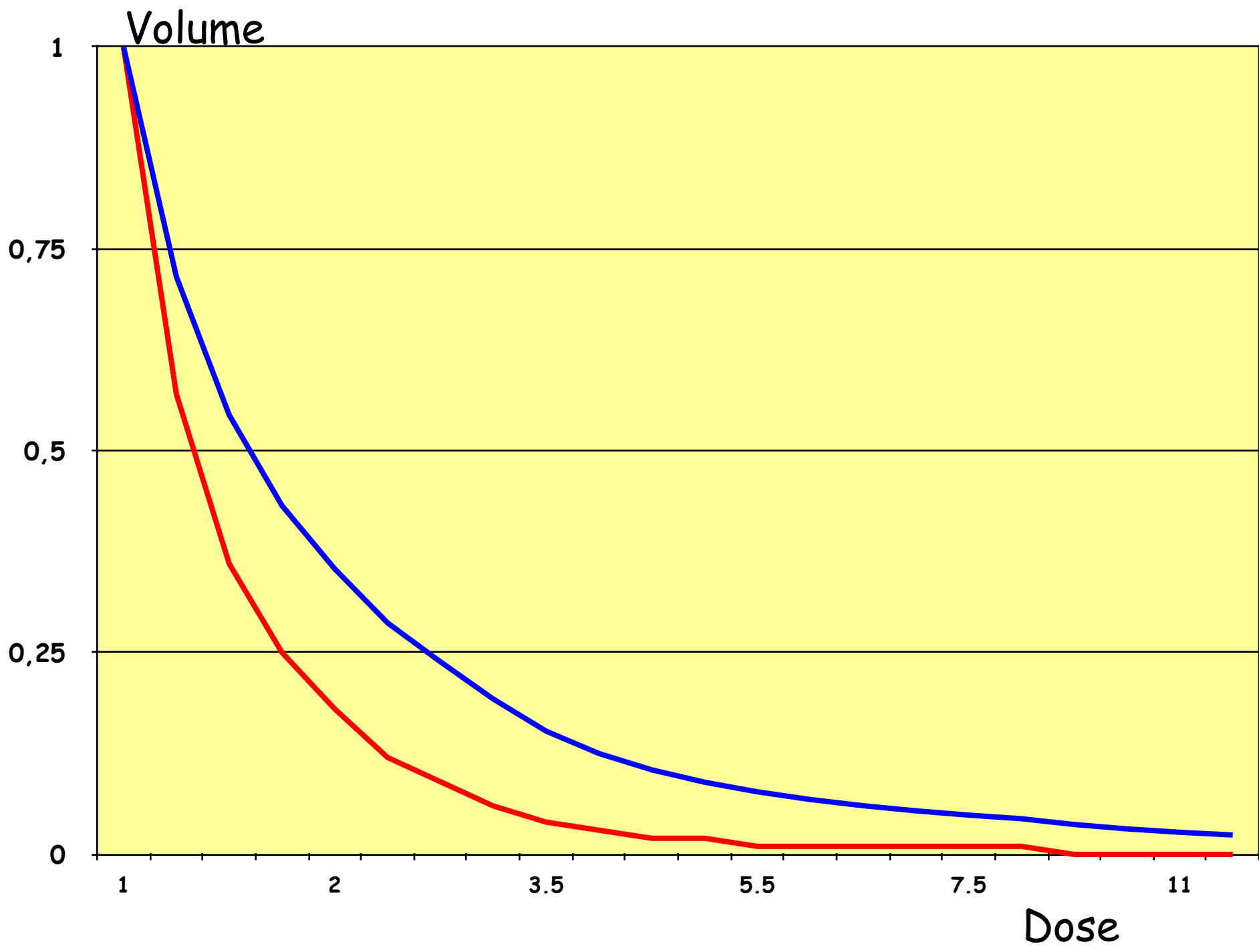
$$\frac{dV}{dD} = \frac{dkD^{-\frac{3}{2}}}{dD}$$

Histograma - Diferencial

$$\frac{dV}{dD} = \frac{dkD^{-\frac{3}{2}}}{dD}$$

Histograma - Diferencial

$$\frac{dV}{dD} = k D^{-\frac{5}{2}}$$



Histogramas

Volume x Dose

- Acumulativo
- Diferencial
- Natural

Histograma - Acumulativo

$$V = k D^{\frac{-3}{2}}$$

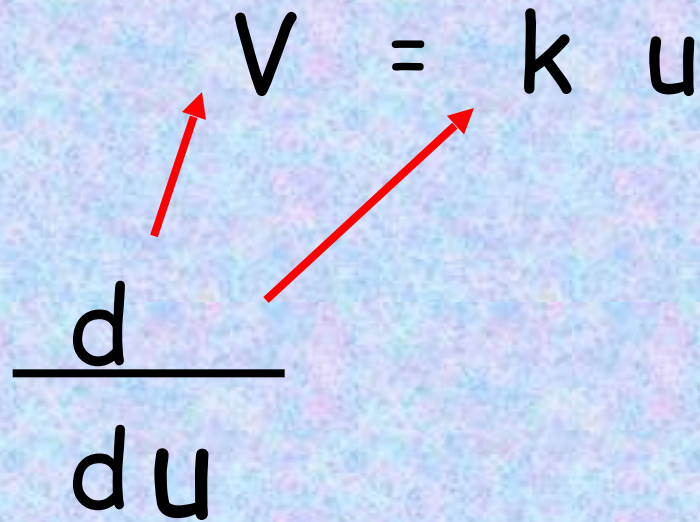
Histograma - Natural

$$V = k \cdot D^{\frac{-3}{2}} \cdot u$$

Histograma - Natural

$$V = k u$$

Histograma - Natural

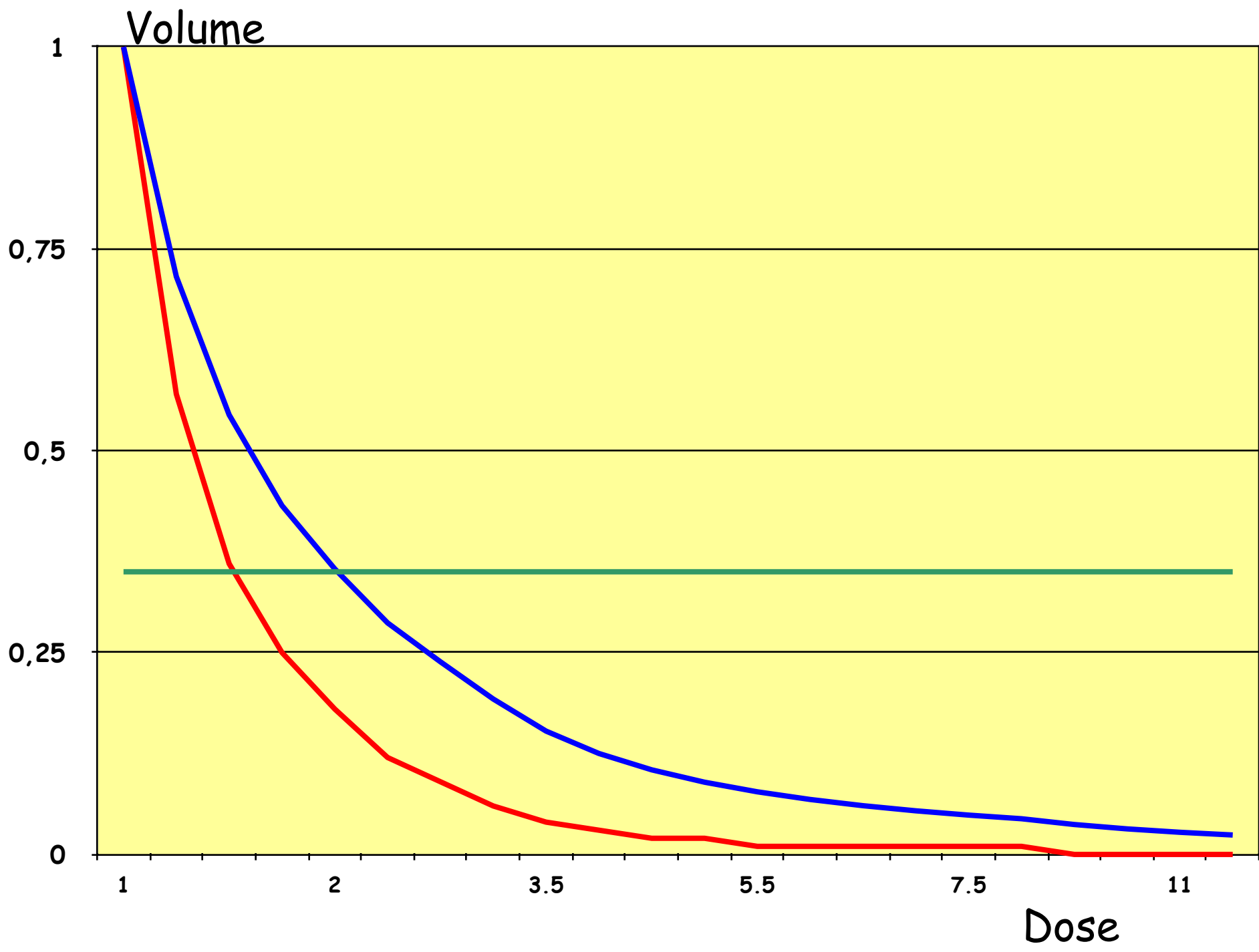
$$\frac{d}{du} V = k u$$


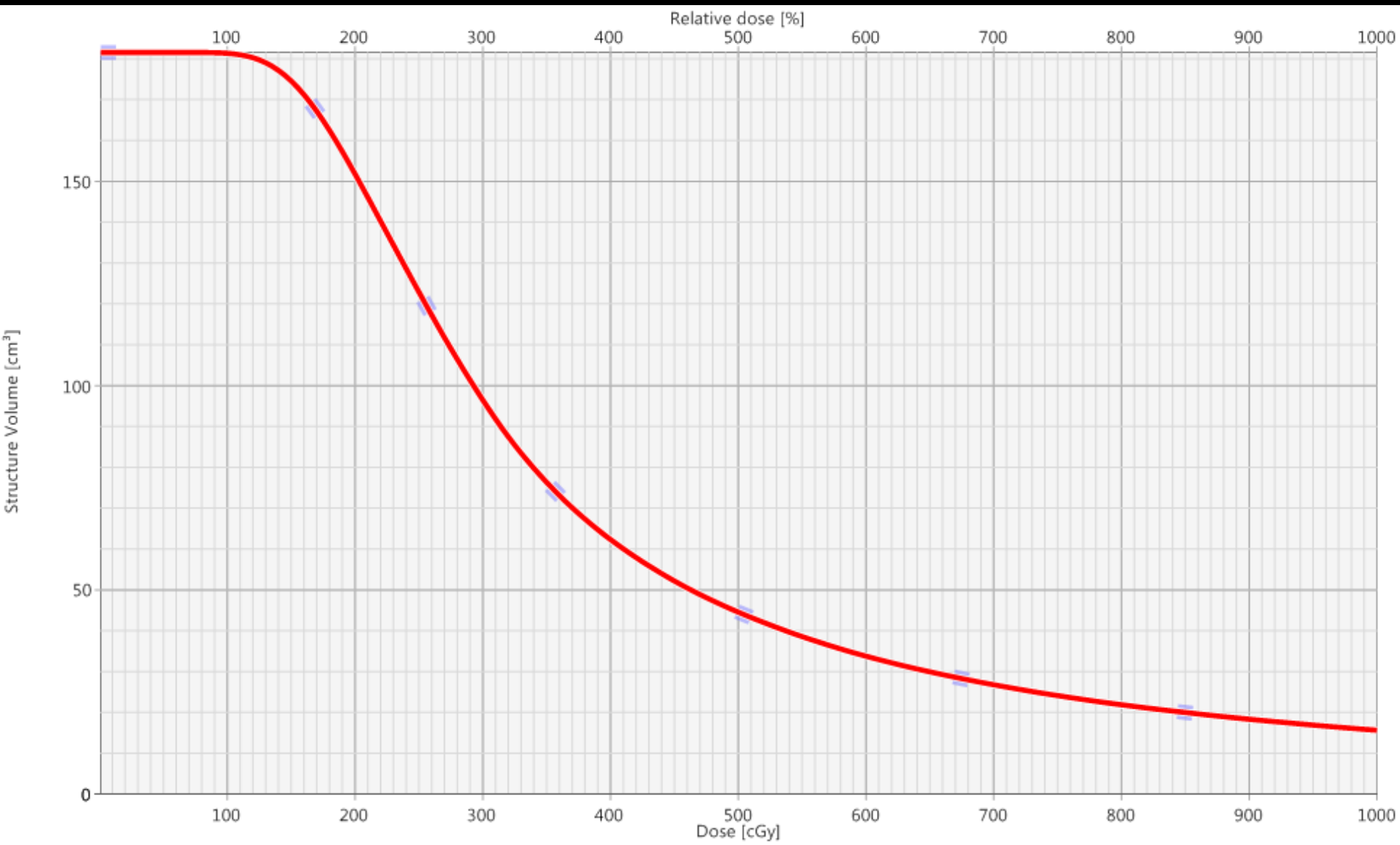
Histograma - Natural

$$\frac{dV}{du} = \left(\frac{du}{du} \right)$$

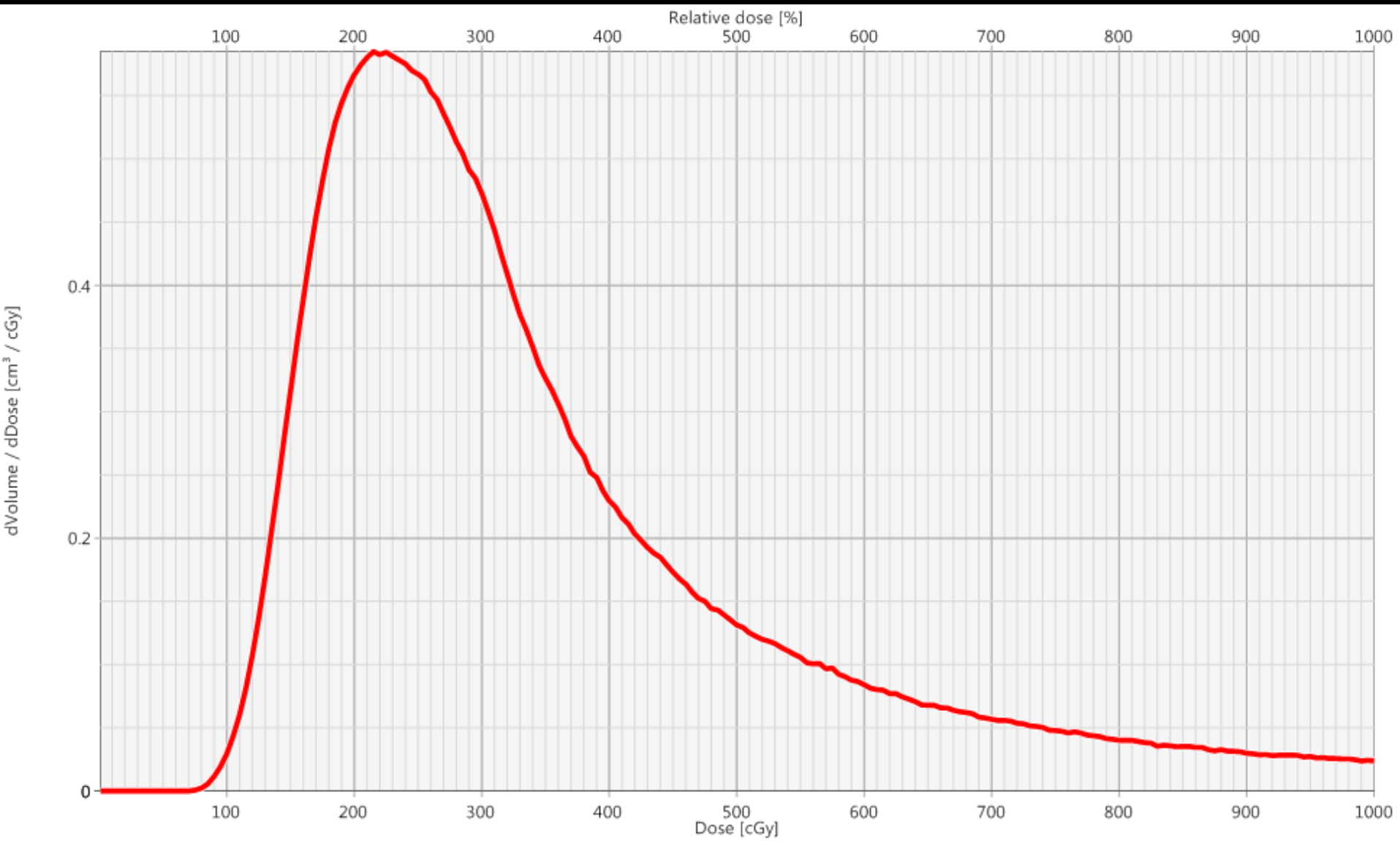
Histograma - Natural

$$\frac{dV}{du} = \text{constante}$$

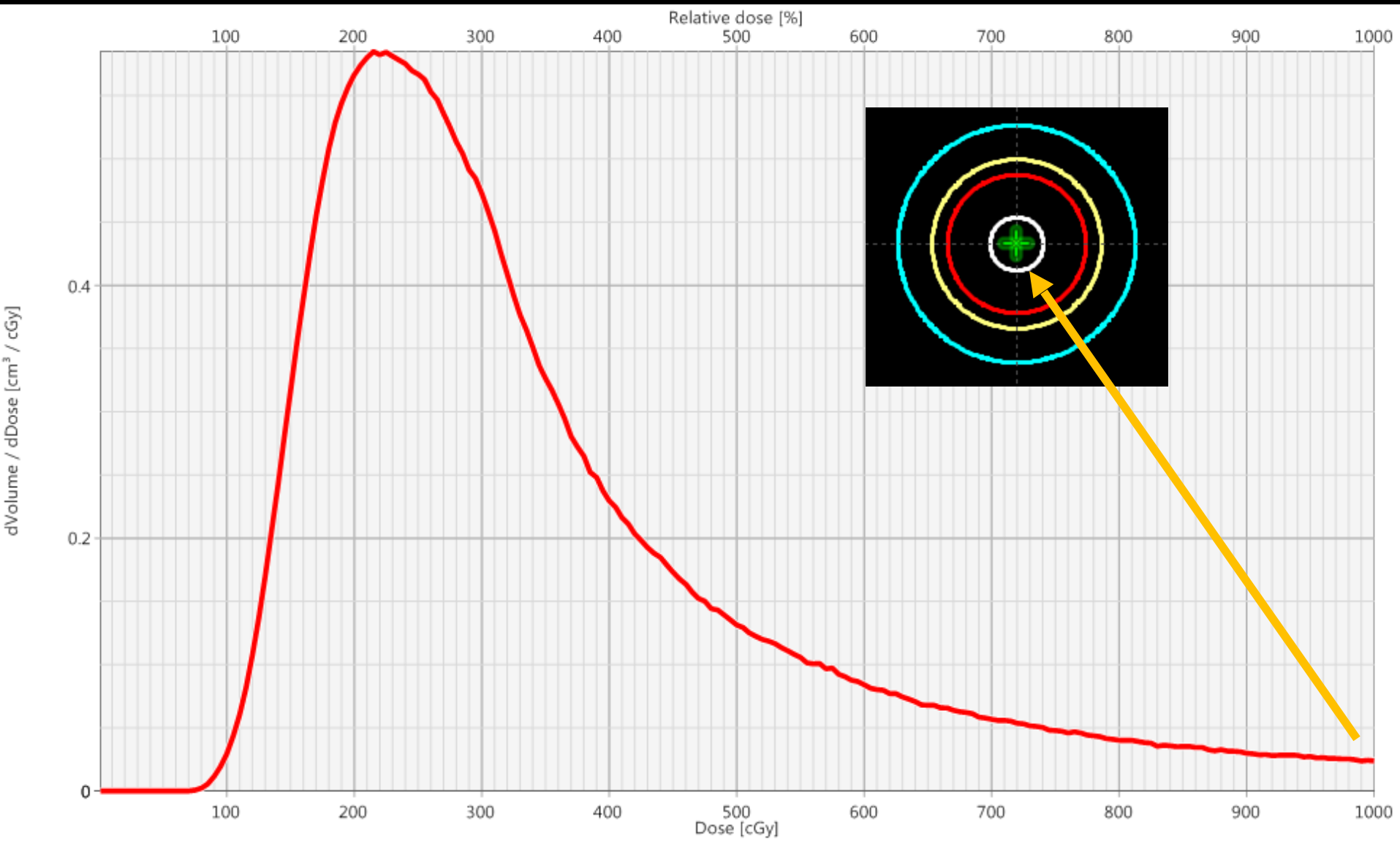




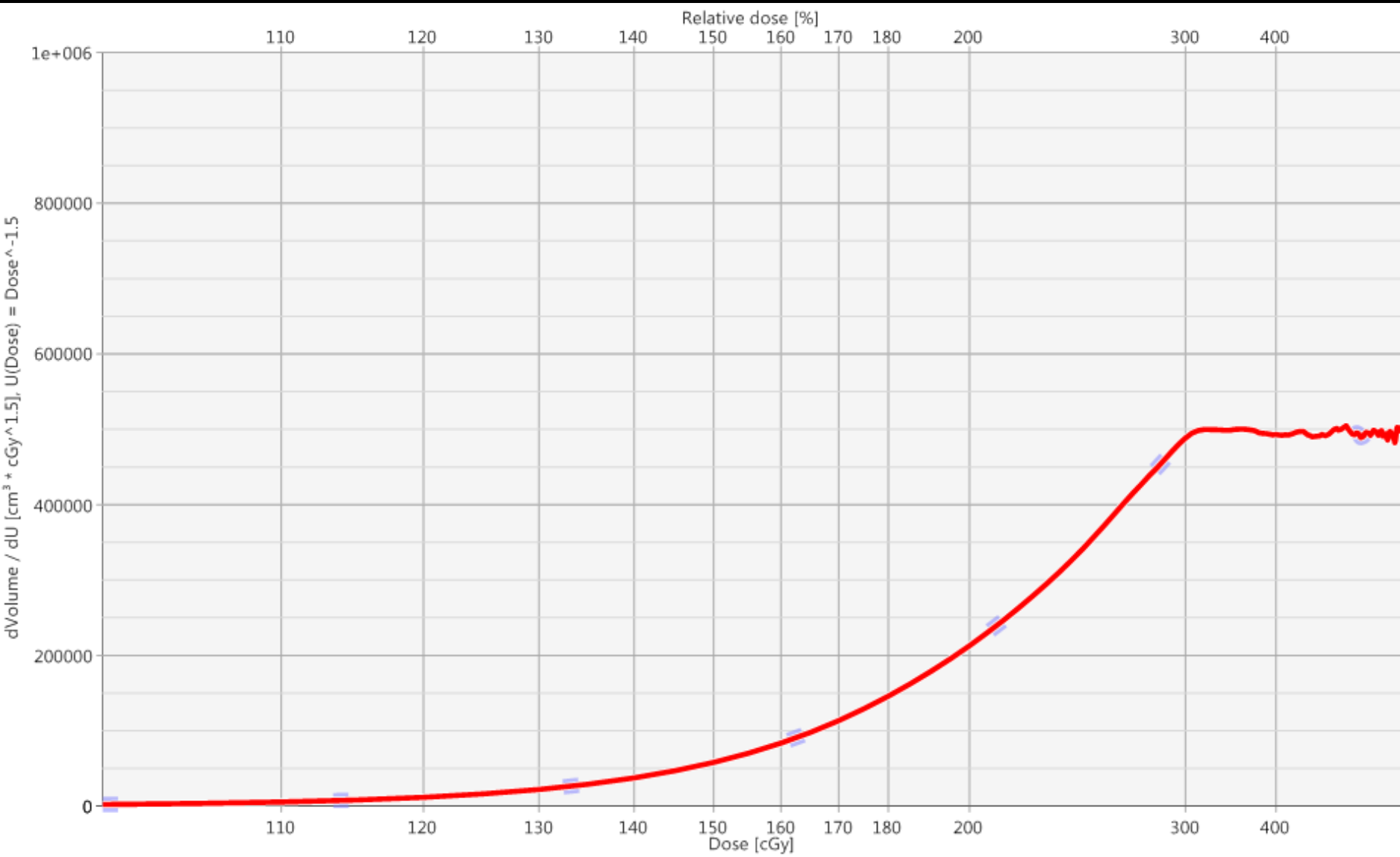
Some structures are unapproved or rejected



Some structures are unapproved or rejected

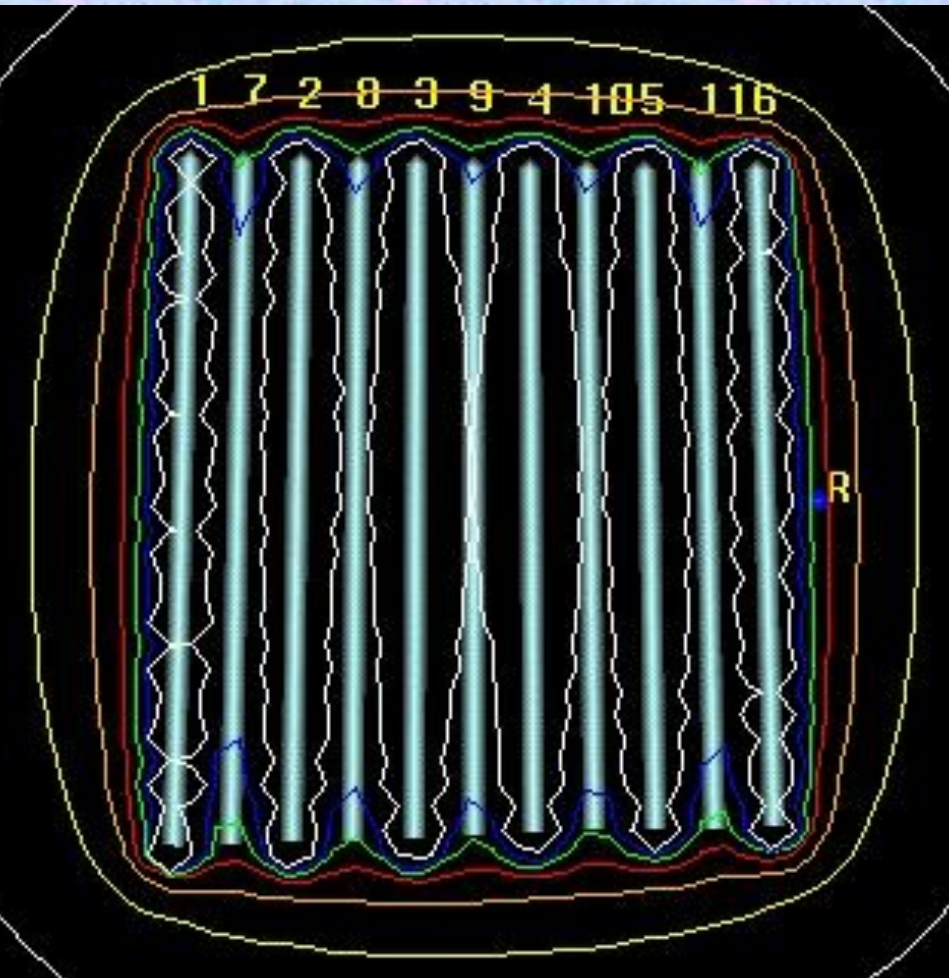


Some structures are unapproved or rejected

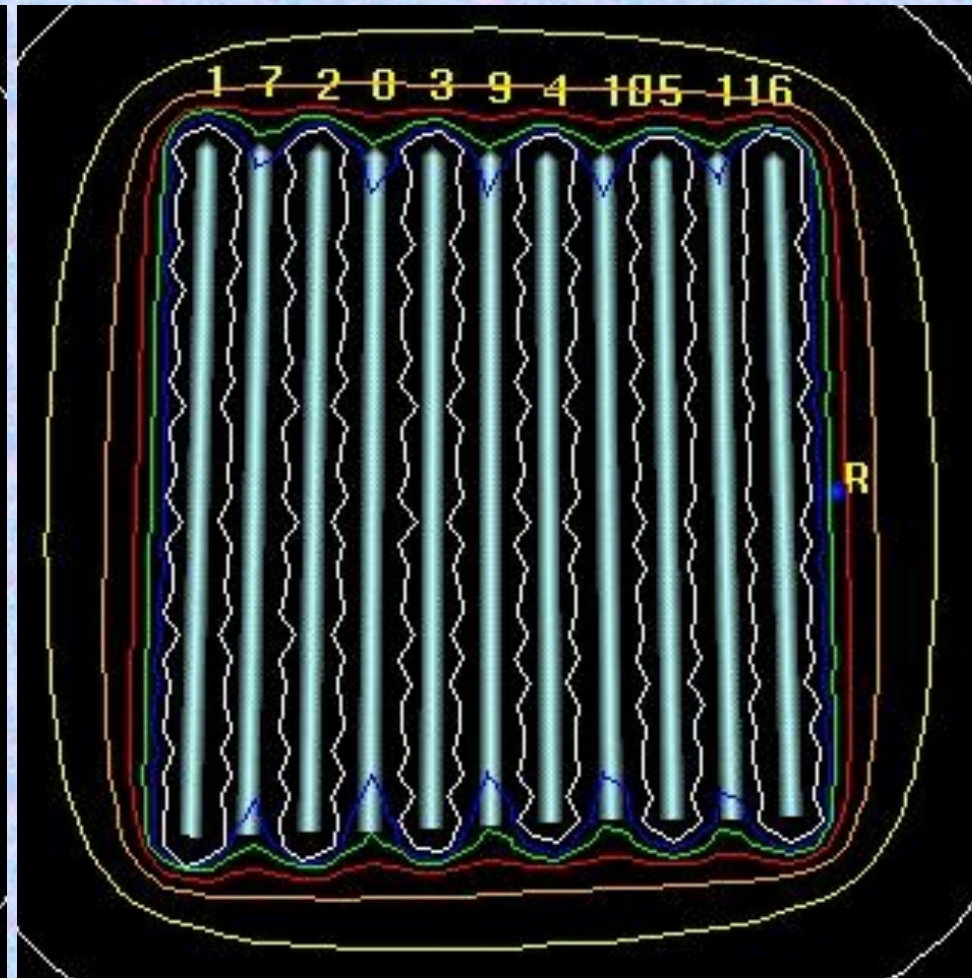


Some structures are unapproved or rejected

10 mm - tiempos iguales

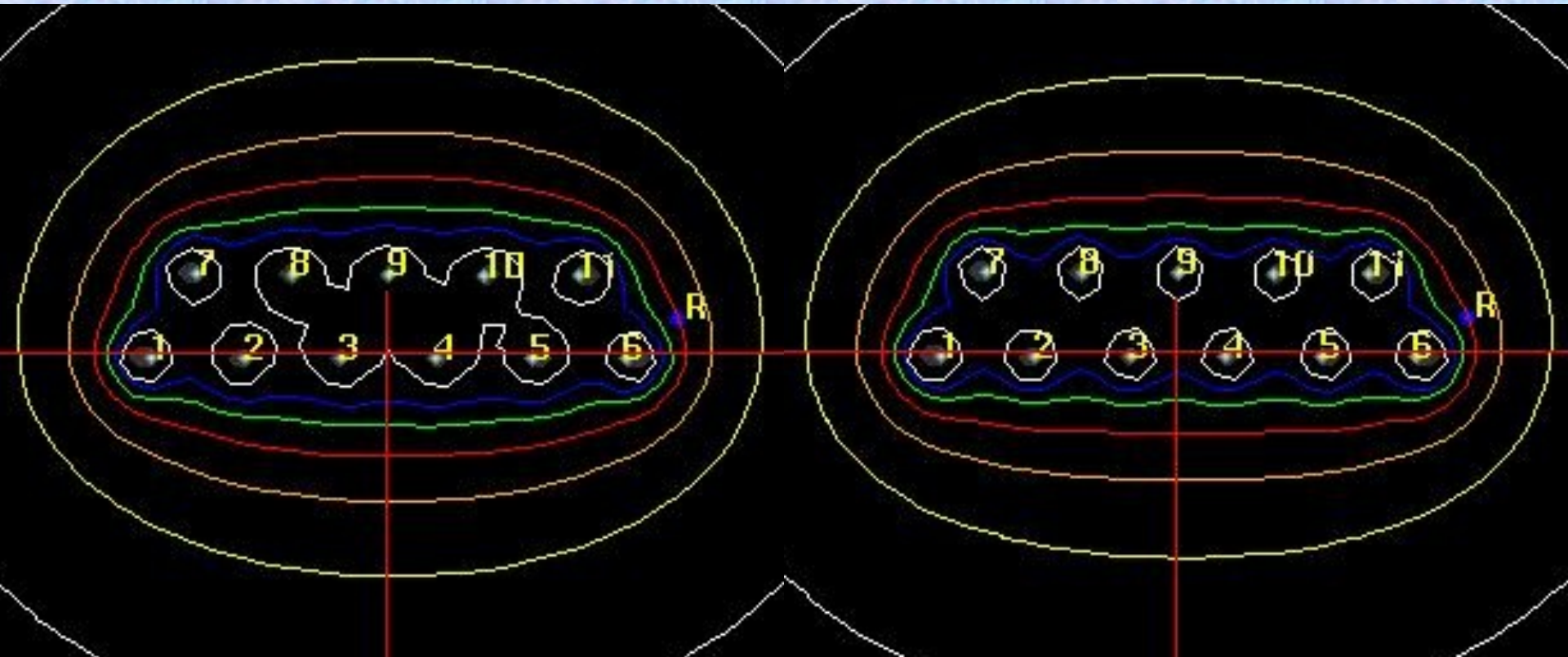


10 mm - optimizado

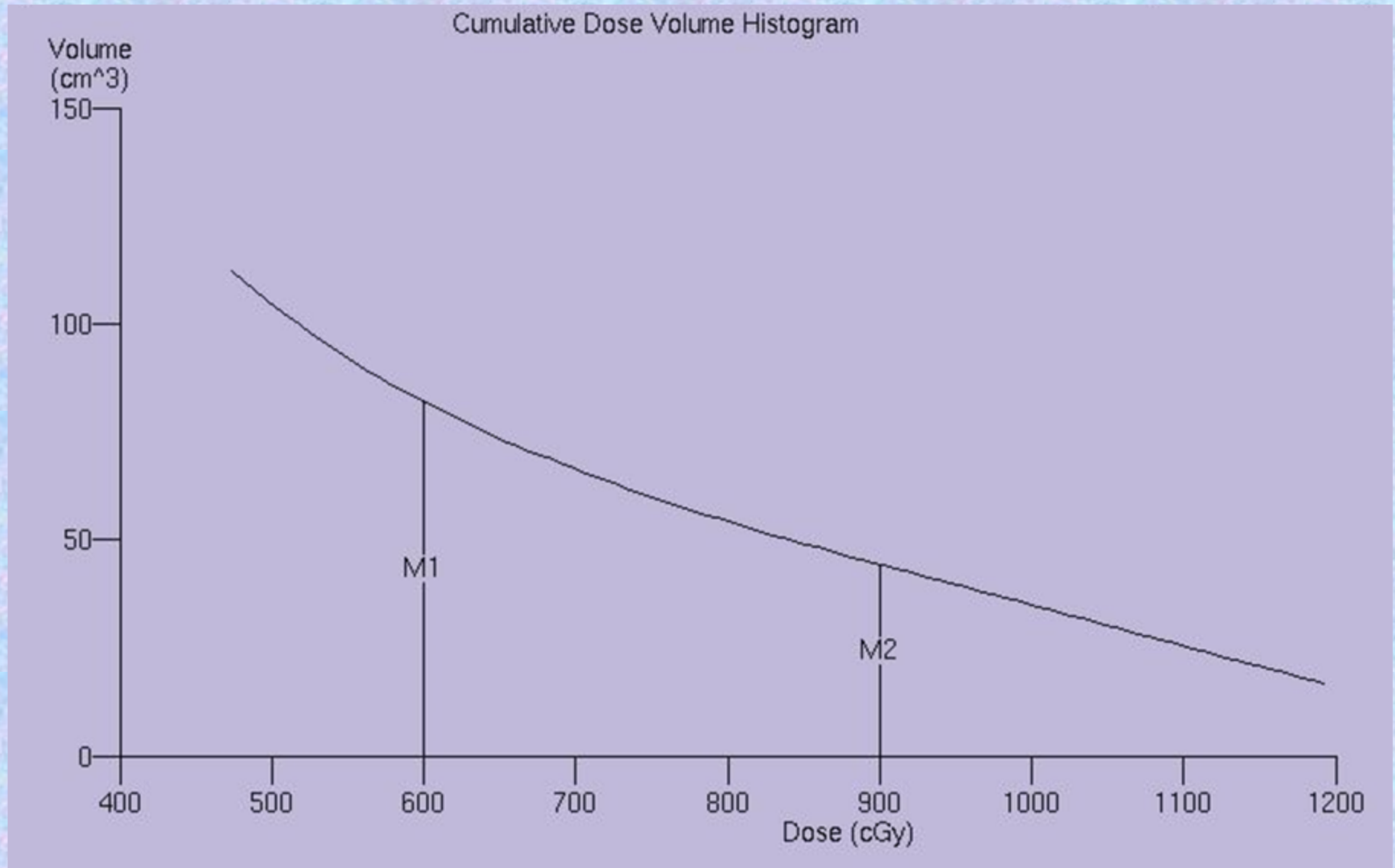


10 mm - tiempos iguales

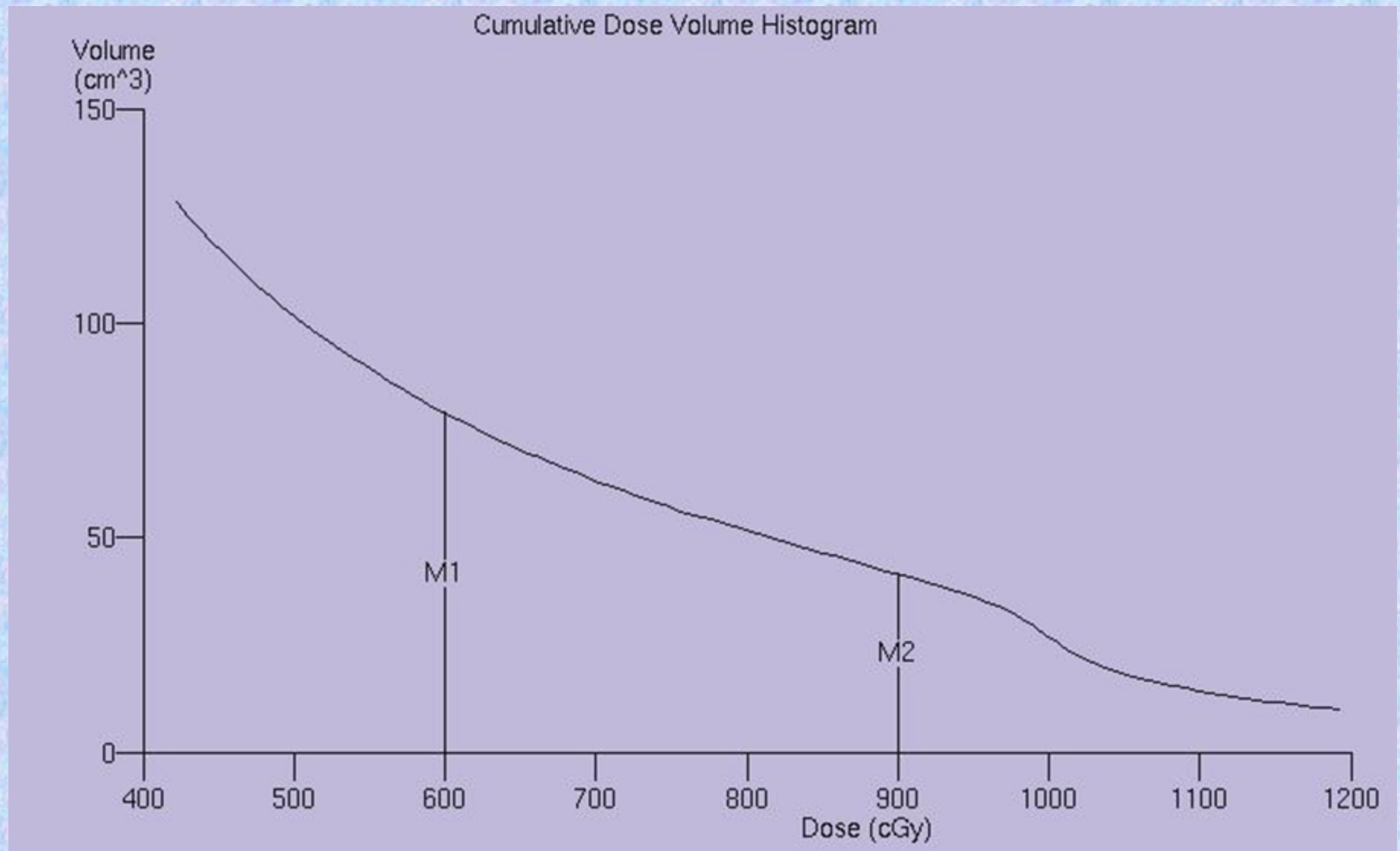
10 mm - optimizado



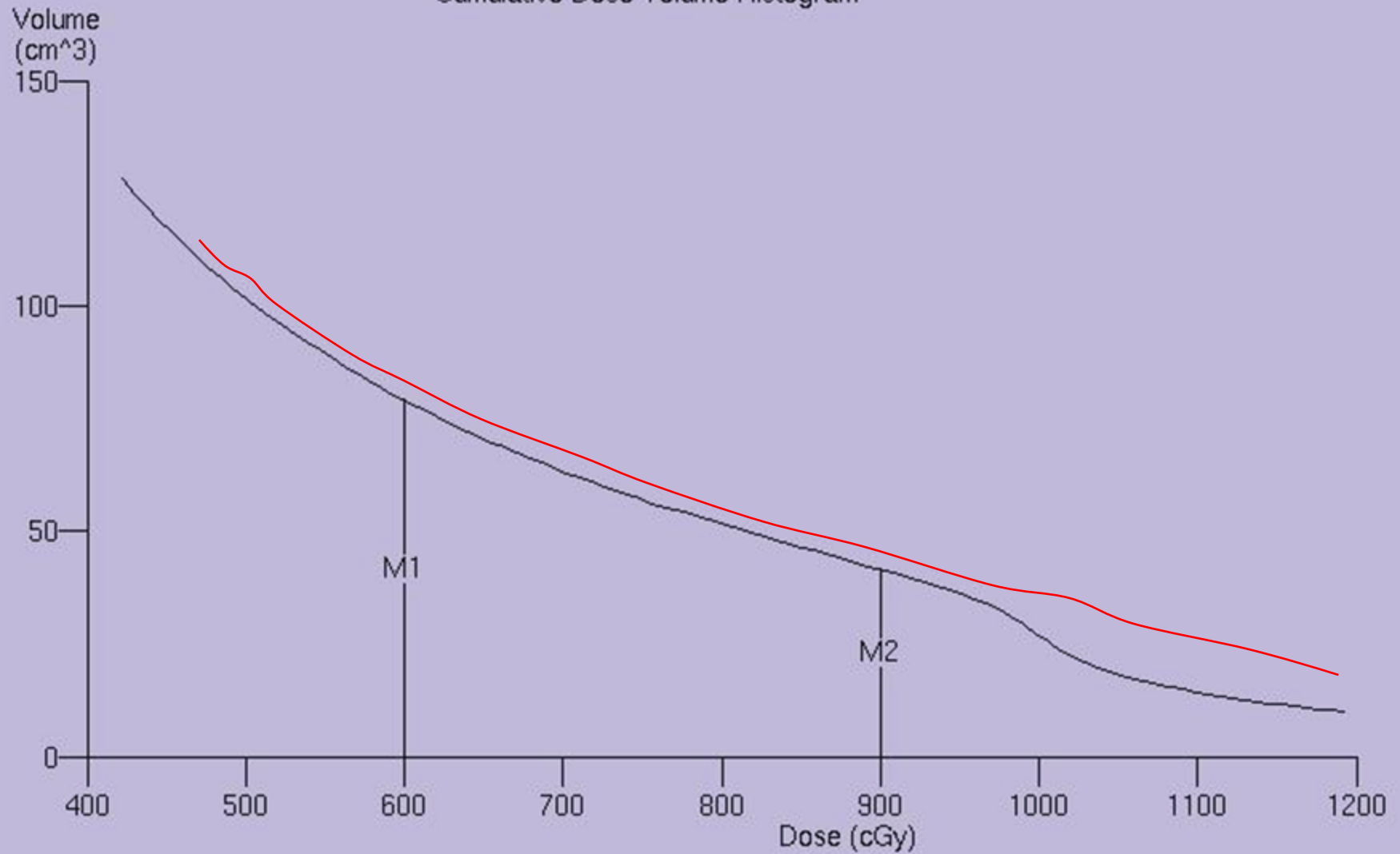
10 mm - tiempos iguales



10 mm - optimizado

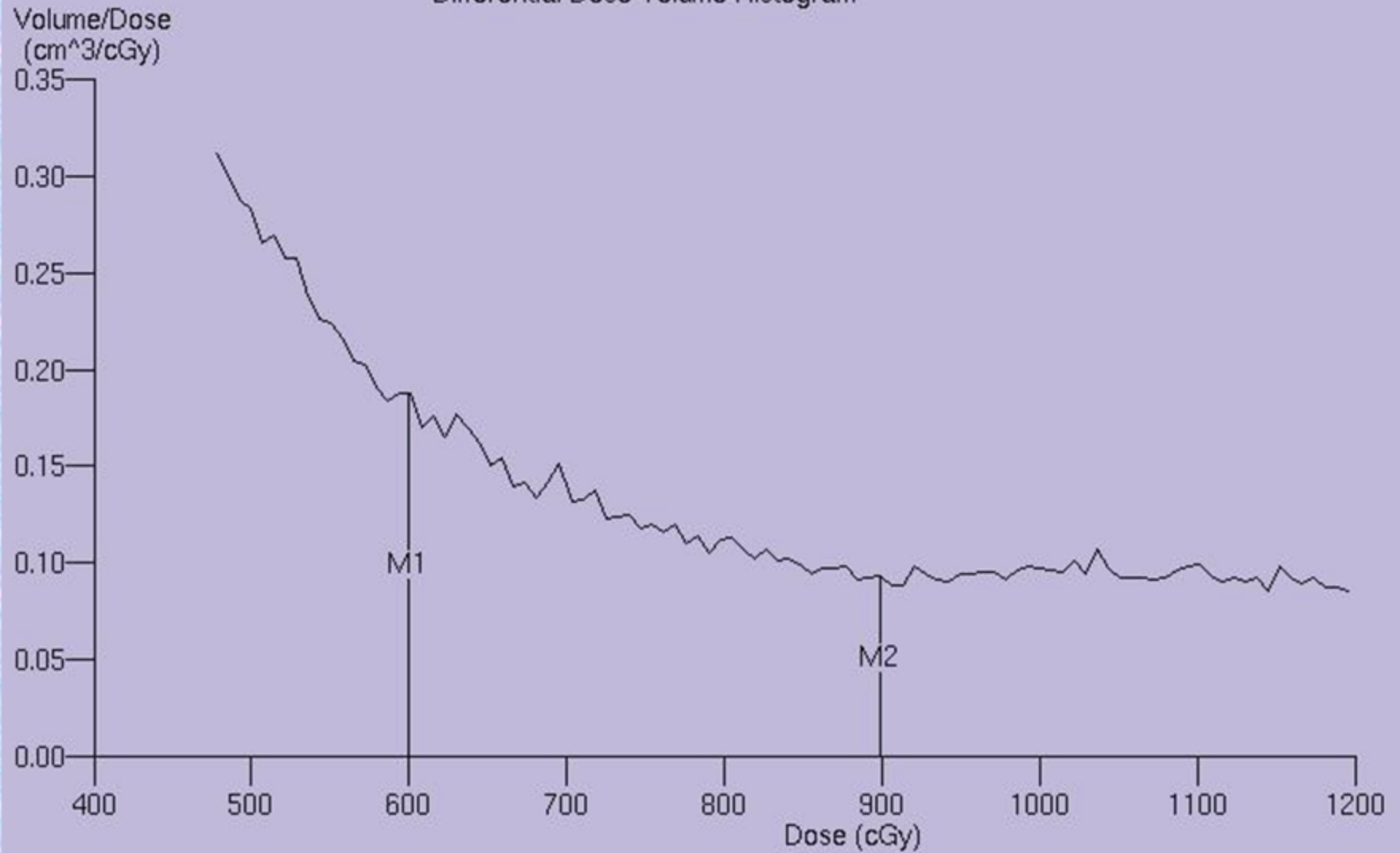


Cumulative Dose Volume Histogram



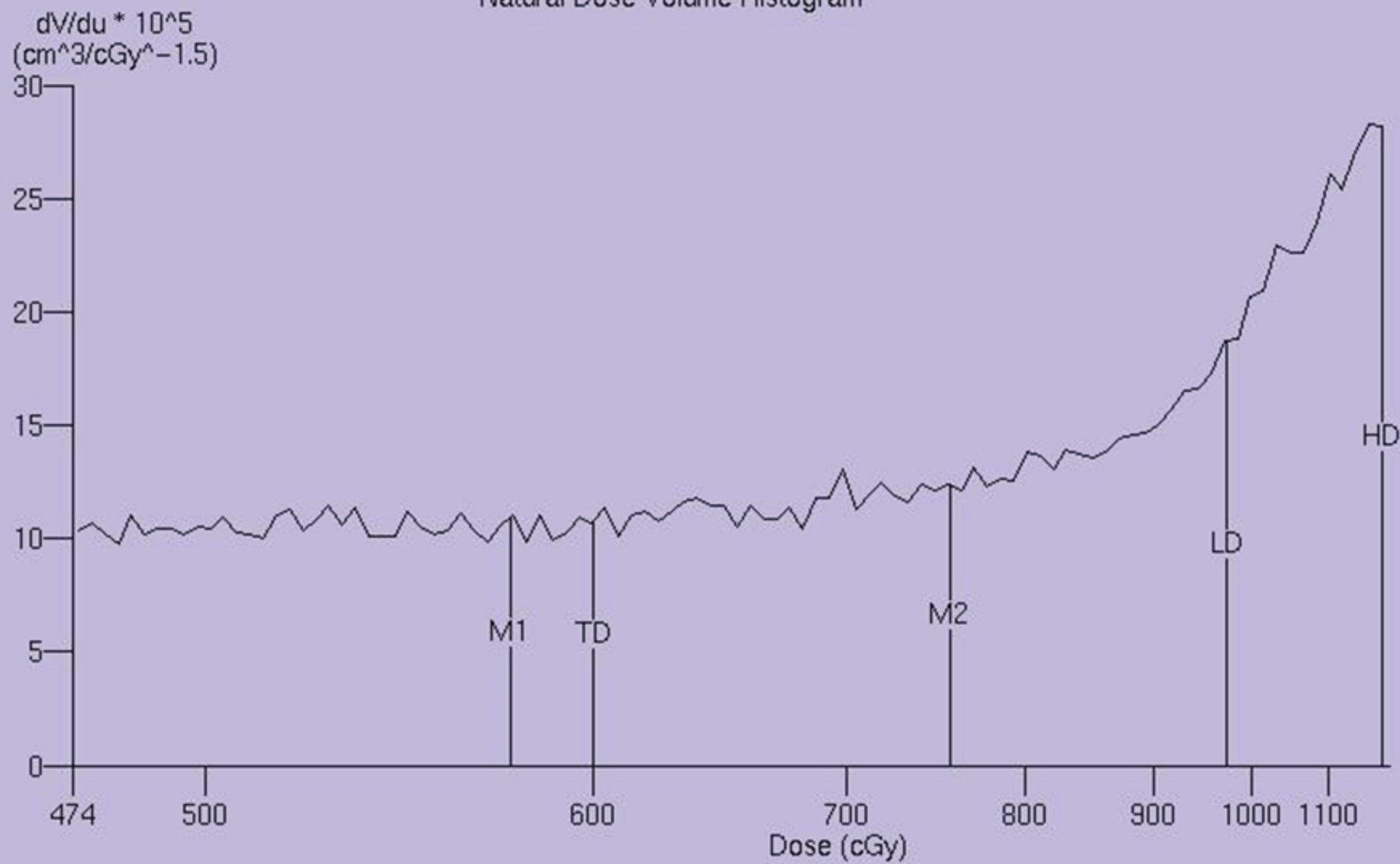
10 mm - tiempos iguales

Differential Dose Volume Histogram

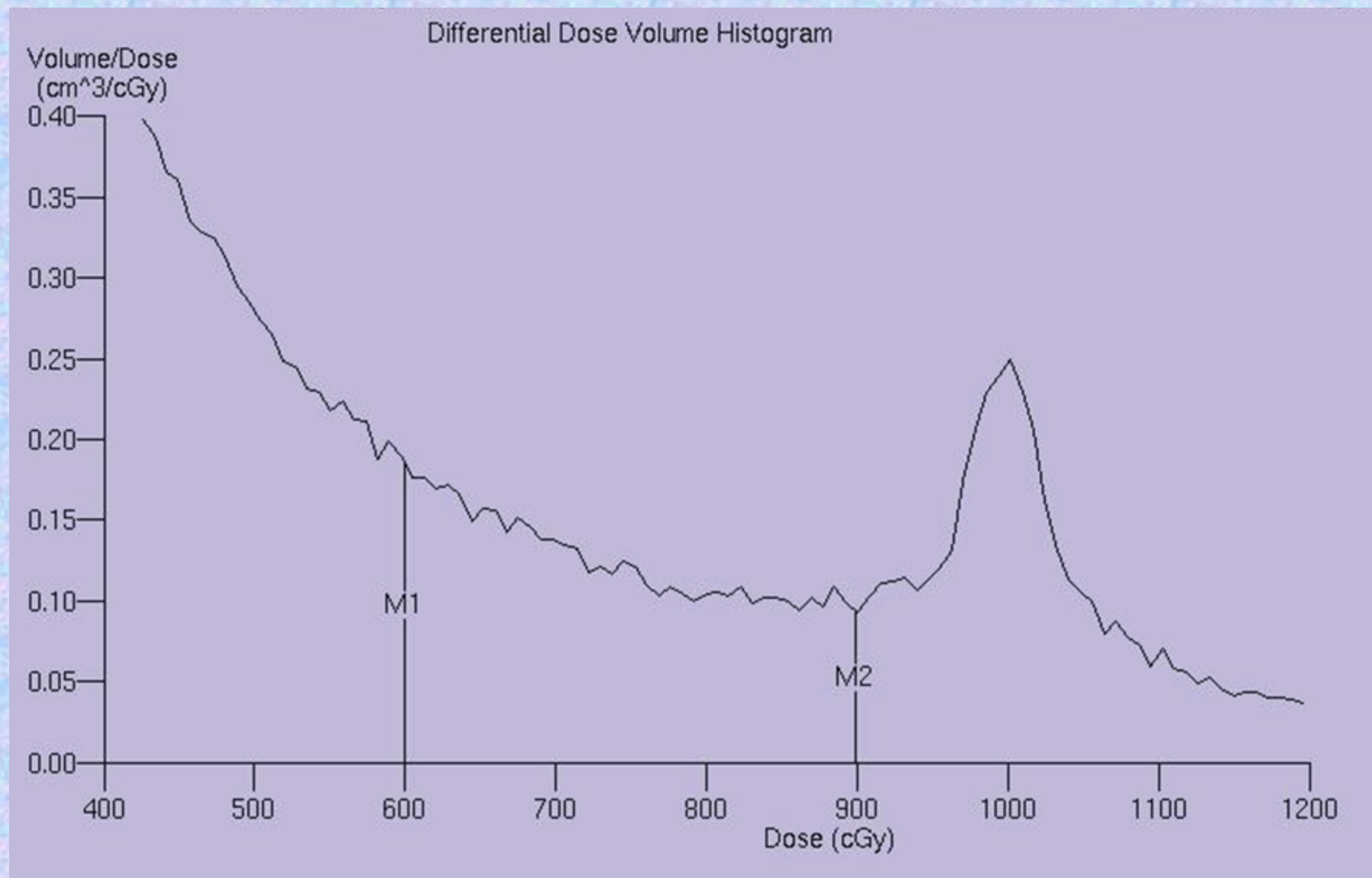


10 mm - tiempos iguales

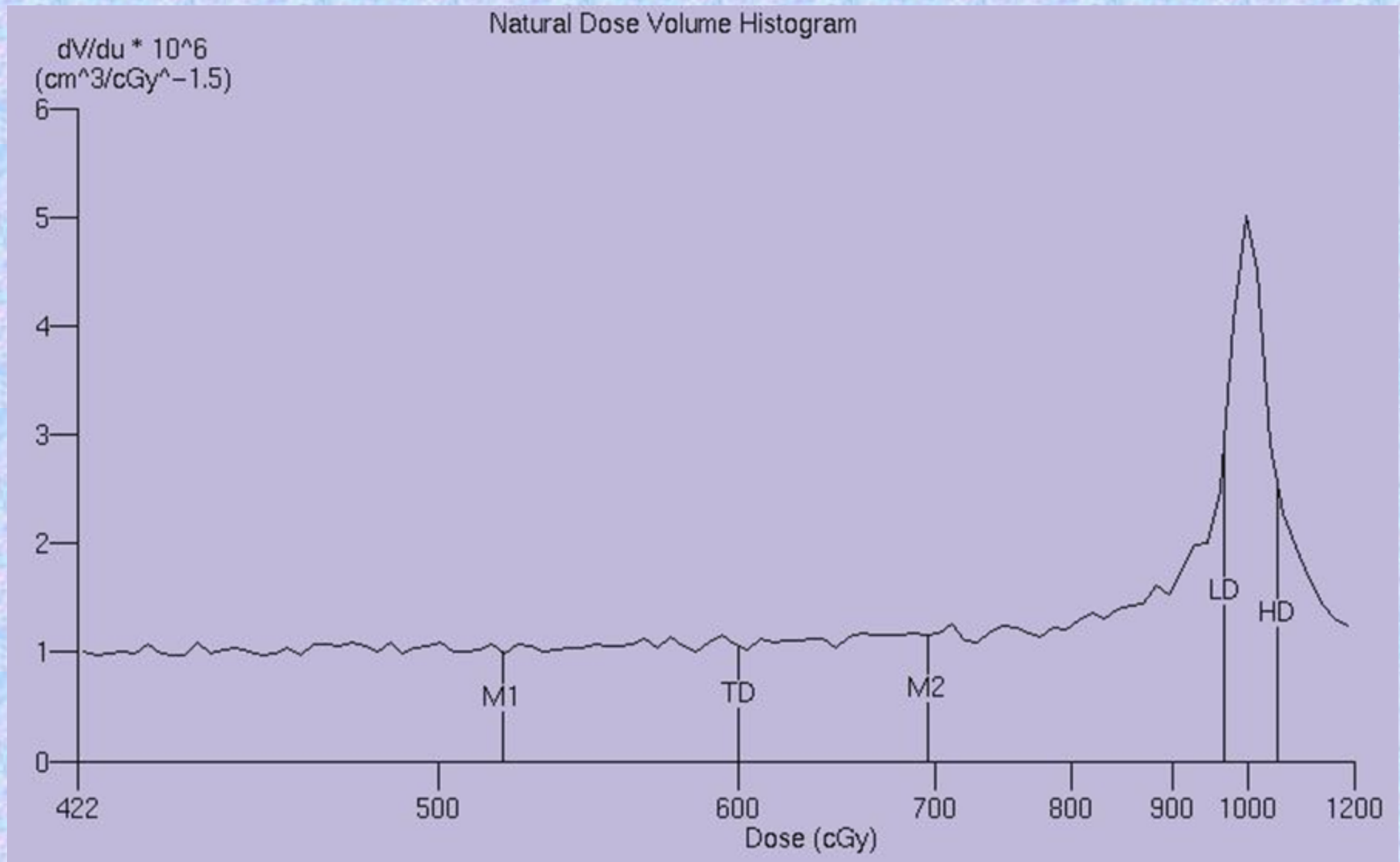
Natural Dose Volume Histogram



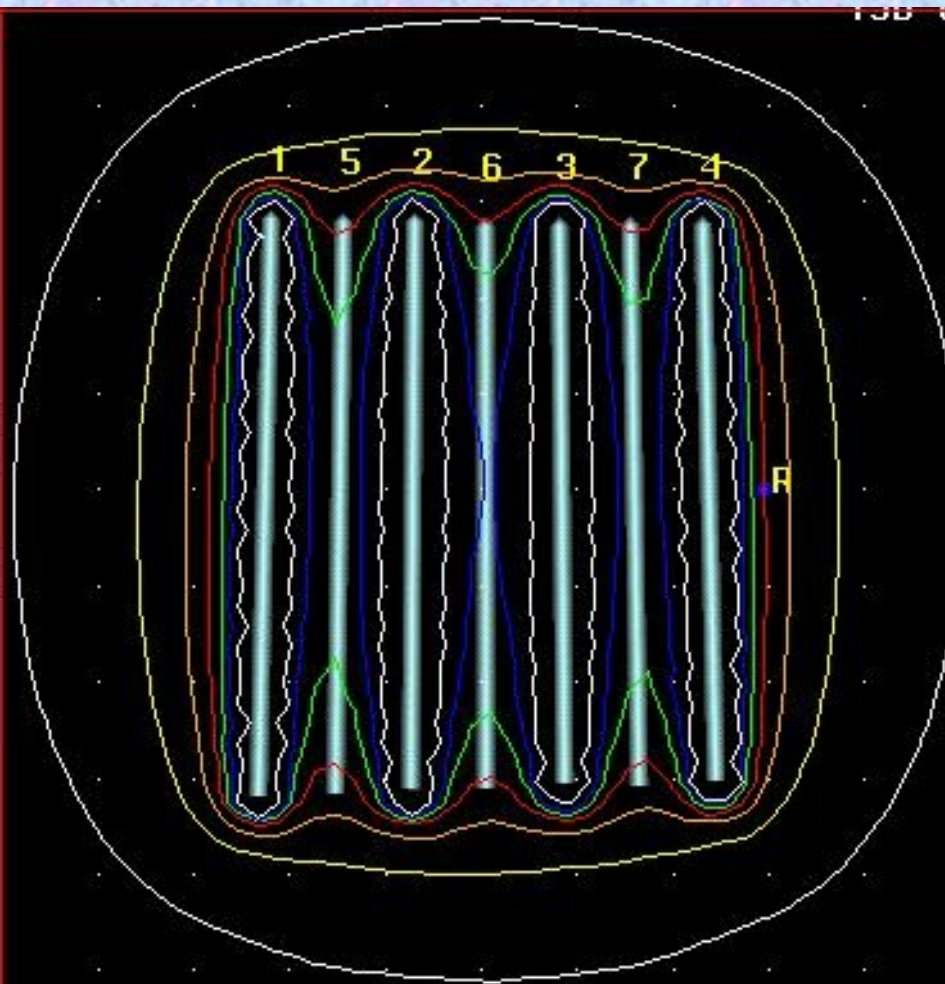
10 mm - optimizado



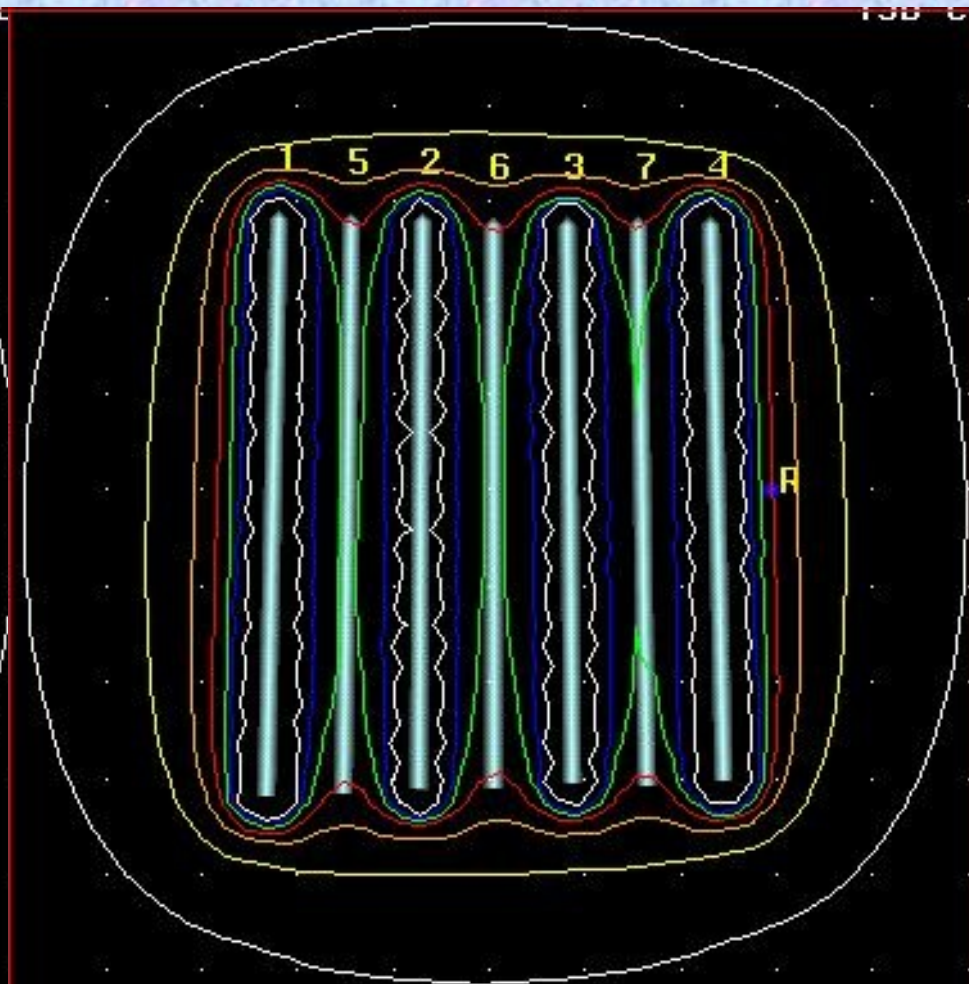
10 mm - optimizado



15 mm - tiempos iguales

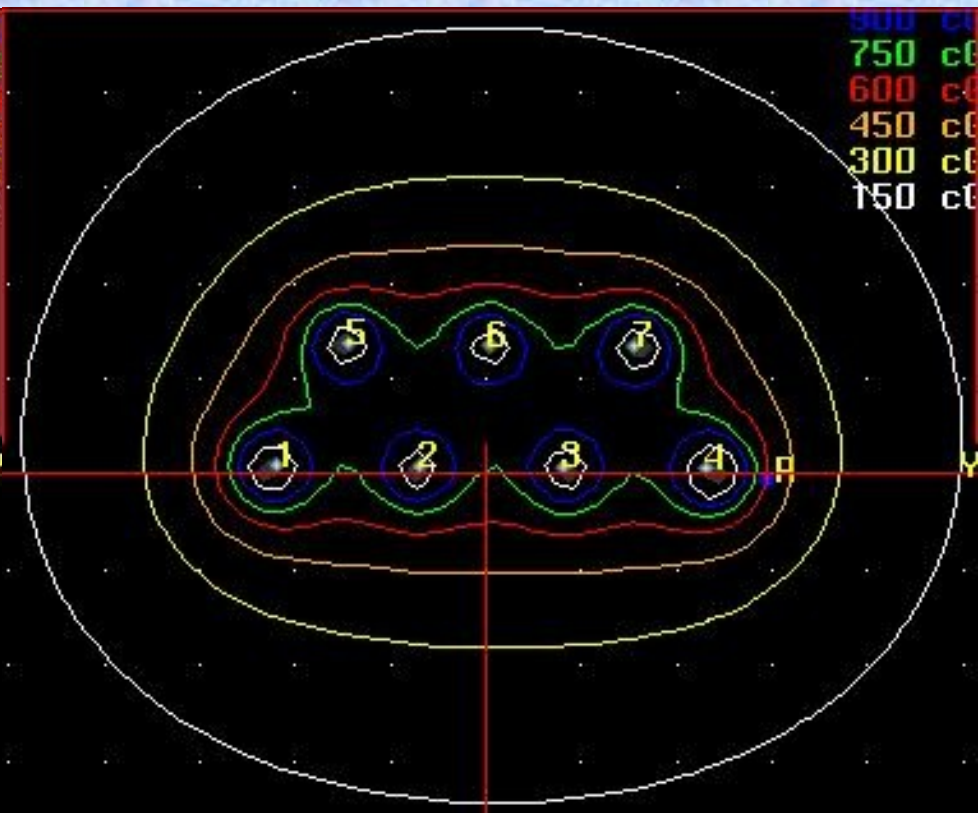
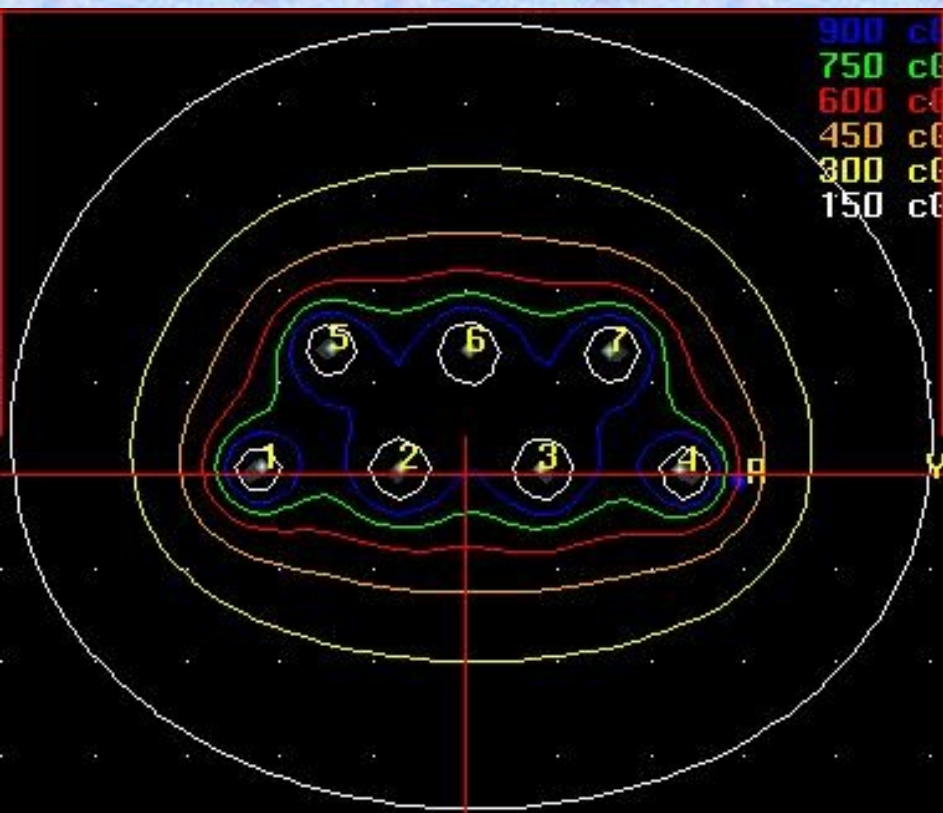


15 mm - optimizado

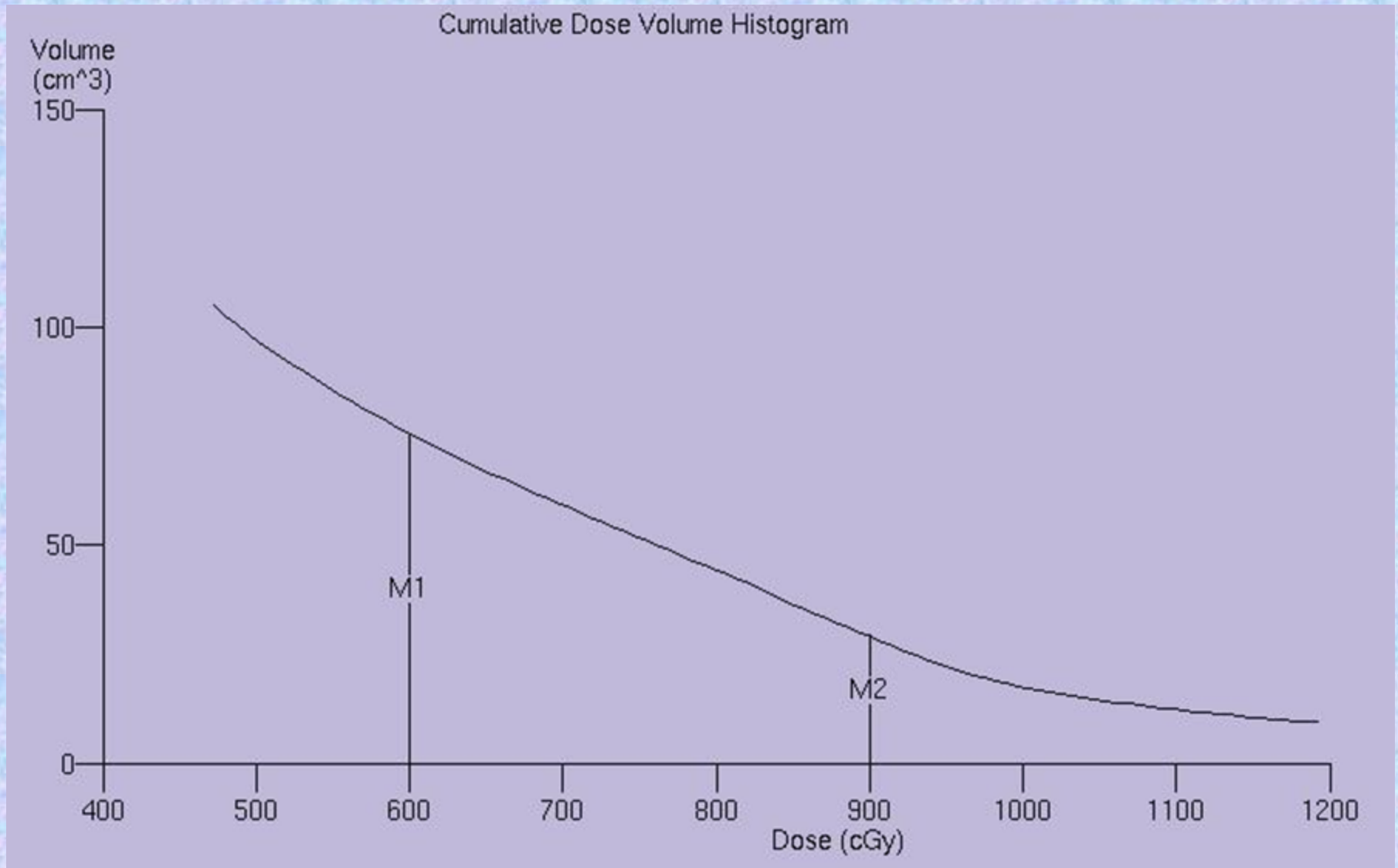


15 mm - tiempos iguales

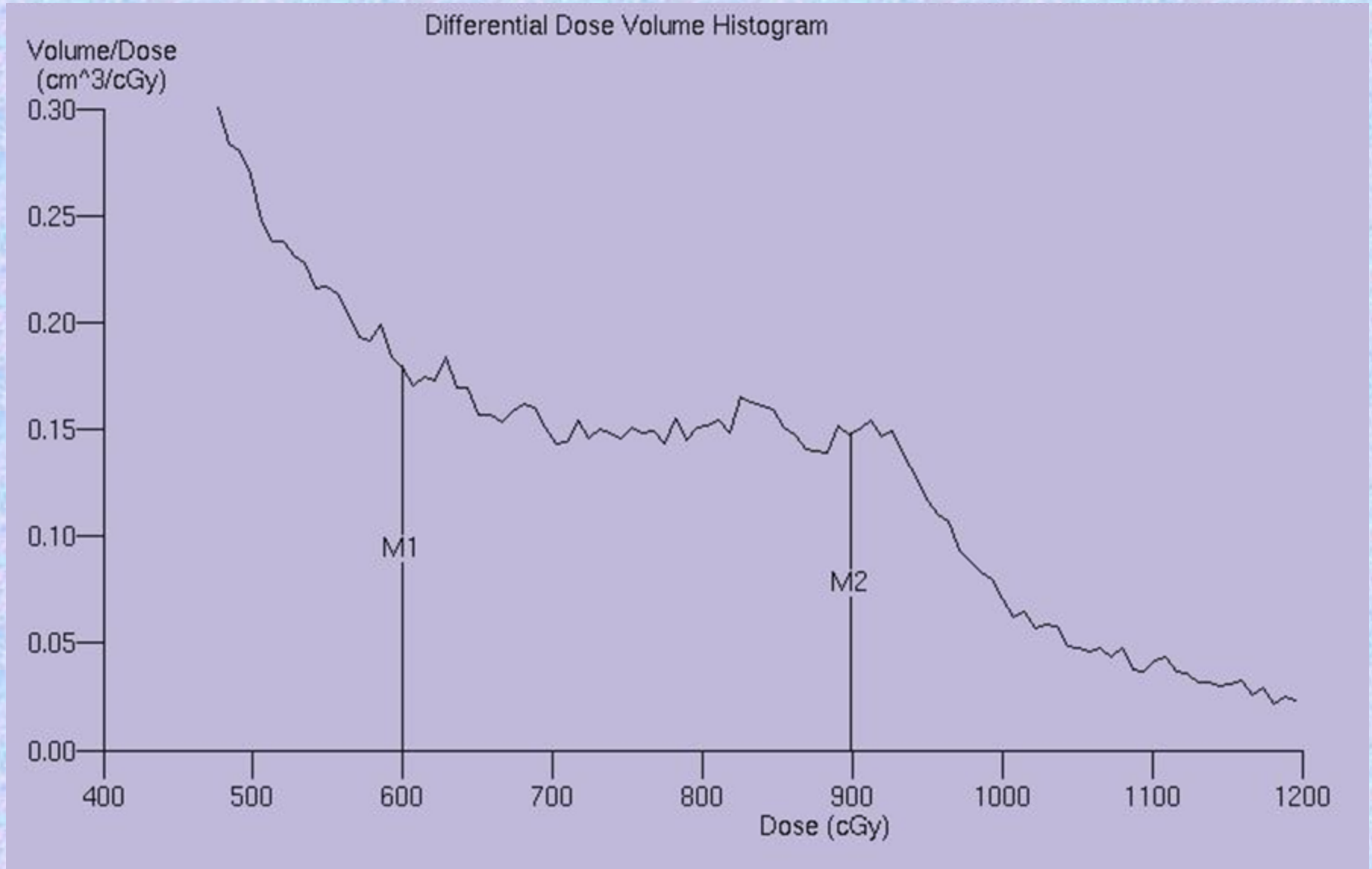
15 mm - optimizado



15 mm - tiempos iguales

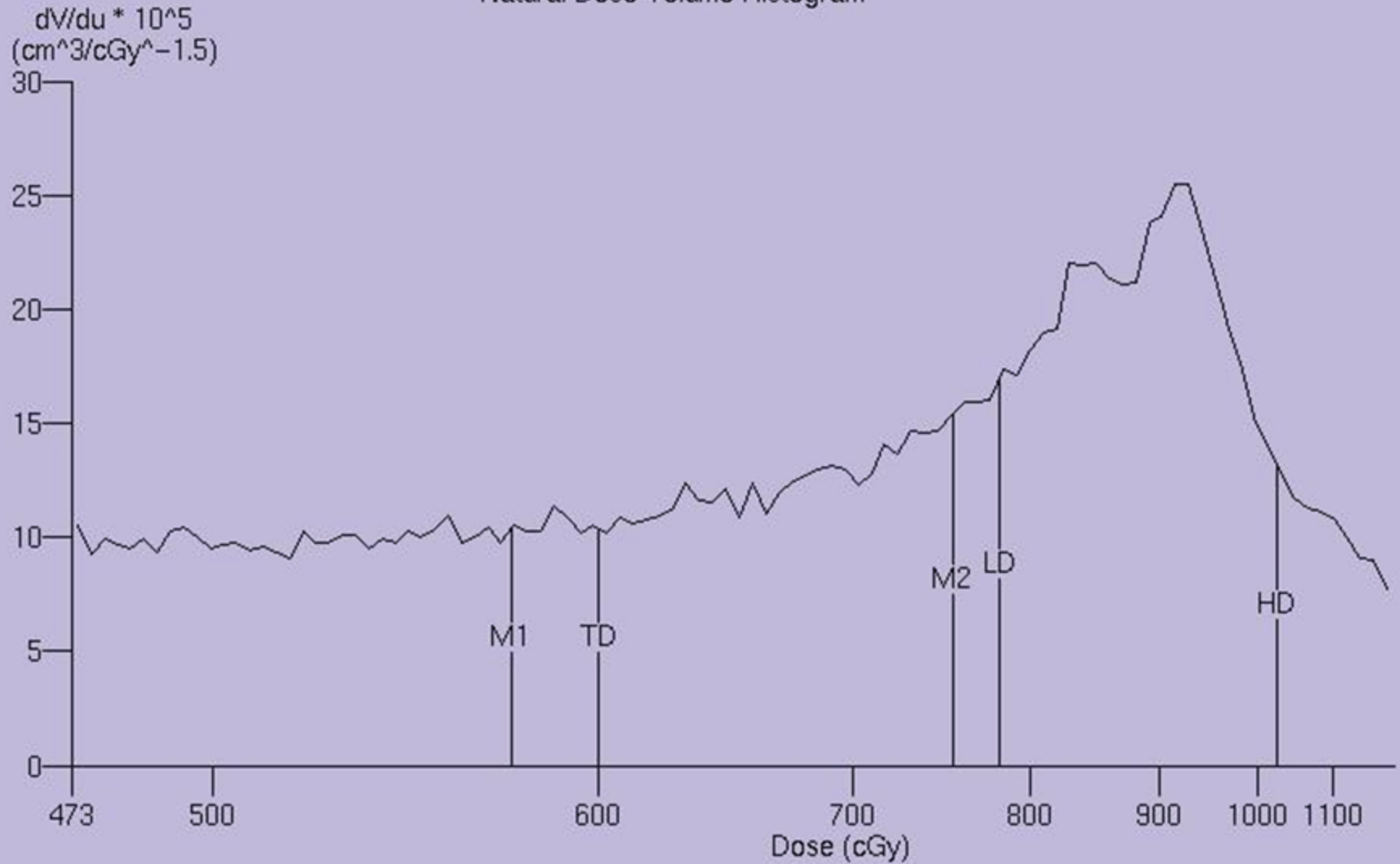


15 mm - tiempos iguales



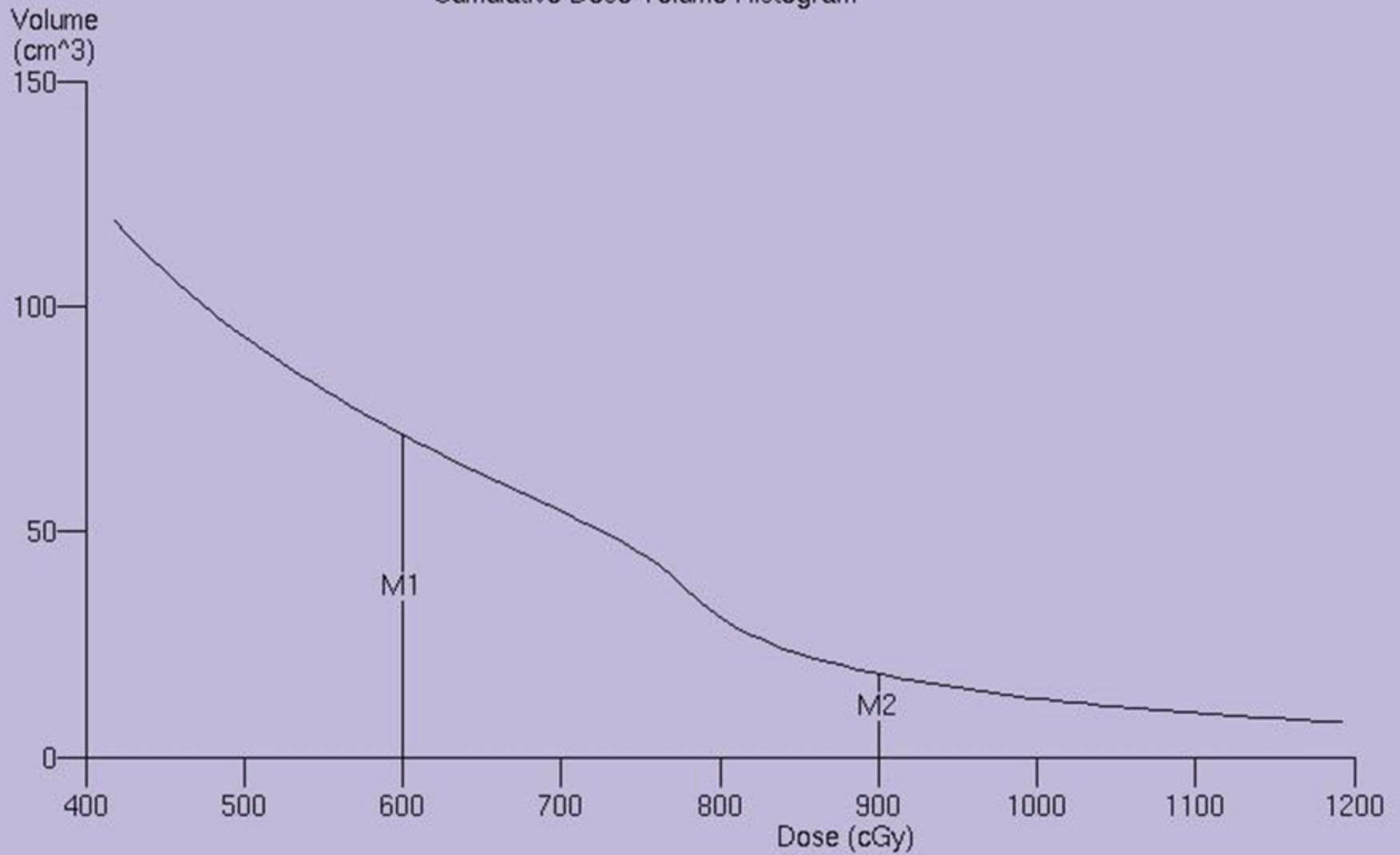
15 mm - tempos iguais

Natural Dose Volume Histogram



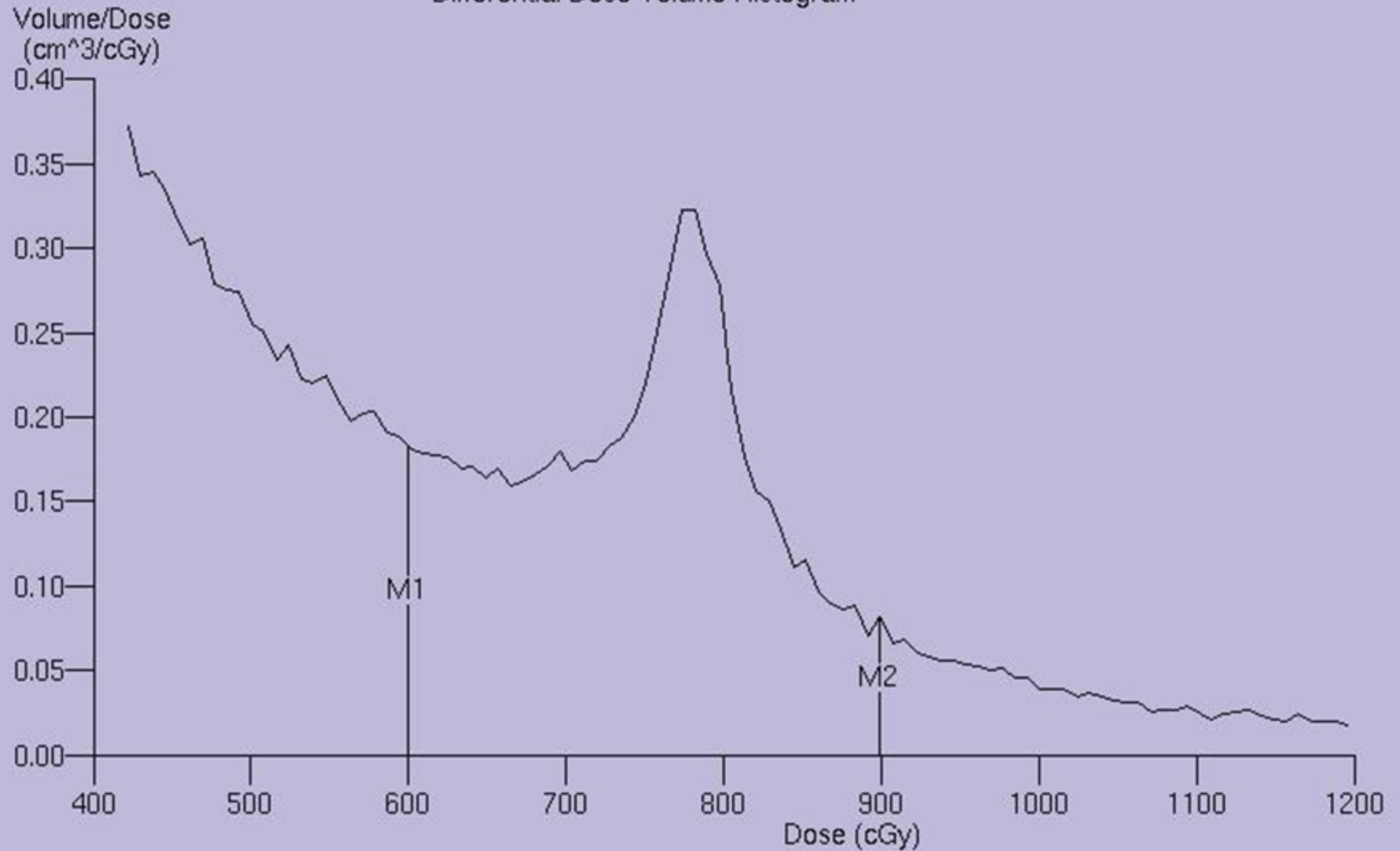
15 mm - optimizado

Cumulative Dose Volume Histogram



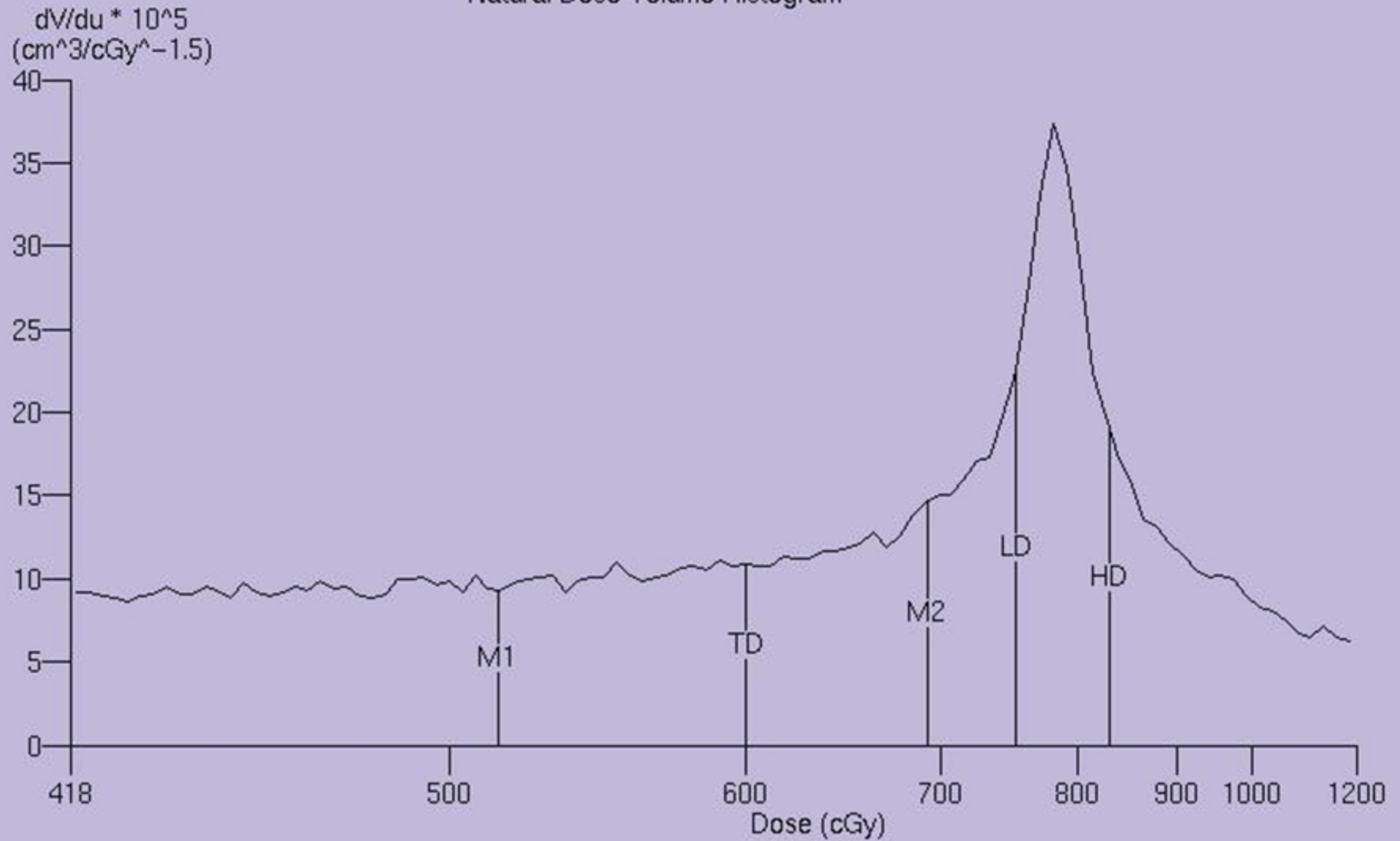
15 mm - optimizado

Differential Dose Volume Histogram

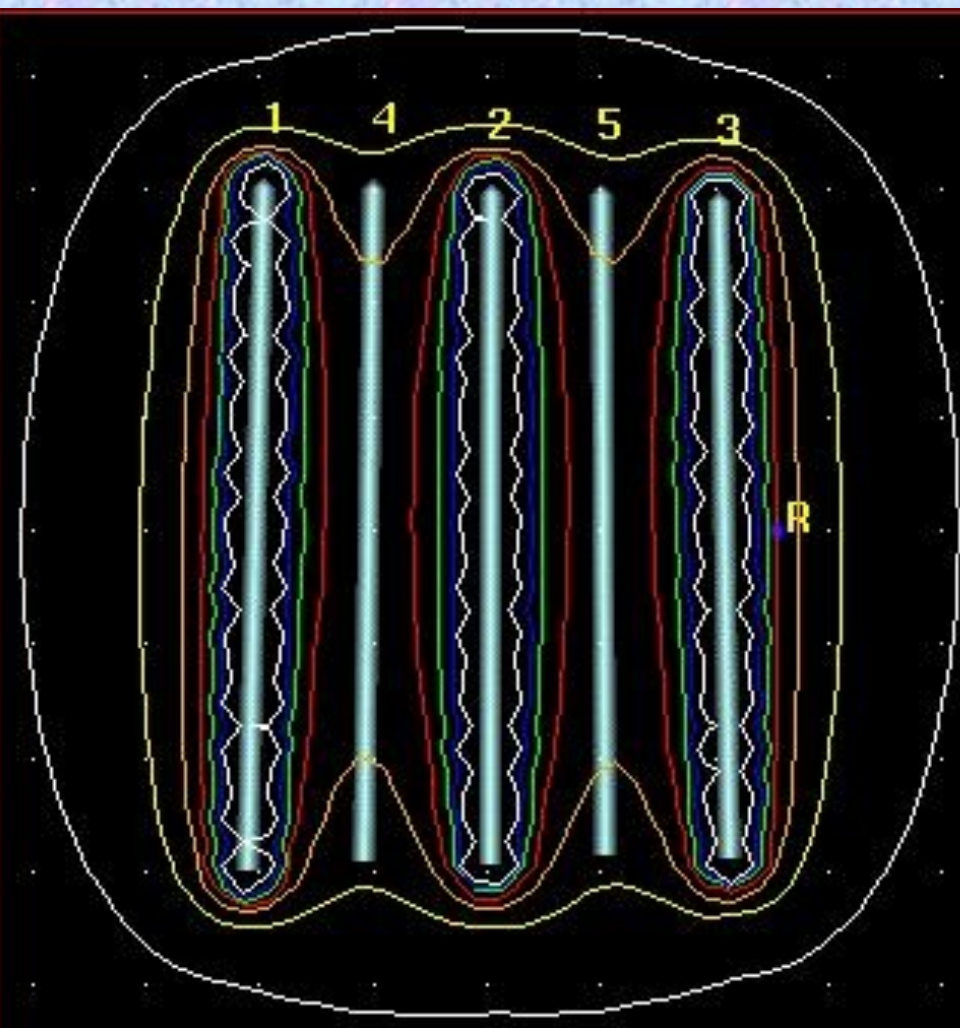


15 mm - optimizado

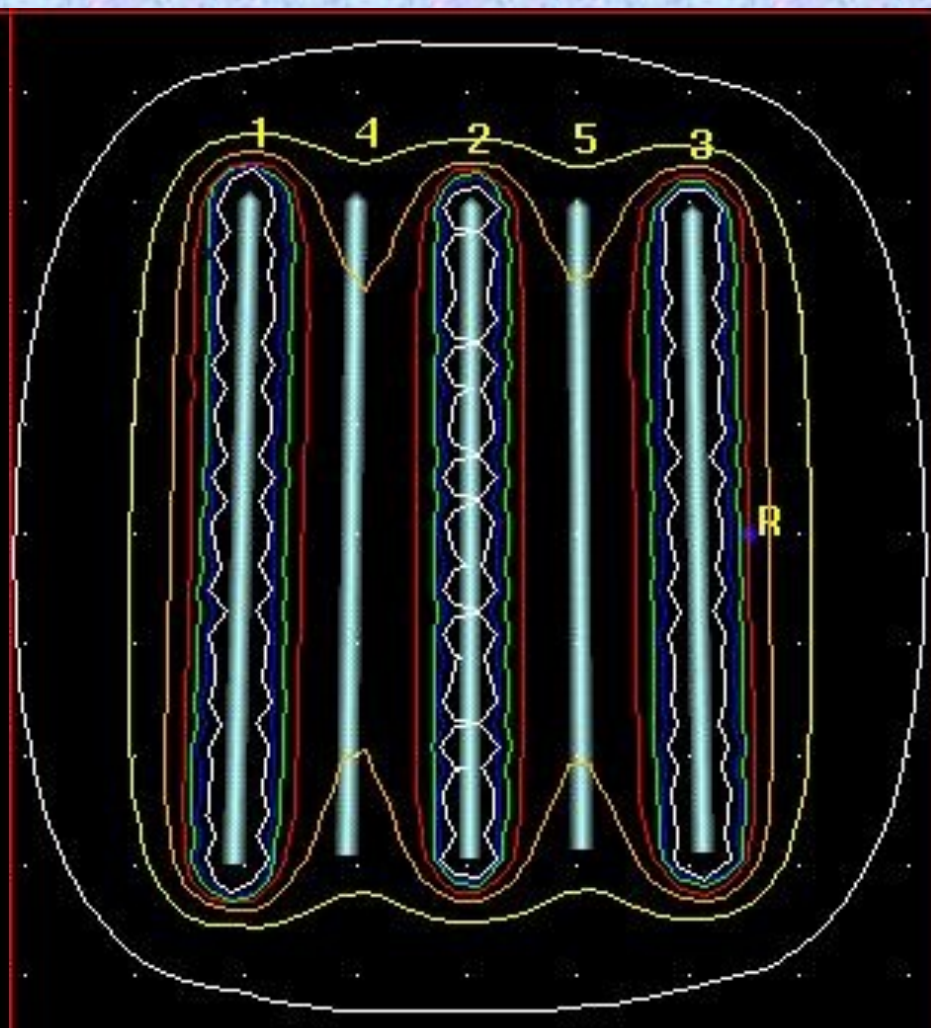
Natural Dose Volume Histogram



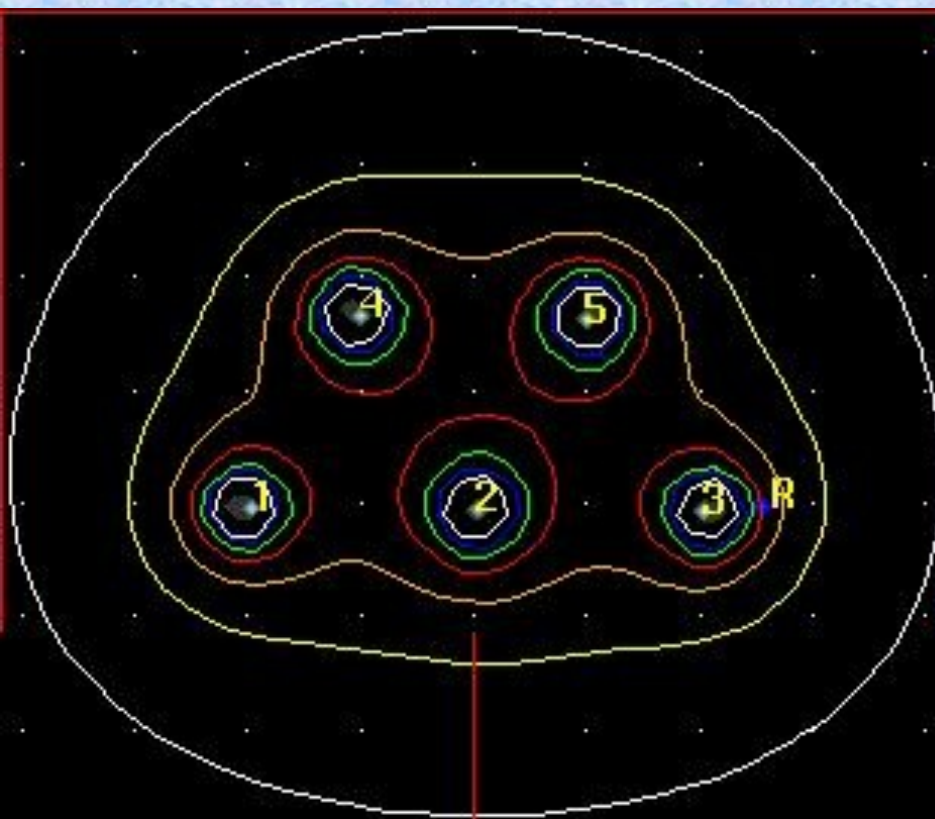
20 mm - tempos iguais



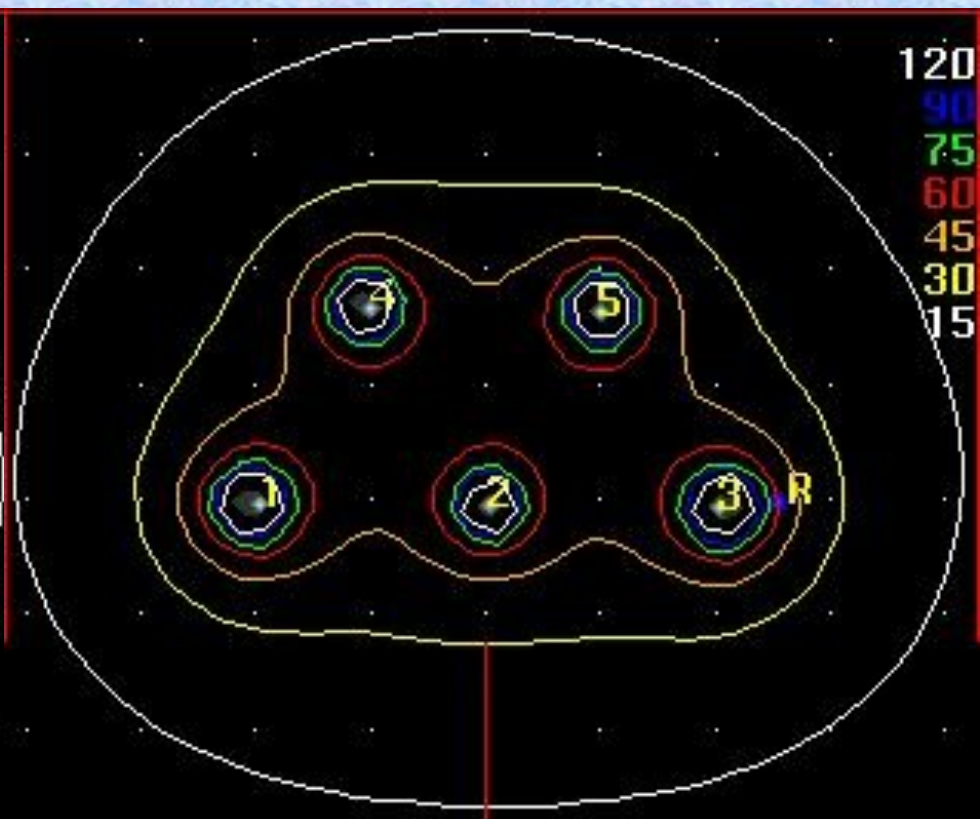
20 mm - optimizado



20 mm - tempos iguais

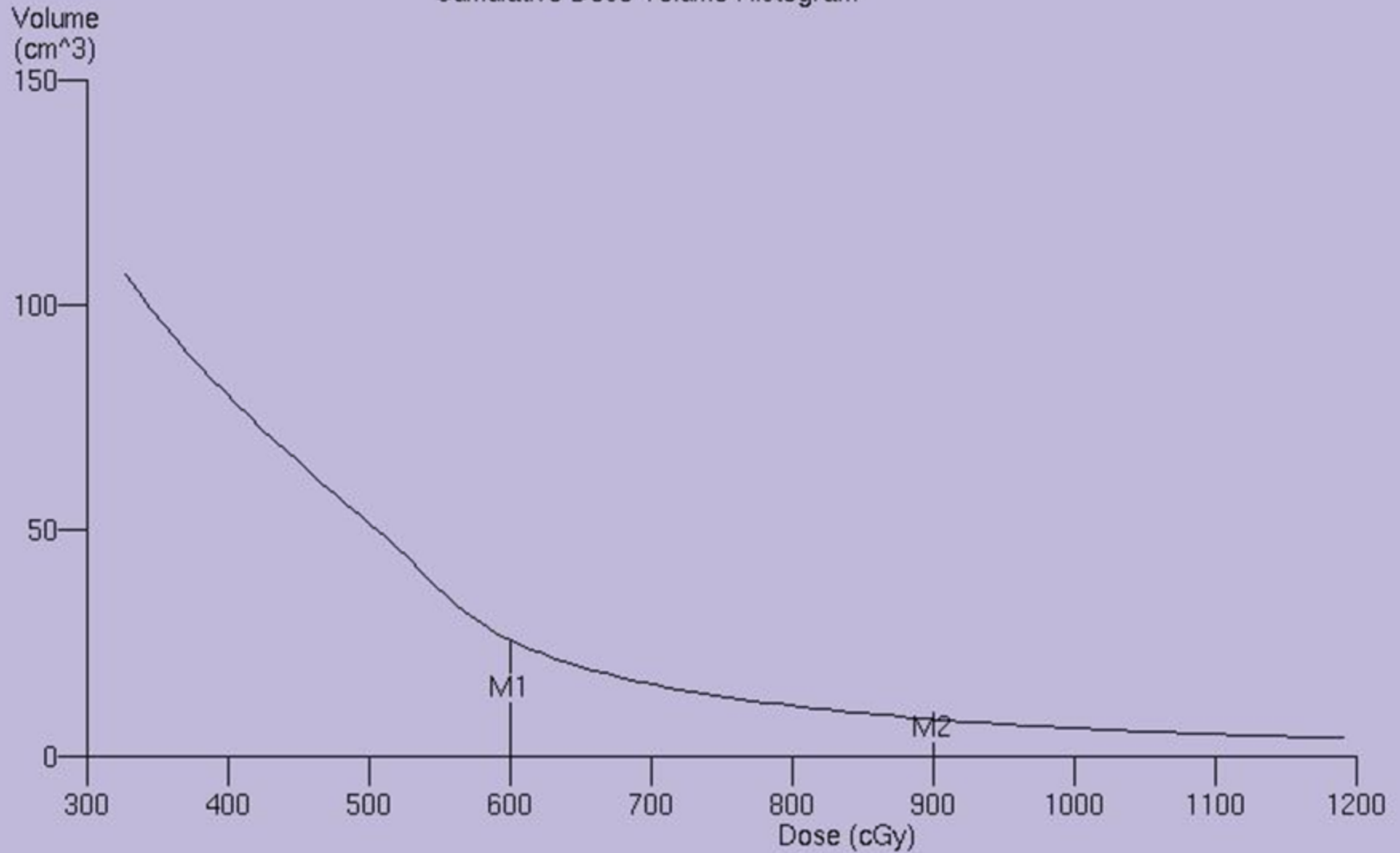


20 mm - optimizado

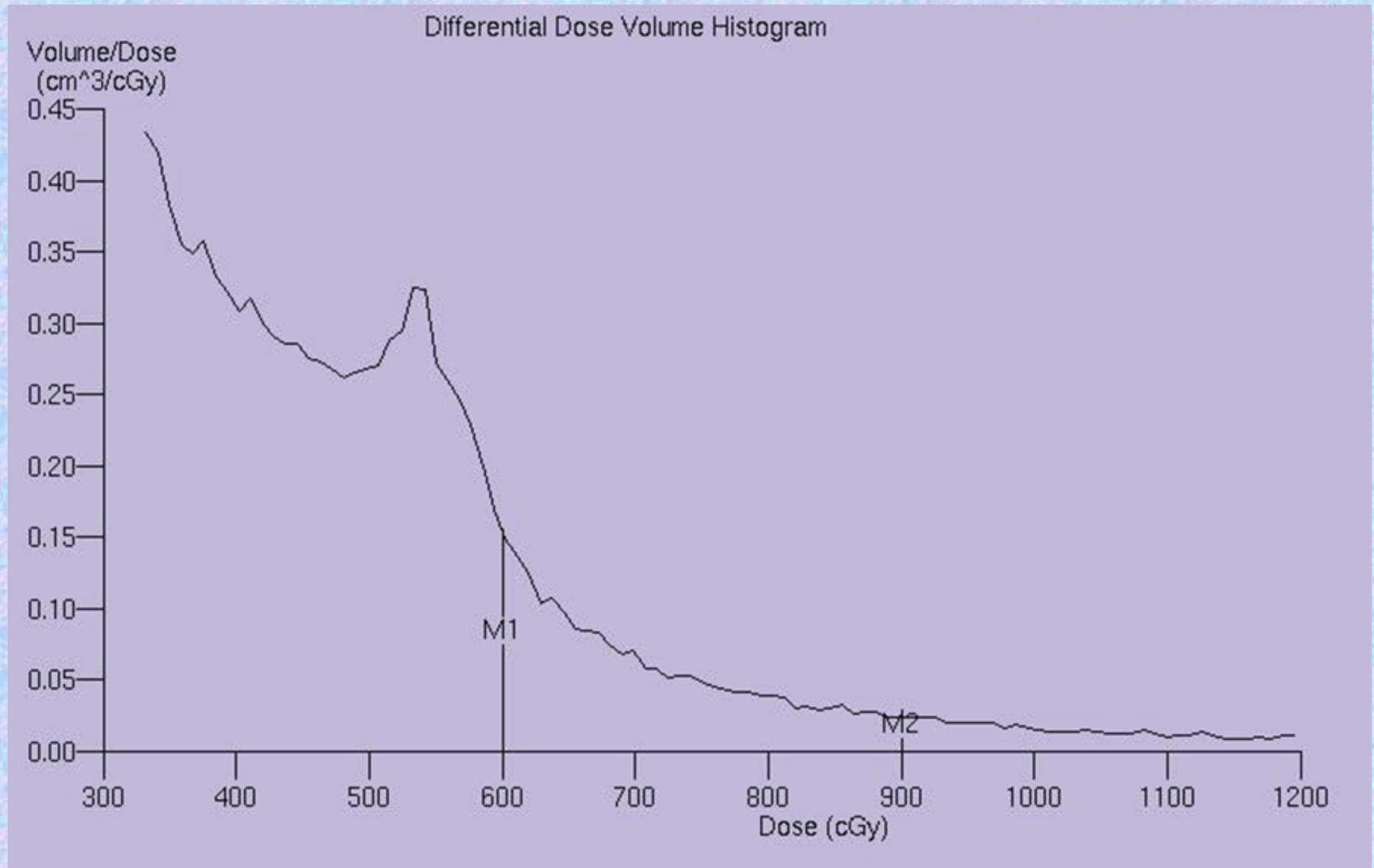


20 mm - tiempos iguales

Cumulative Dose Volume Histogram

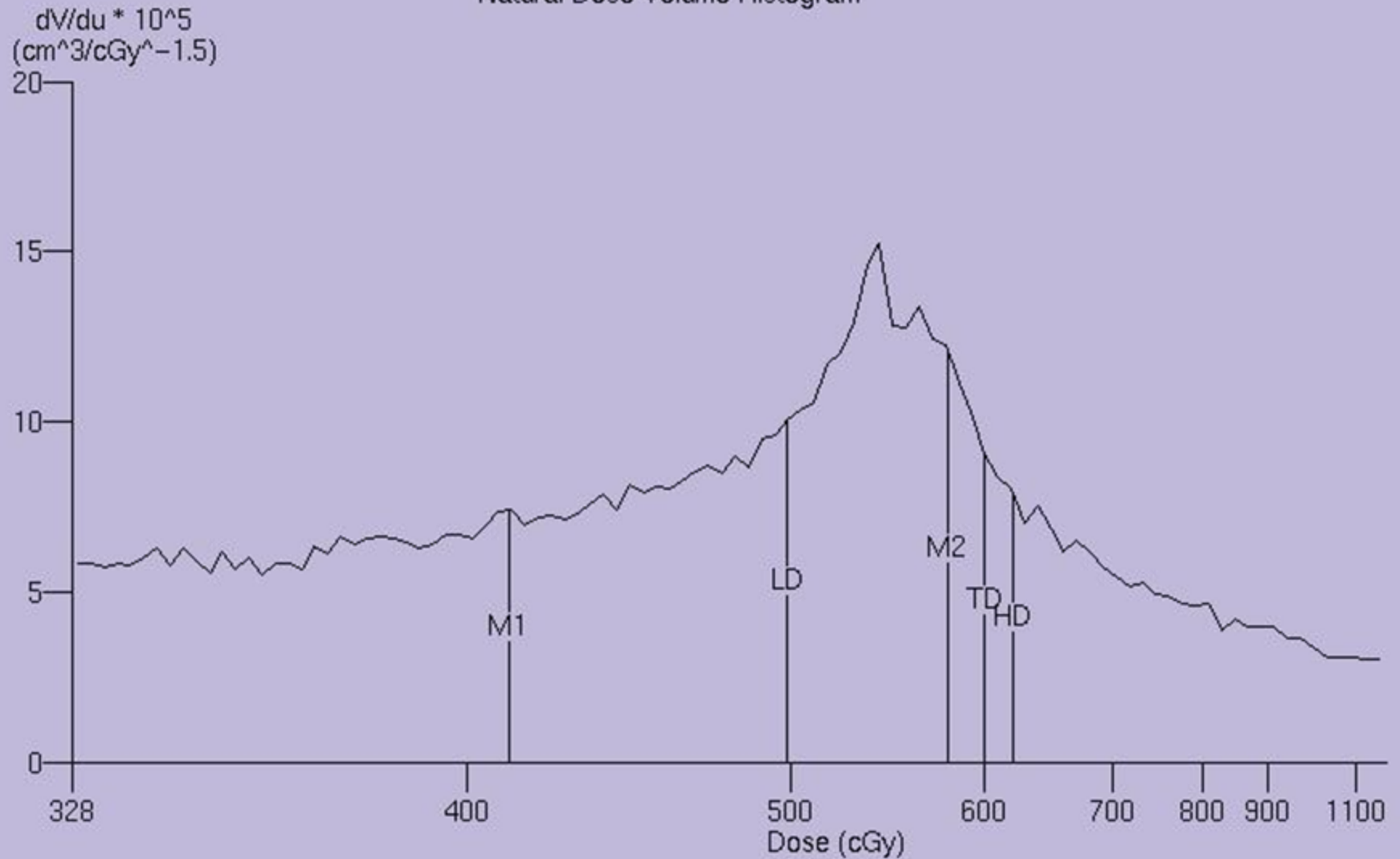


20 mm - tempos iguais



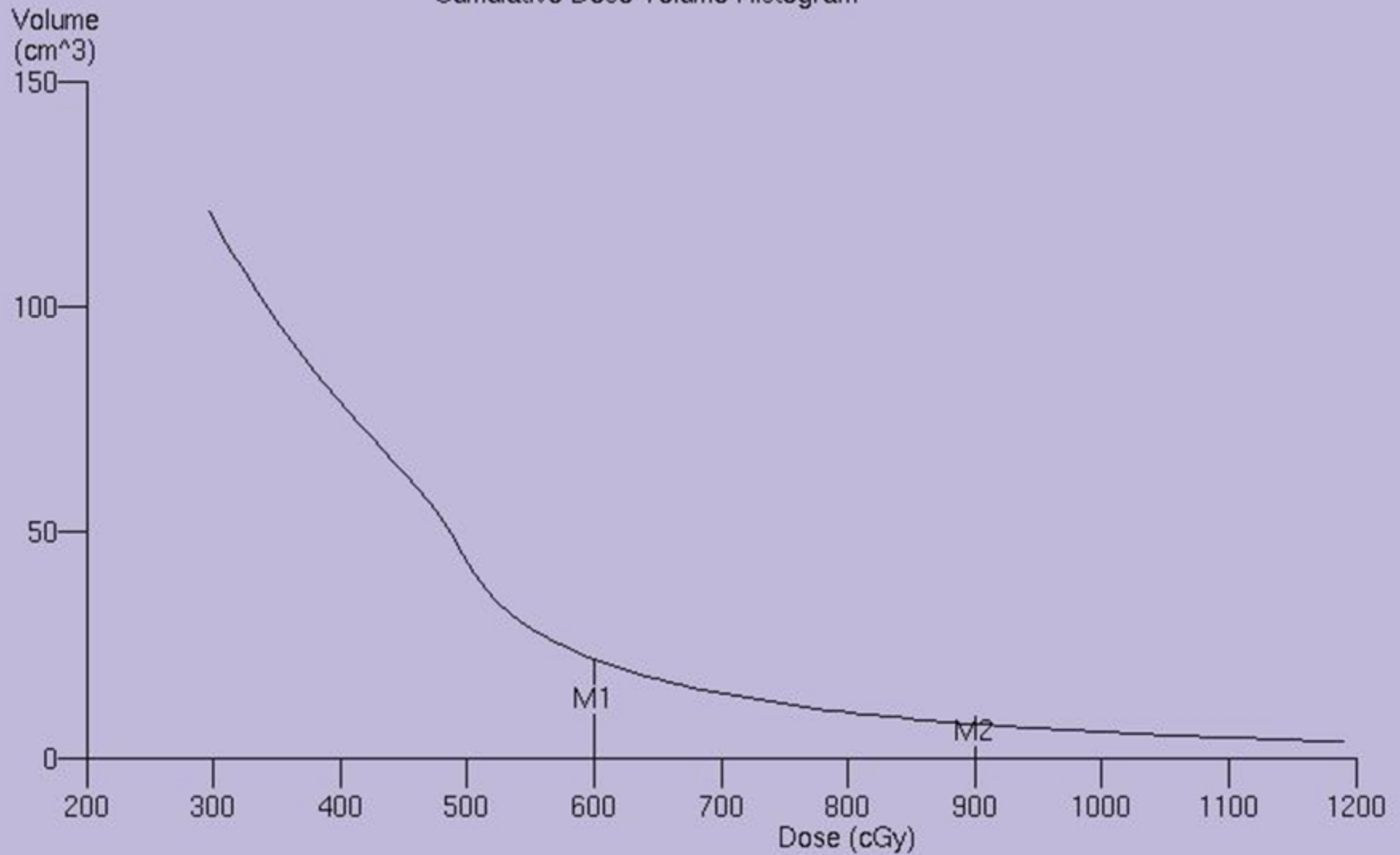
20 mm - tiempos iguales

Natural Dose Volume Histogram



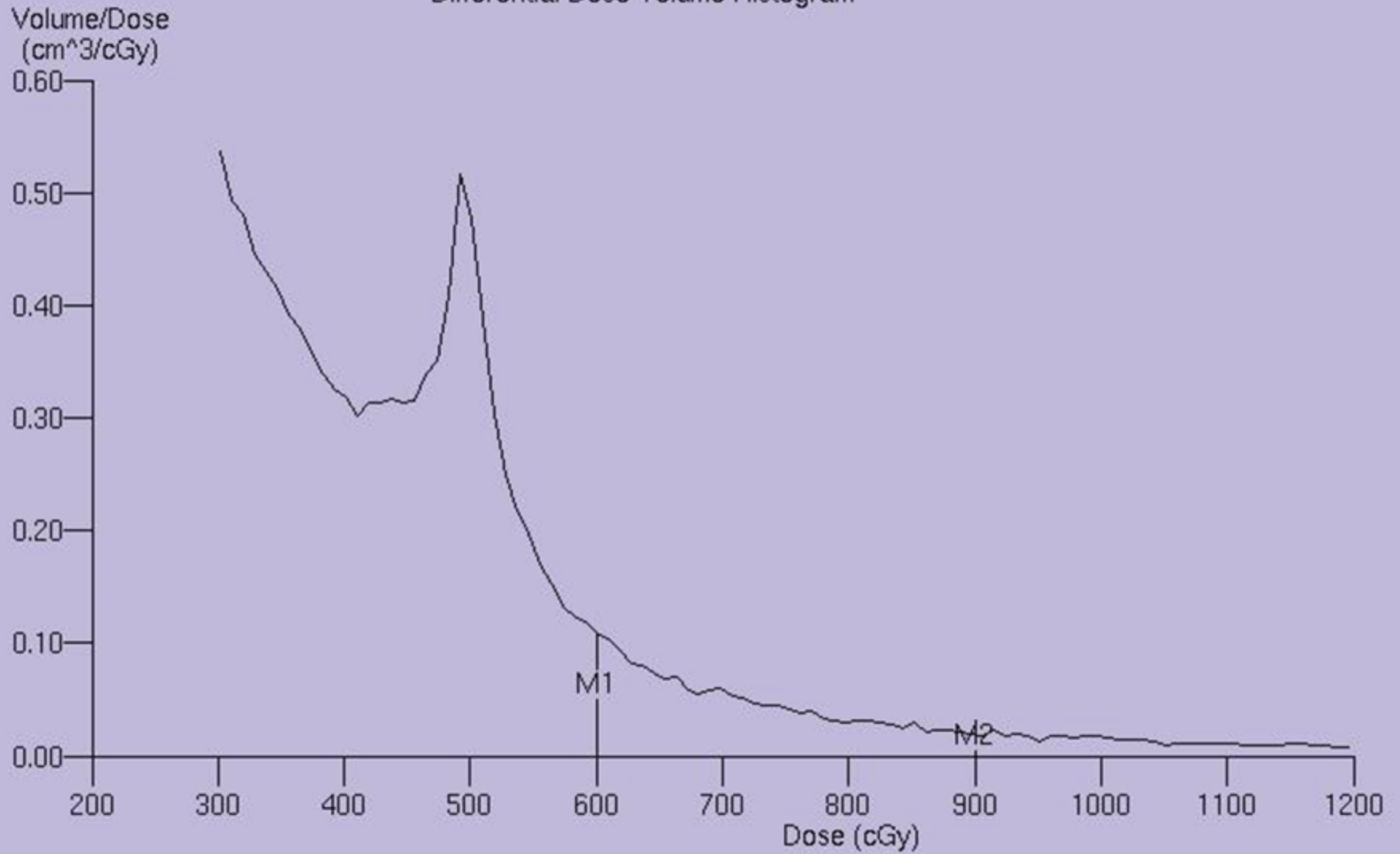
20 mm - optimizado

Cumulative Dose Volume Histogram

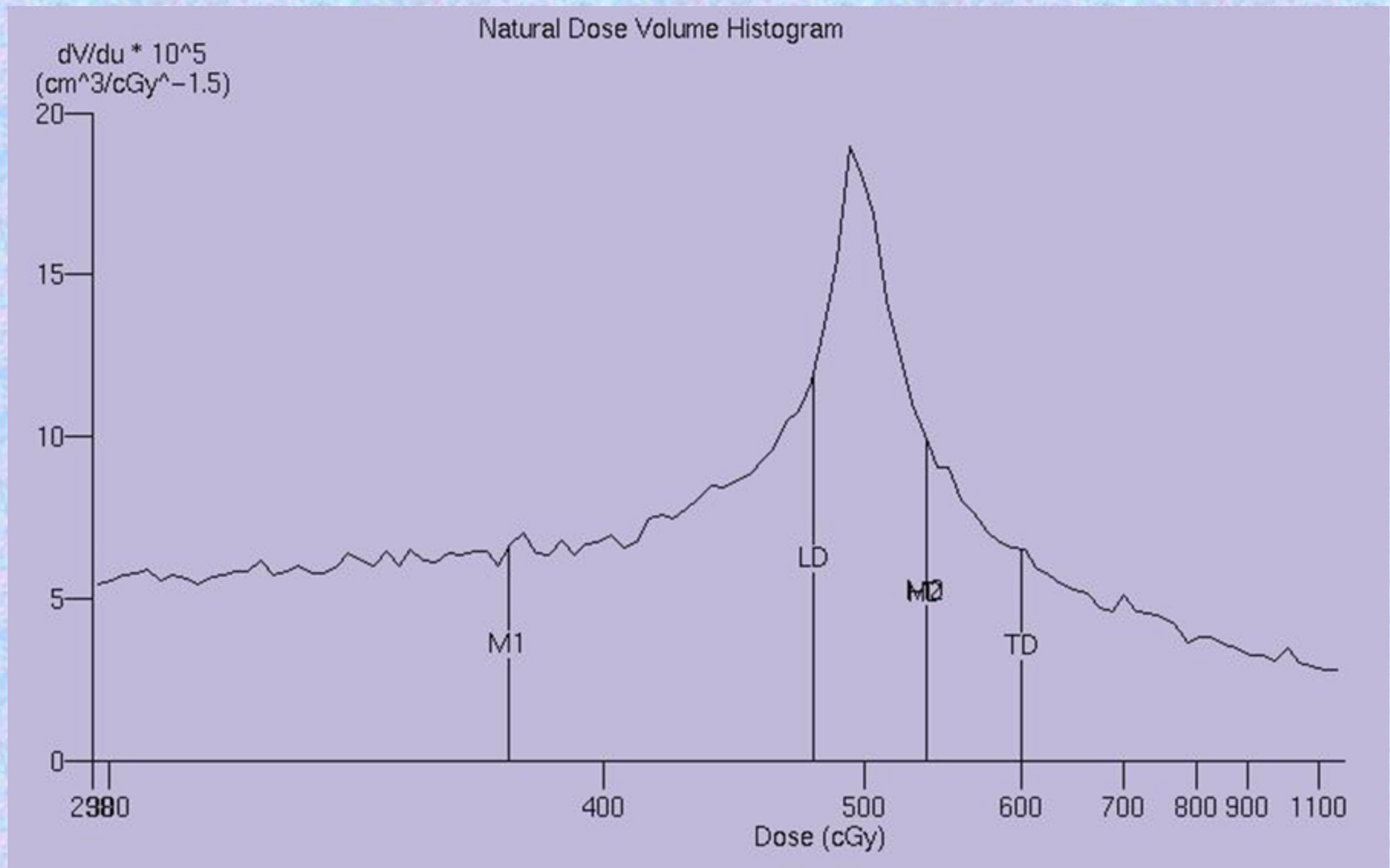


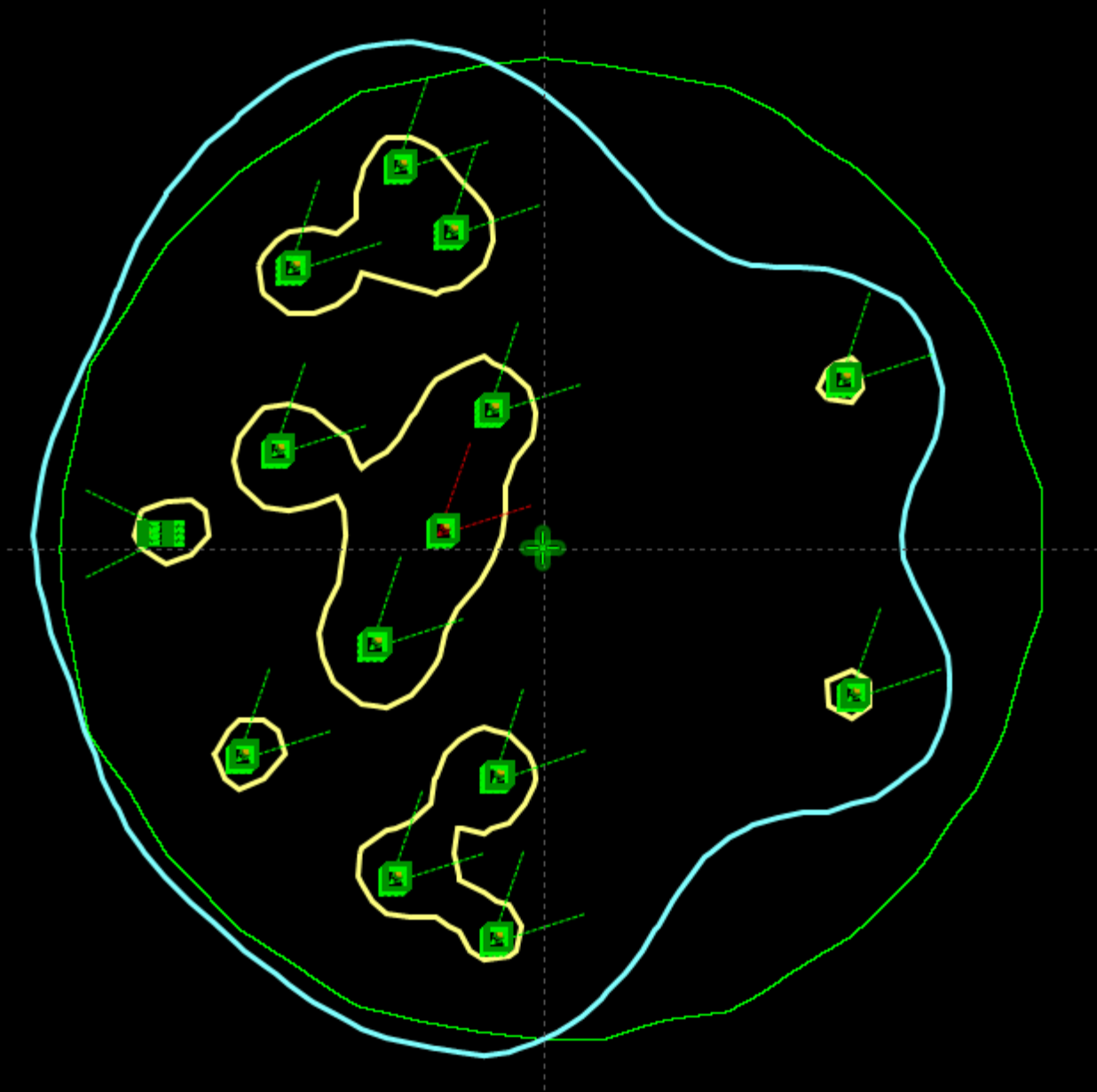
20 mm - optimizado

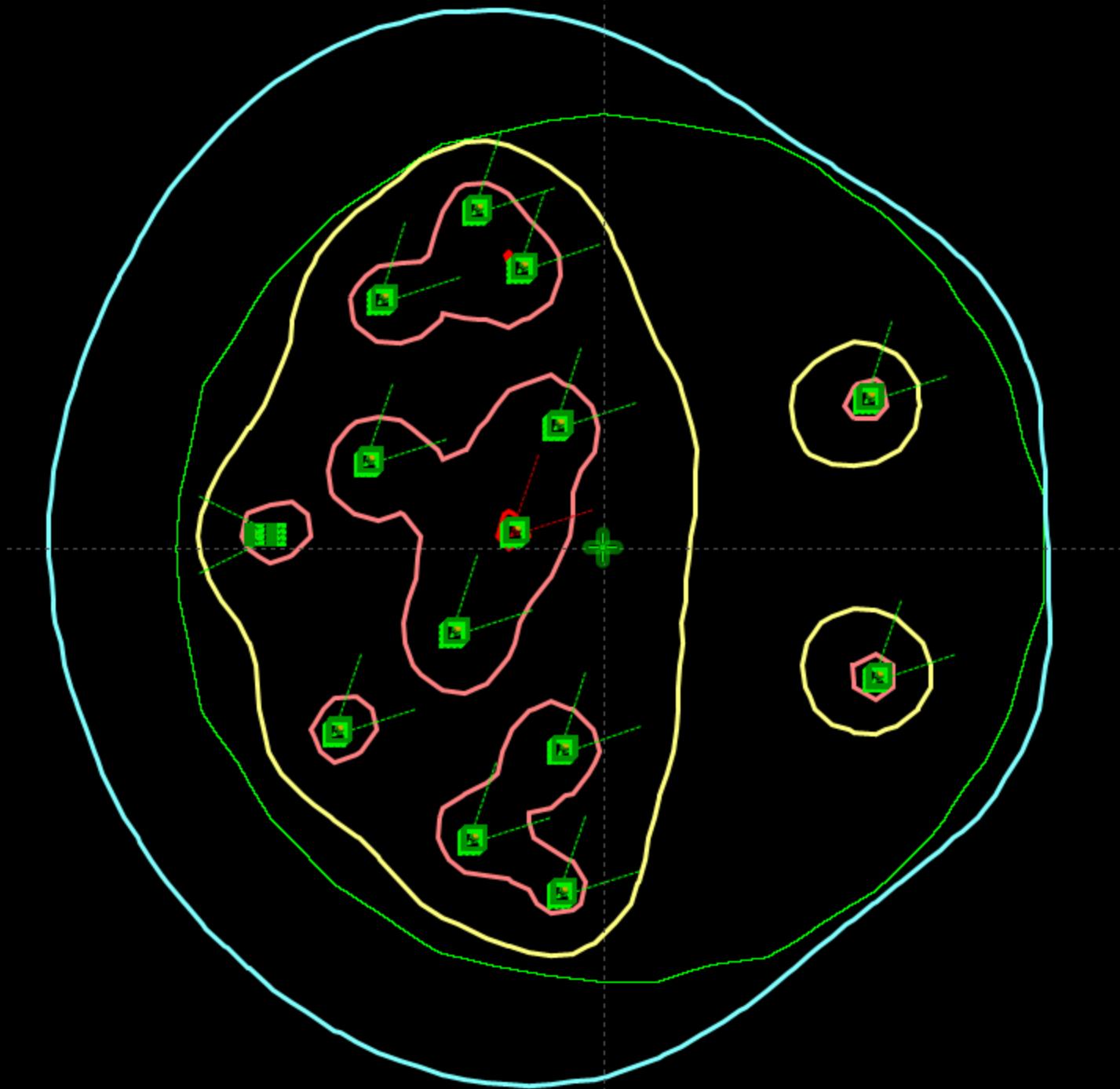
Differential Dose Volume Histogram



20 mm - optimizado







Histogramas

Son útiles e importantes cuando el volumen y la posición de cada estructura de interés están bien definidos en el sistema de planificación

Histogramas

Son interesantes cuando el volumen de cada estructura es conocido pero no está definido en el sistema de planificación

Histogramas

Son menos útiles cuando no
se conoce el volumen de cada
estructura





Gracias

