

Ventajas de ELEMENTS para planificar e irradiar más de 10 metástasis

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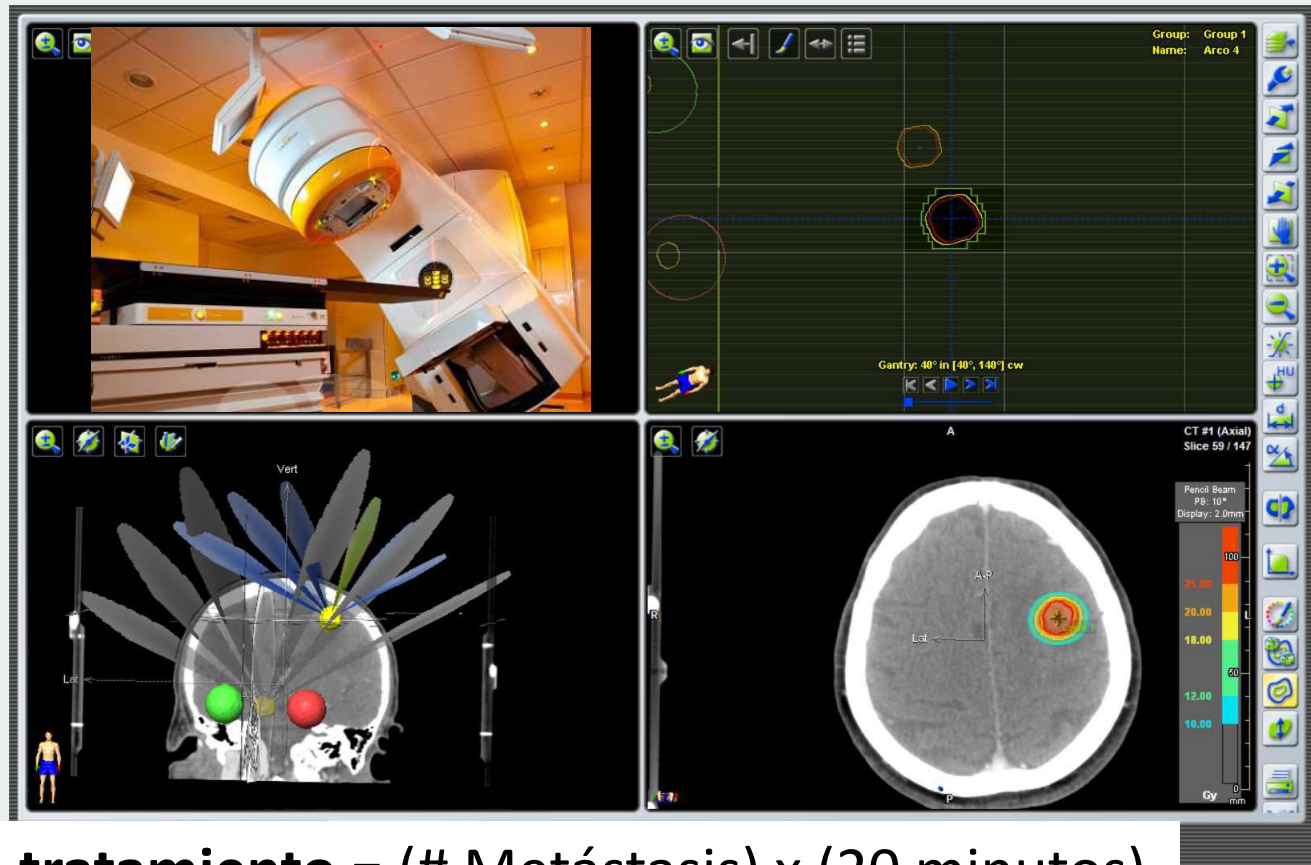
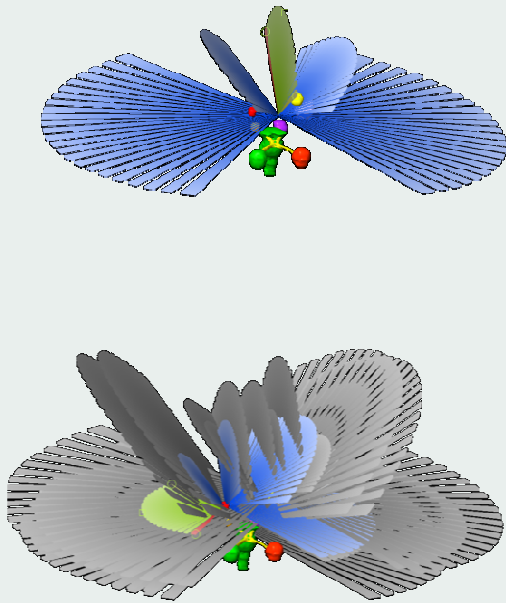
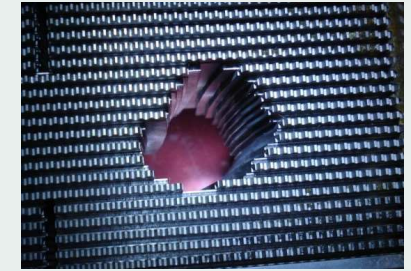
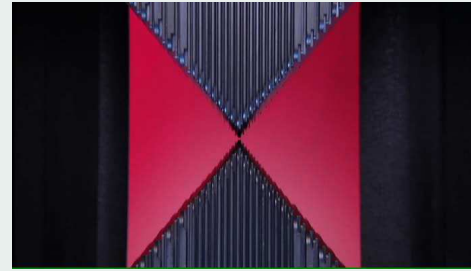


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2° Simposio Internacional
de **RADIOCIRUGÍA**
ESTEREOTÁCTICA
con plataforma Novalis



Radiocirugía con Linac + HDMLC



Tiempo de tratamiento = (# Metástasis) x (20 minutos)

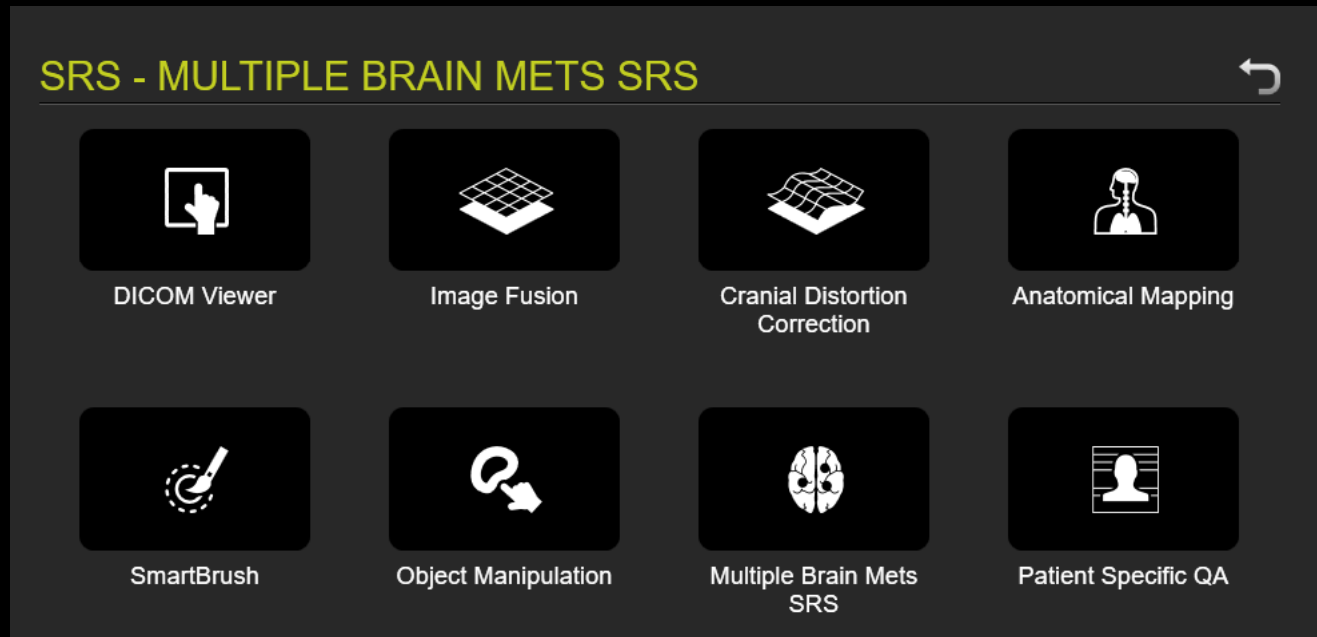


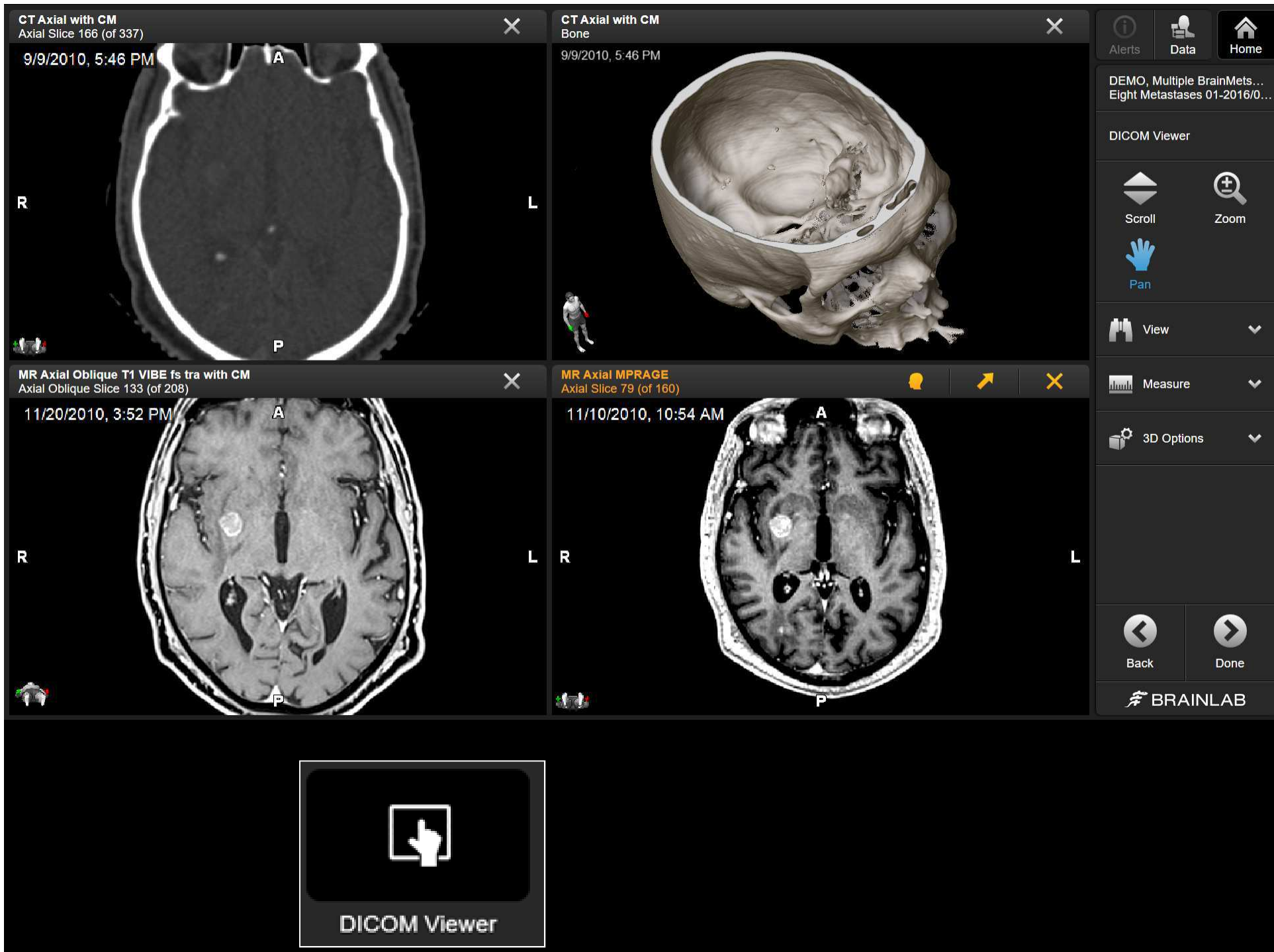
SRS Múltiple Metástasis

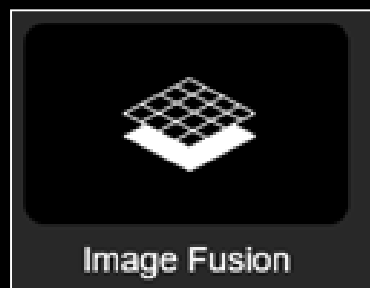
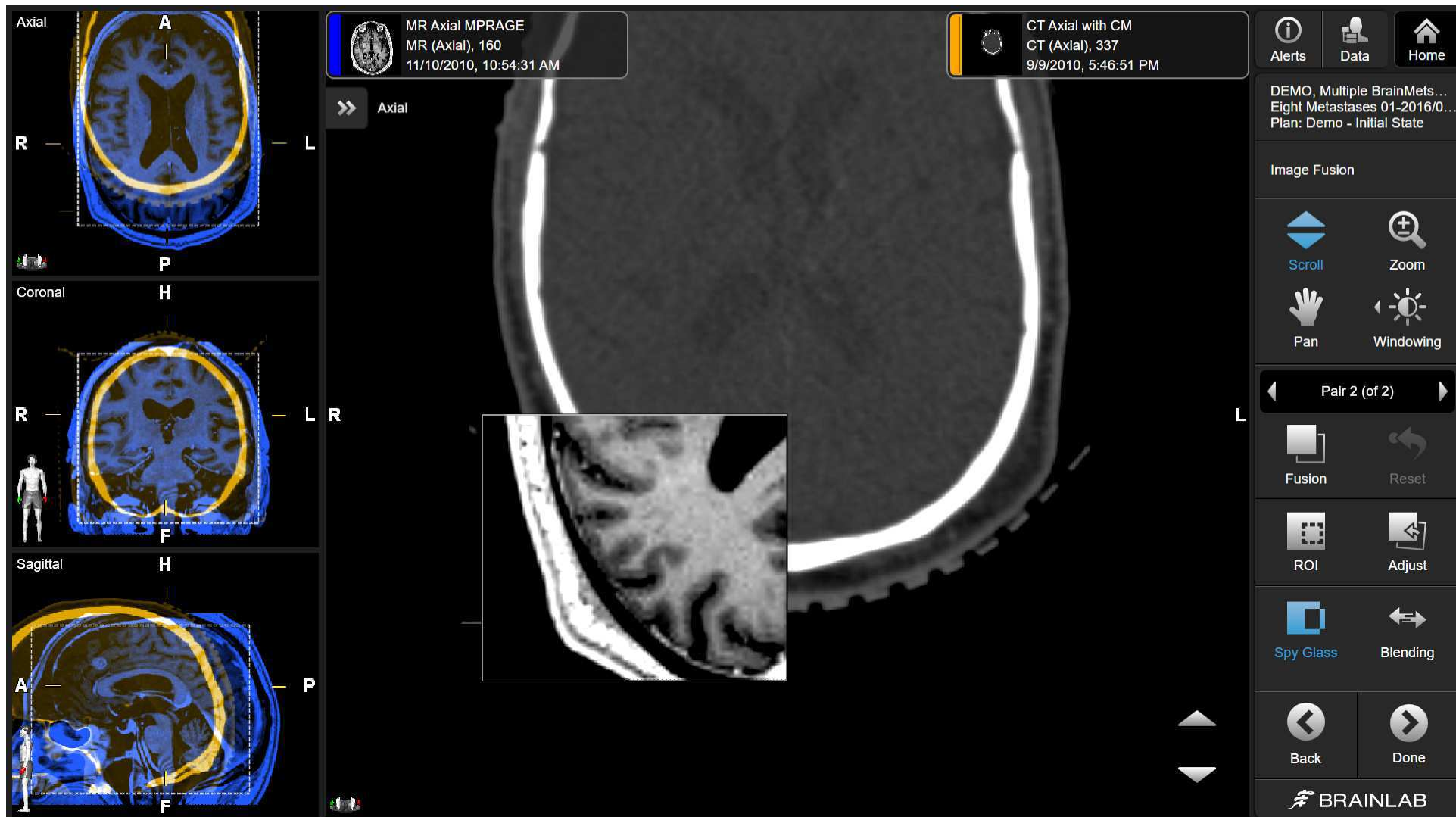
ELEMENT



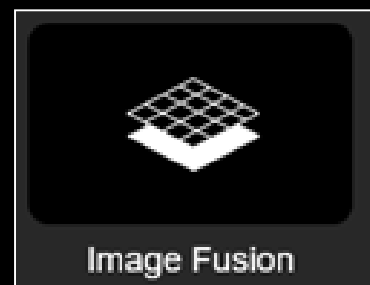
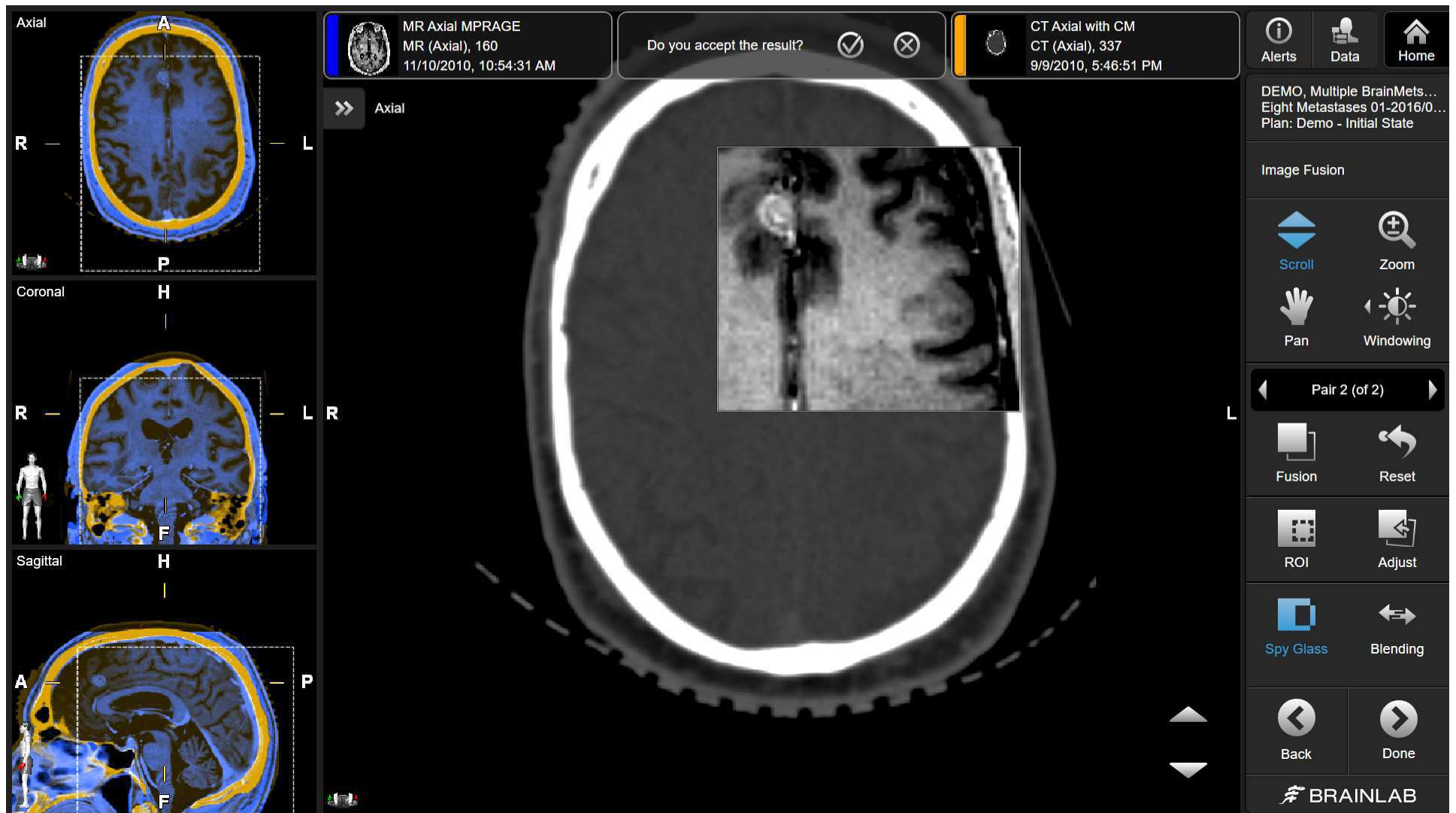
Element Múltiple Metástasis





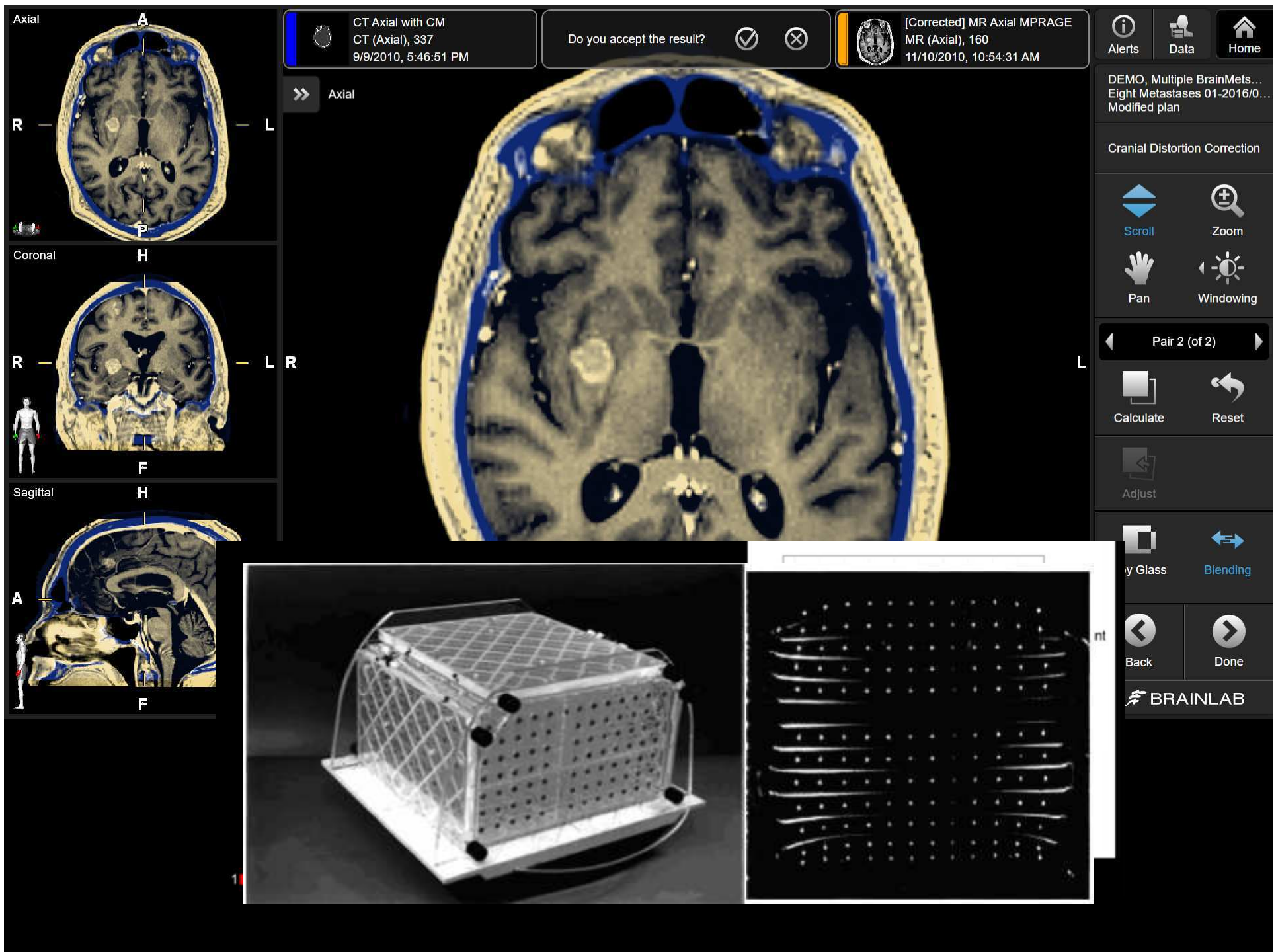


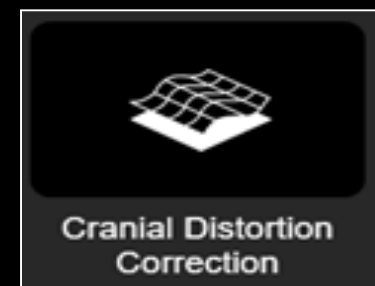
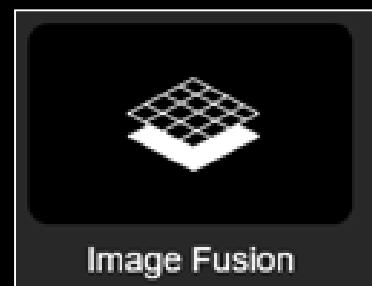
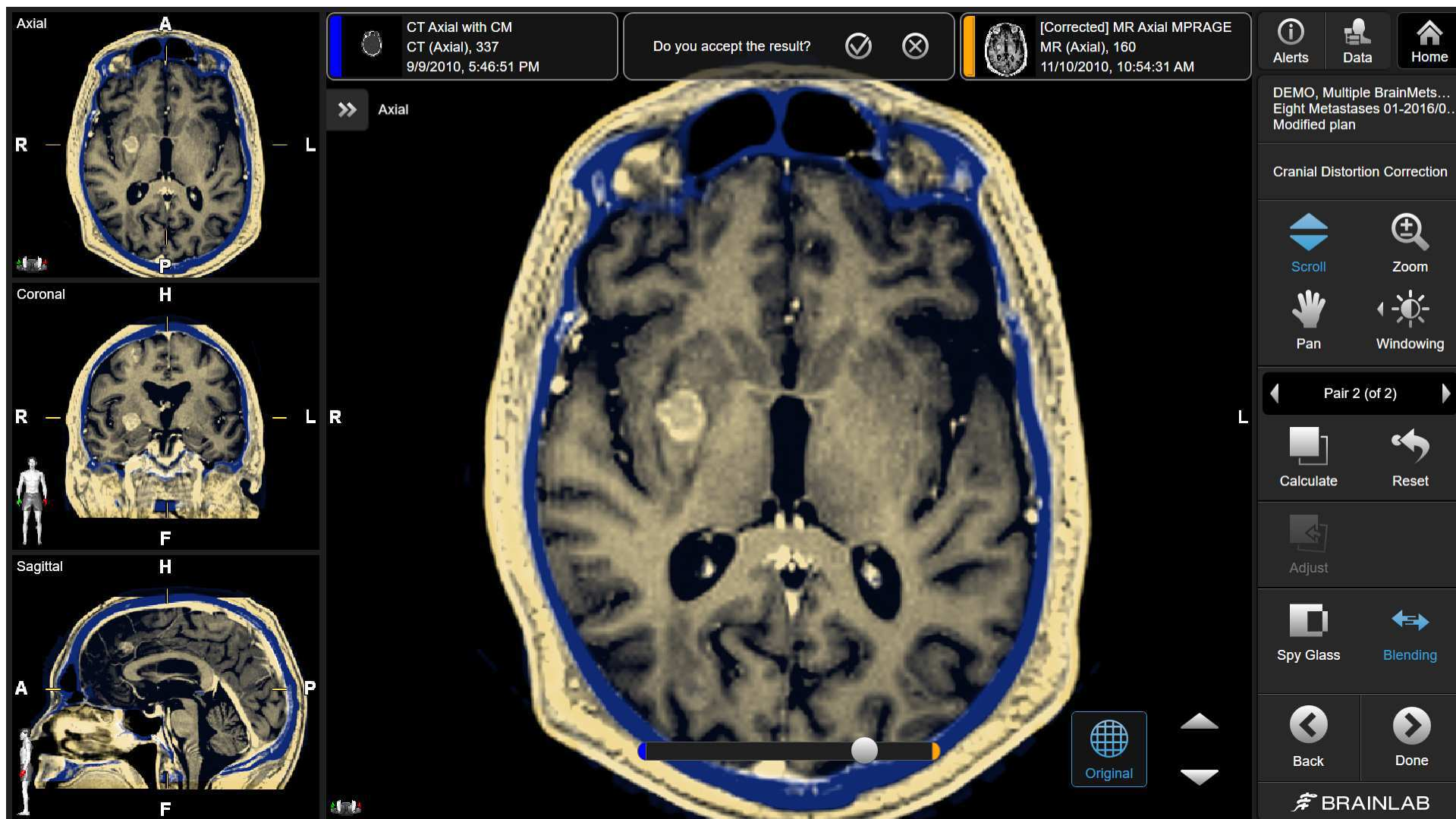
Fusión RIGIDA



Fusión RIGIDA

- Traslación / Rotación
- Escalación





MR Axial Oblique T1 VIBE fs tra with CM

Axial

R —

— L

A

P

Sagittal

H

A

— P

F

Coronal

H

R —

— L

F

OBJECTS



DEMO, Multiple BrainMets...
Eight Metastases 01-2016/0...
Modified plan

Anatomical Mapping



Scroll



Zoom



Pan



Windowing



Shape



Back



Done

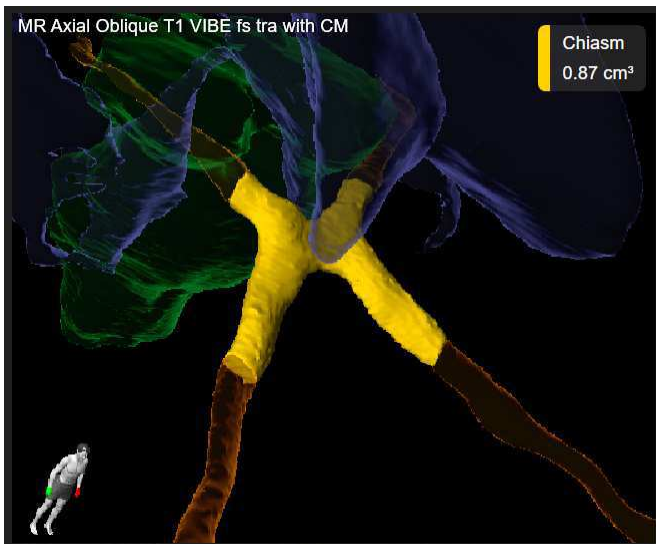
BRAINLAB



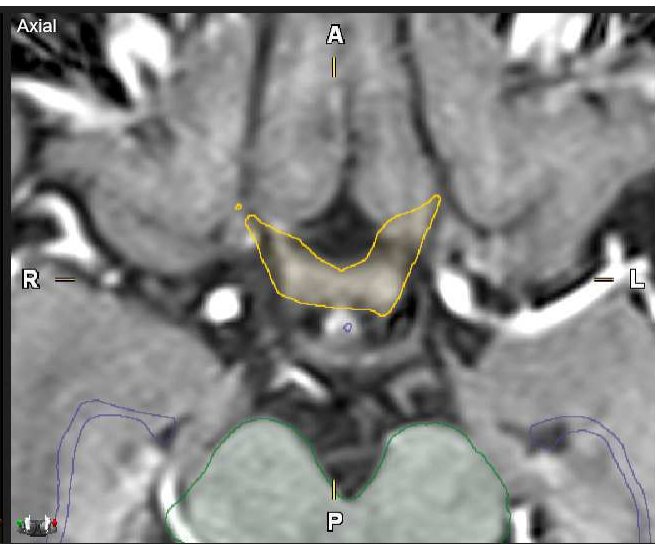
Anatomical Mapping

MR Axial Oblique T1 VIBE fs tra with CM

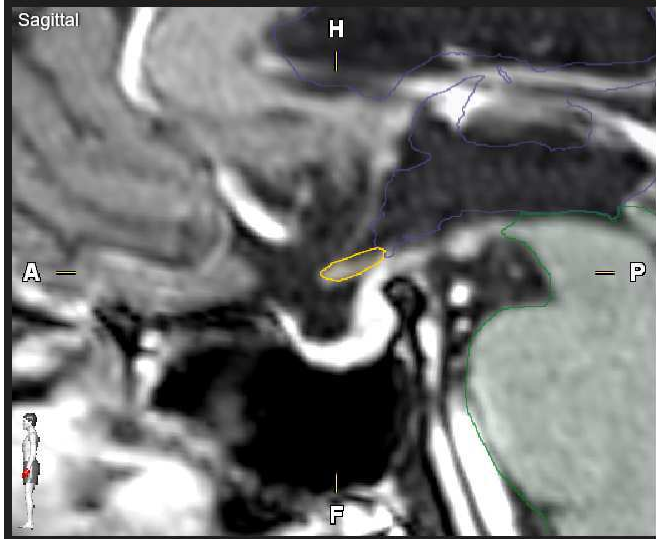
Chiasm
0.87 cm³



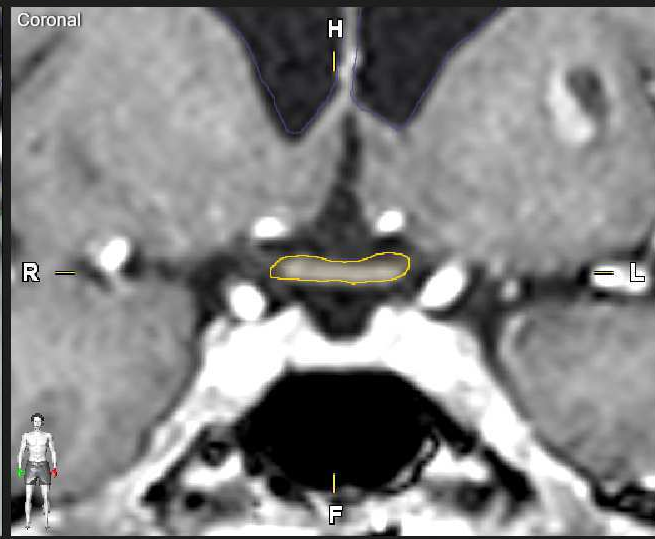
Axial



Sagittal



Coronal



OBJECTS

Chiasm	☒	☒
Eye Left	☒	☒
Eye Right	☒	☒
Lens Left	☒	☒
Lens Right	☒	☒
Metastasis 1	☐	☐
Metastasis 2	☐	☐
Metastasis 3	☐	☐
Metastasis 4	☐	☐
Metastasis 5	☐	☐
Metastasis 6	☐	☐
Metastasis 7	☐	☐
Optic Nerve Left	☒	☒
Optic Nerve Right	☐	☒
Optic Tract Left	☐	☒
Optic Tract Right	☐	☒
Ventricles	☐	☒

Alerts

Data

Home

DEMO, Multiple BrainMets...
Eight Metastases 01-2016/0...
Modified plan

Anatomical Mapping

Scroll

Zoom

Pan

Windowing

Shape

Back

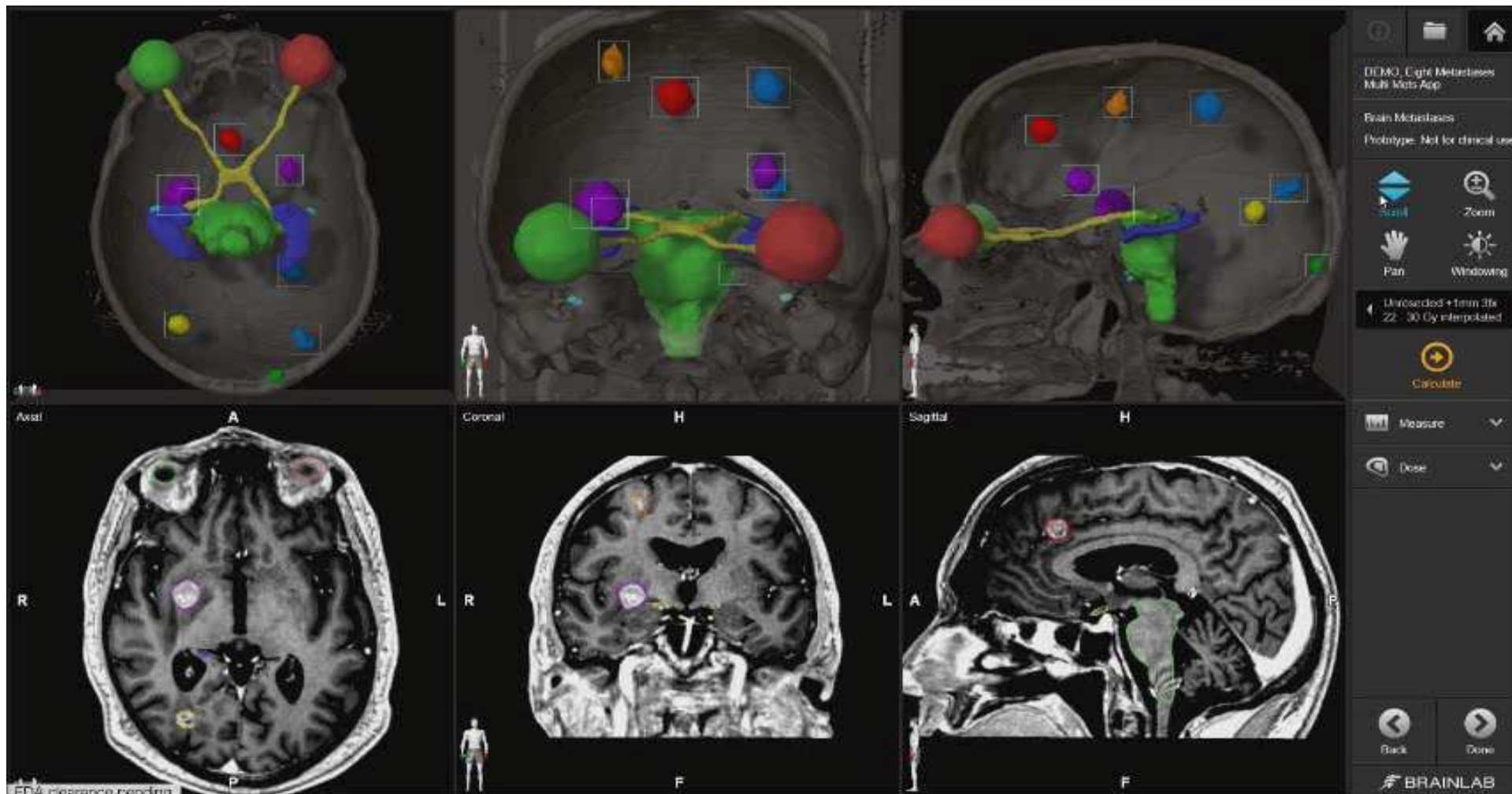
Done

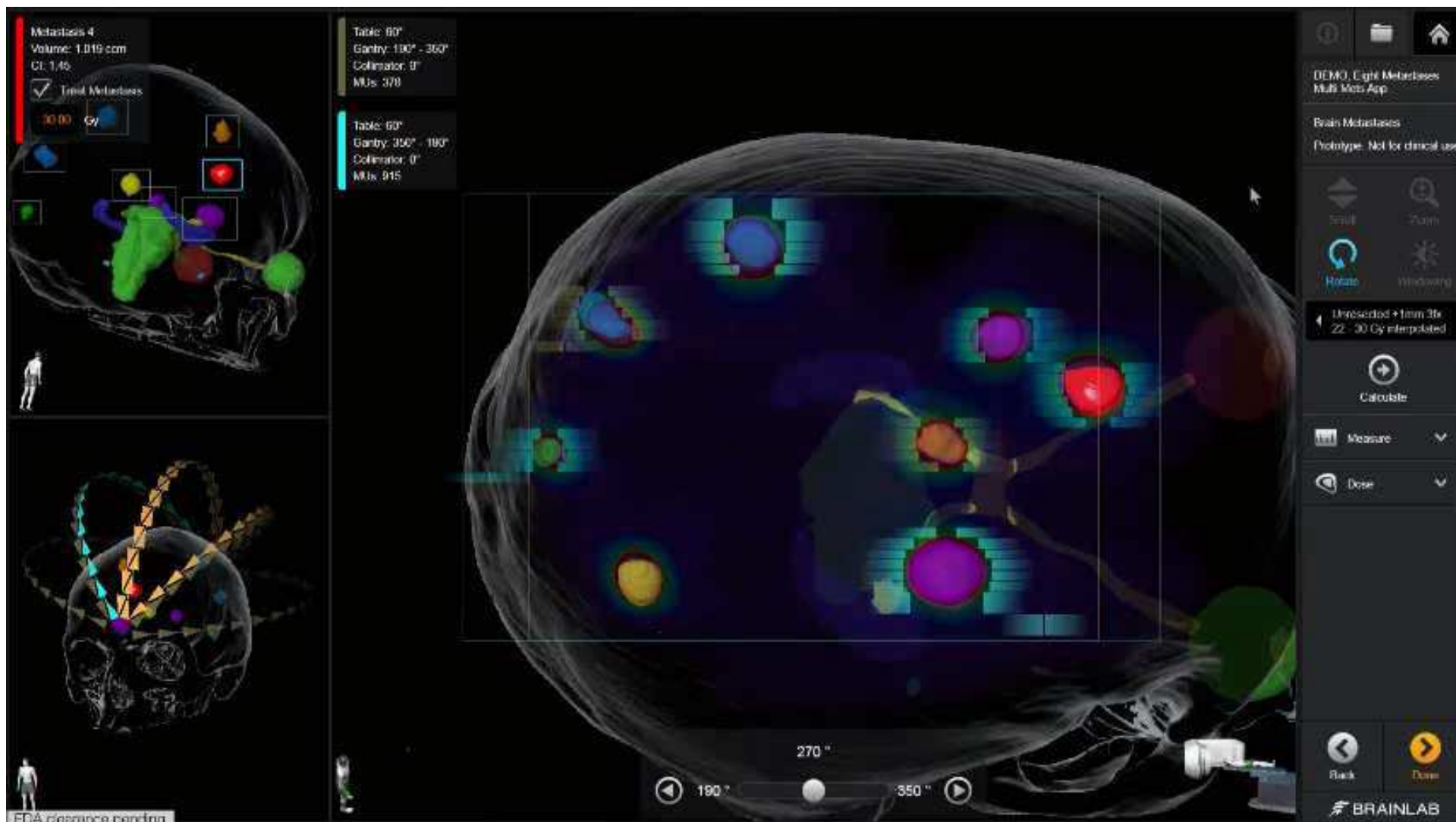
BRAINLAB

→

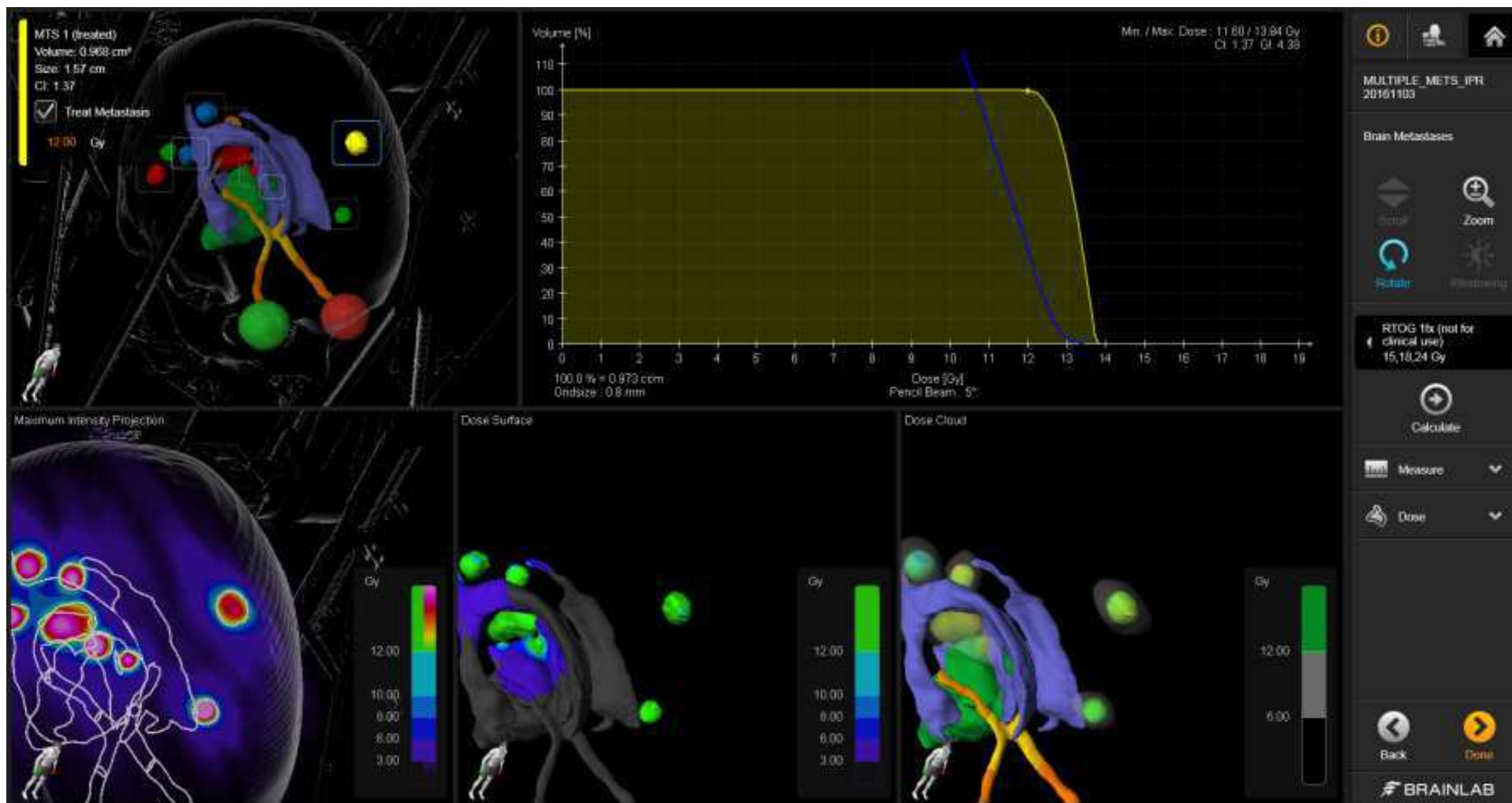


Anatomical Mapping



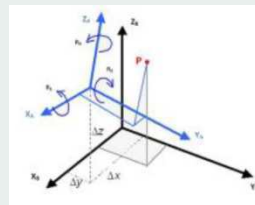
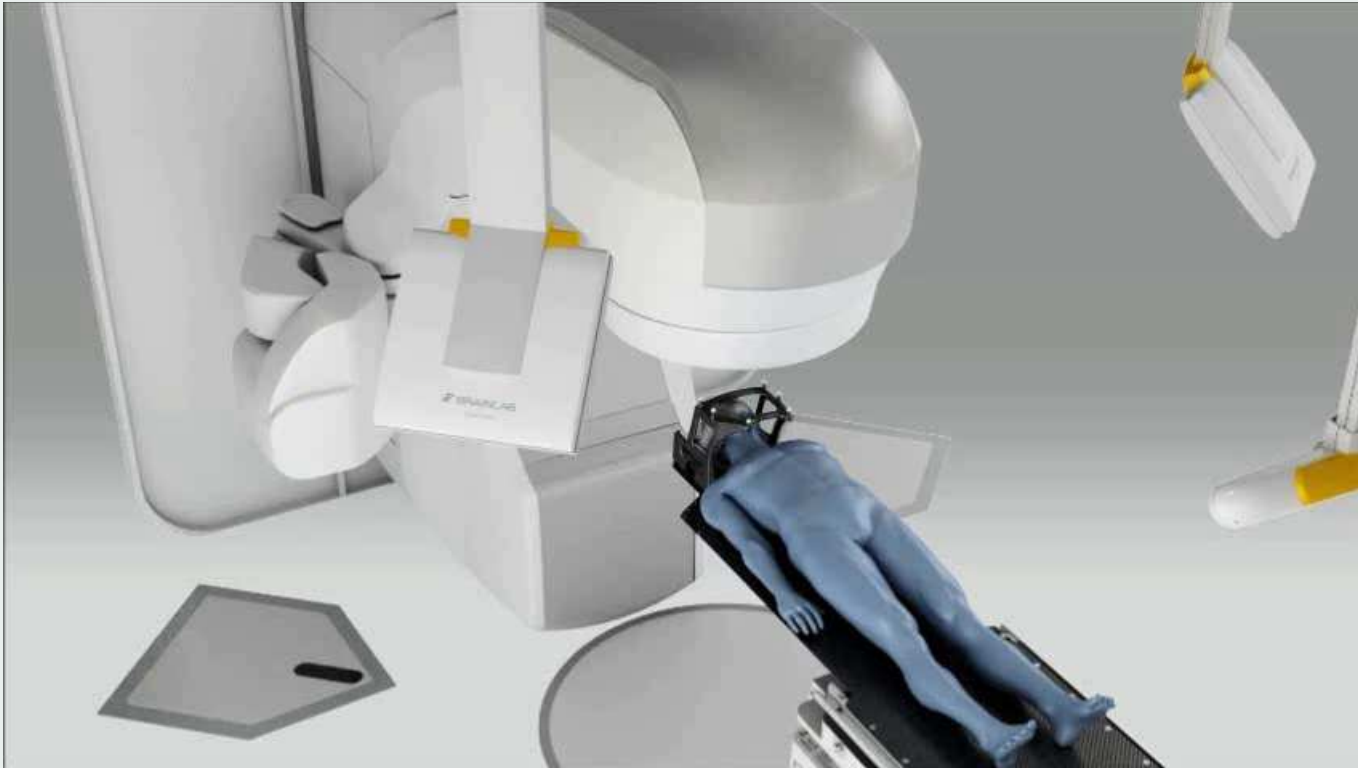


Multiple Brain Mets
SRS



Tiempo de tratamiento ~ **20 minutos**

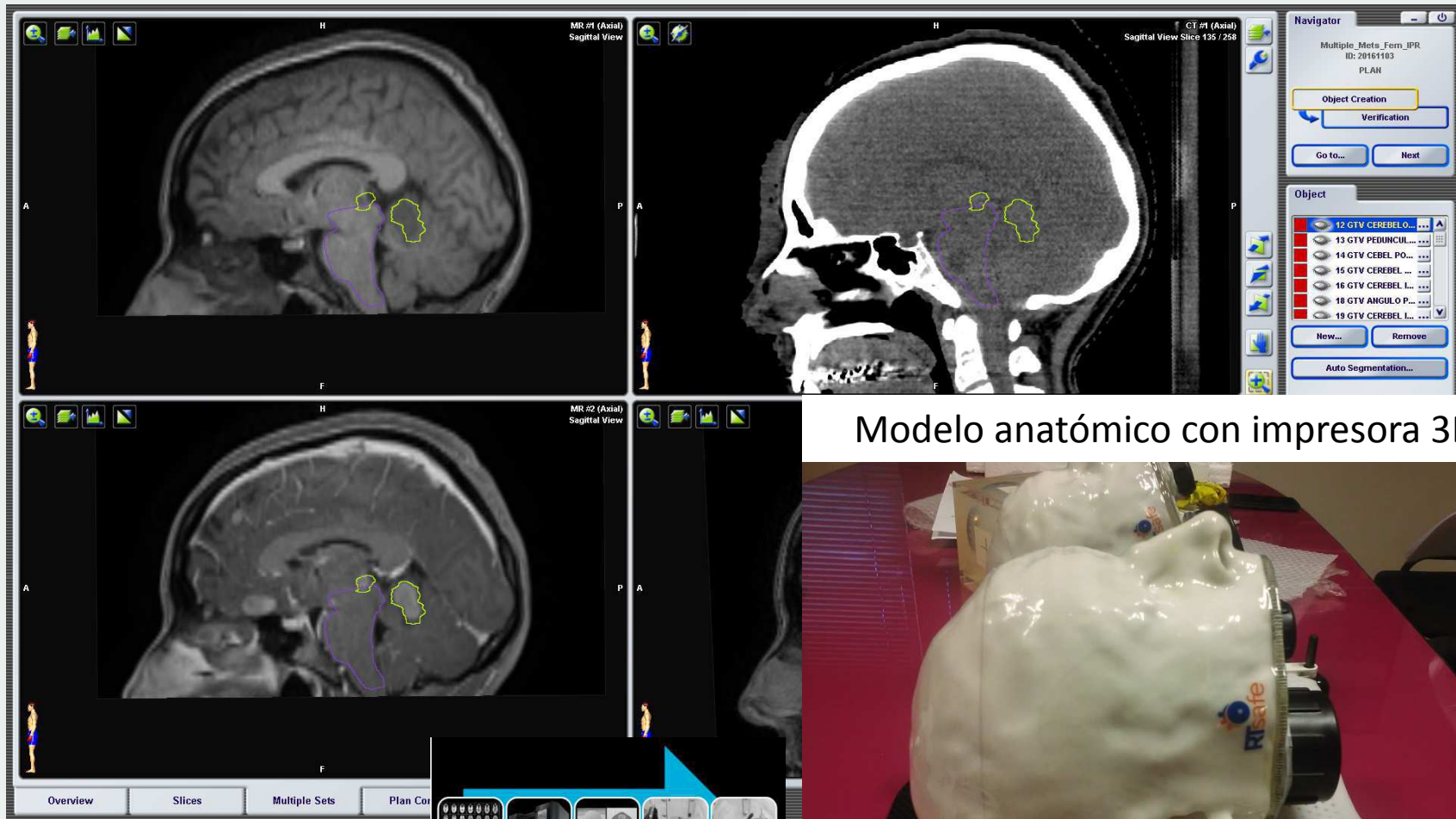
IGRT en SRS – Pre e Intra-tratamiento!



$$\begin{pmatrix} x' \\ y' \\ z' \\ 1 \end{pmatrix} = \begin{pmatrix} r_{11} & r_{12} & r_{13} & t_x \\ r_{21} & r_{22} & r_{23} & t_y \\ r_{31} & r_{32} & r_{33} & t_z \\ 0 & 0 & 0 & 1 \end{pmatrix} x \begin{pmatrix} x' \\ y' \\ z' \\ 1 \end{pmatrix}$$



Implementación tecnológica



Modelo anatómico con impresora 3D



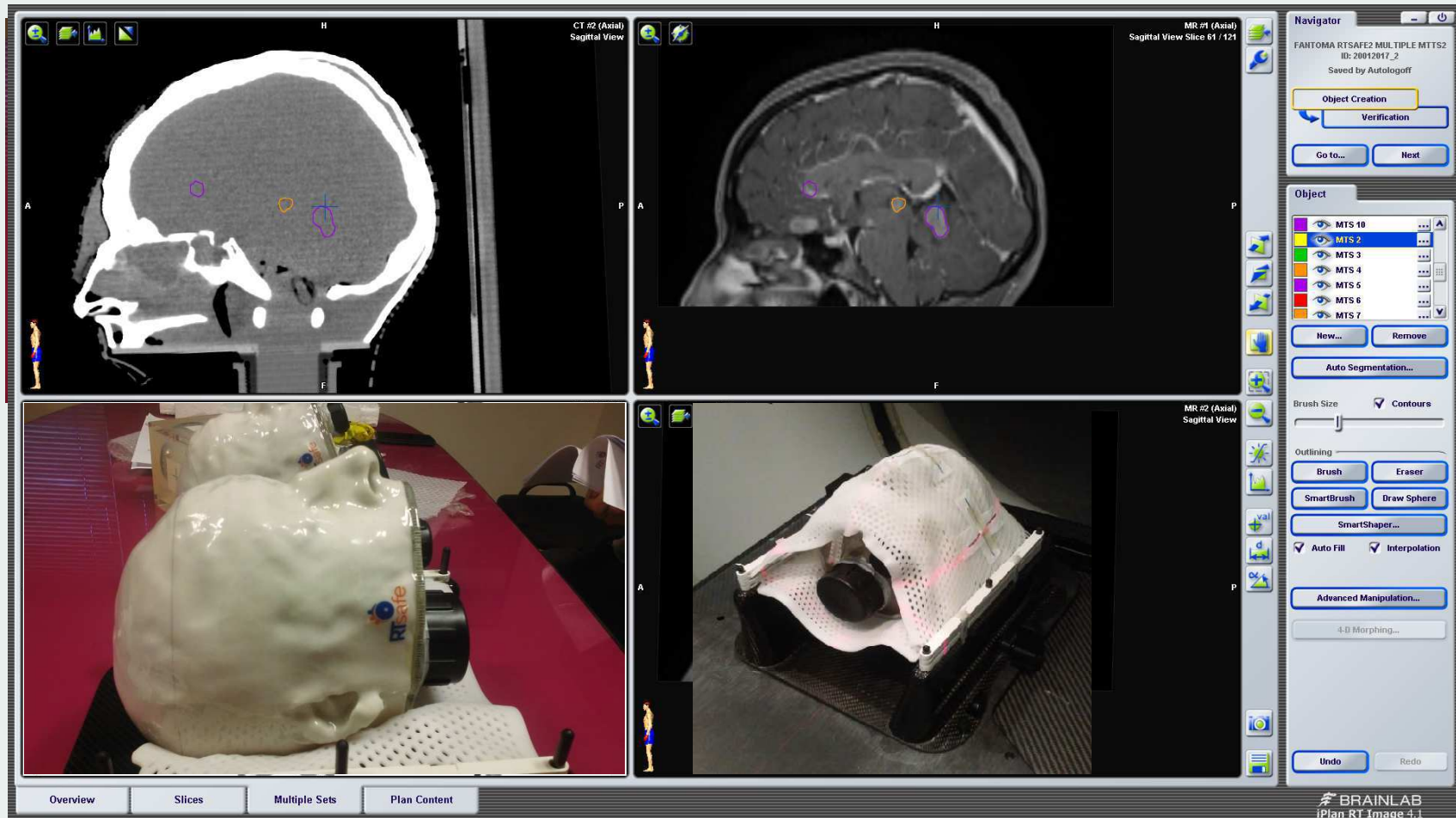
Relleno GEL sensible a RADIACION



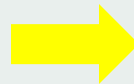
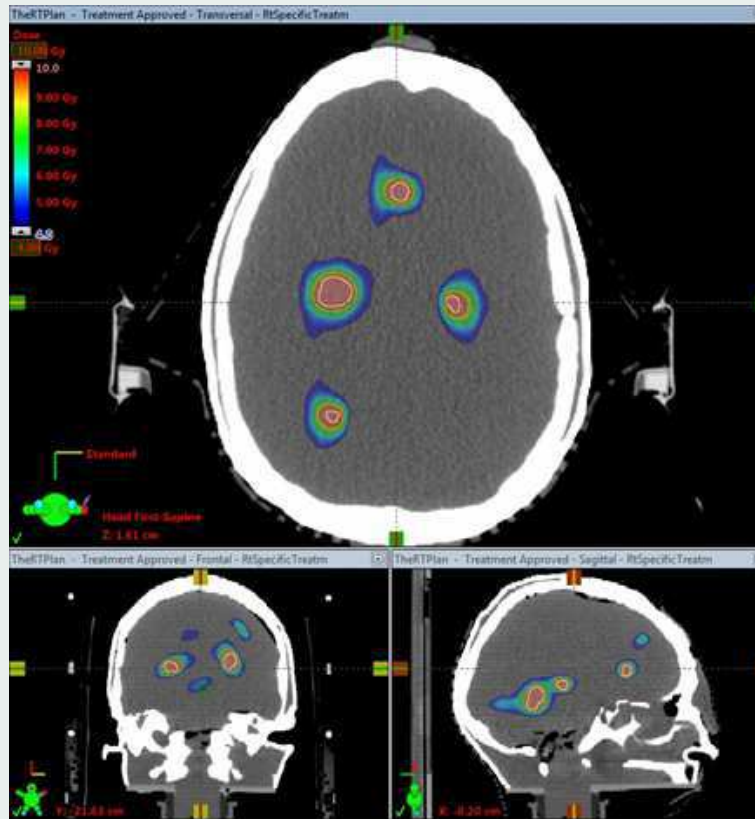
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Implementación tecnológica



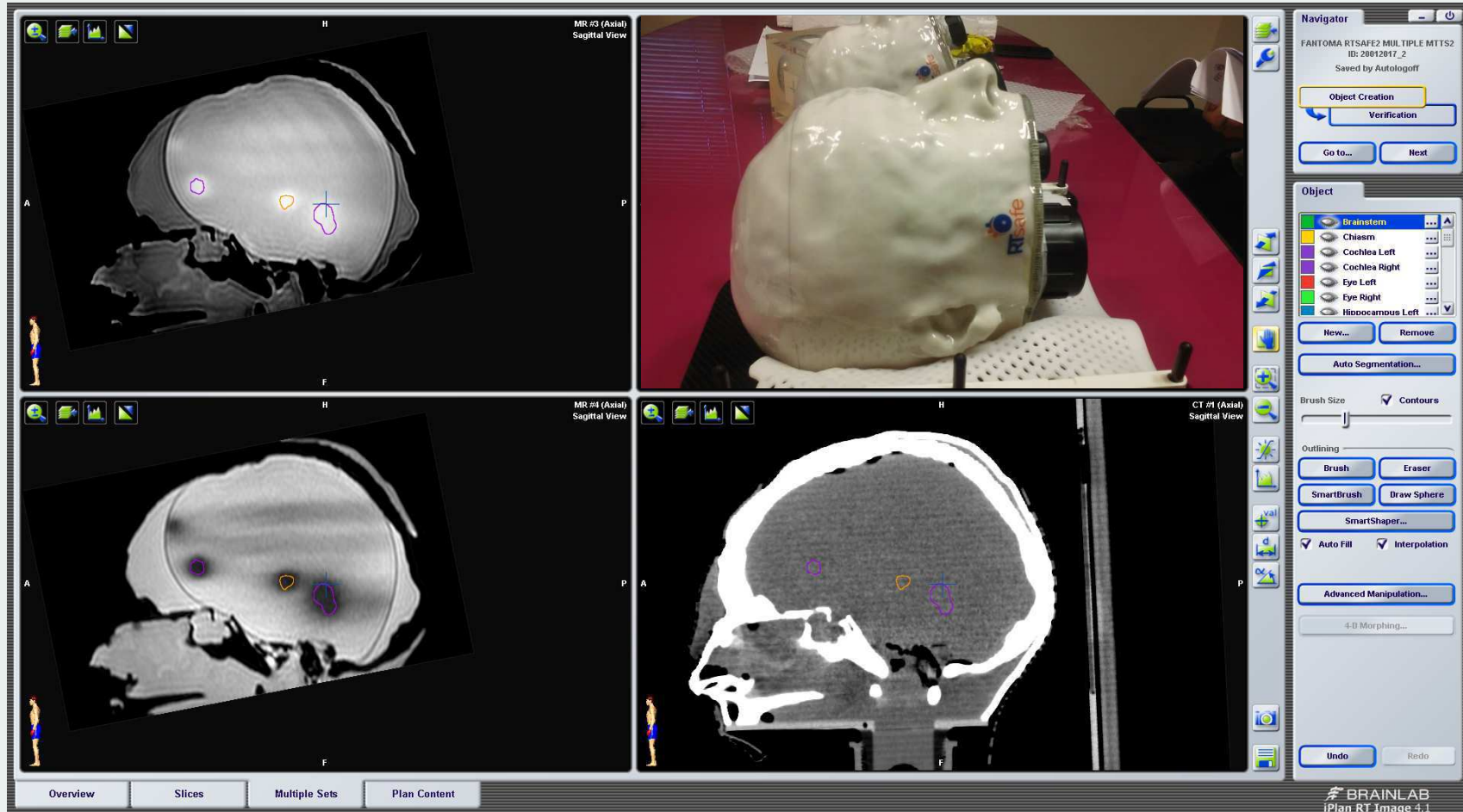
Implementación tecnológica



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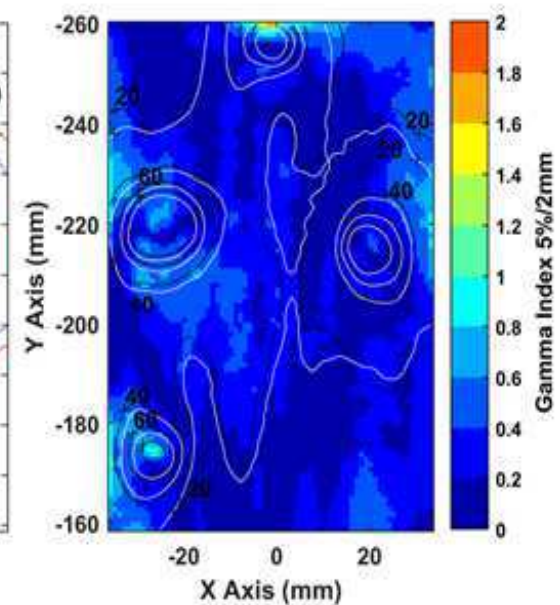
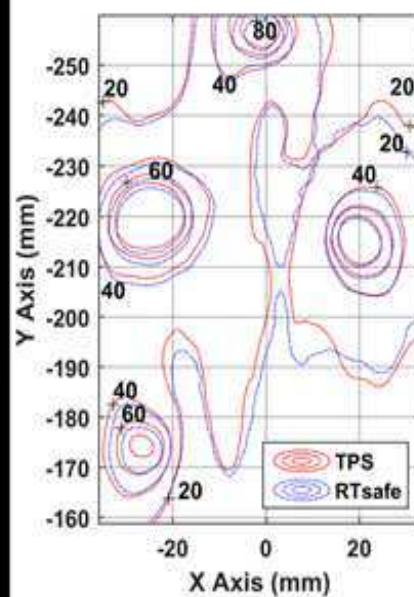
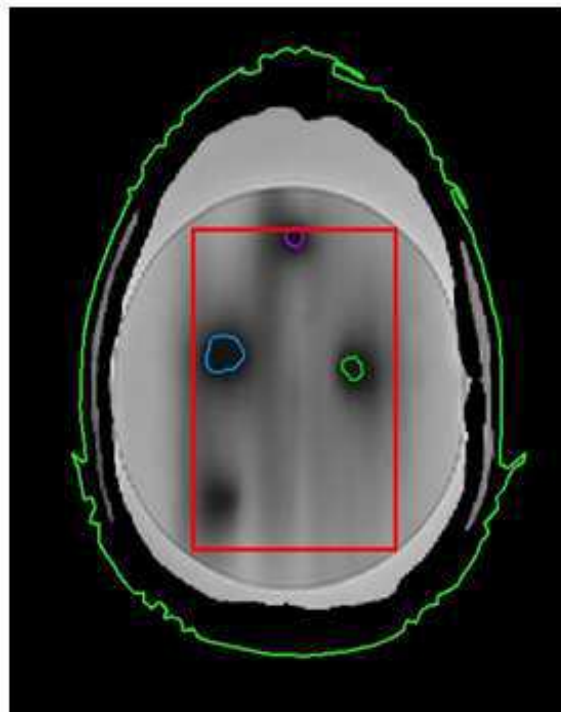


Implementación tecnológica



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Verificación **ELEMENT**

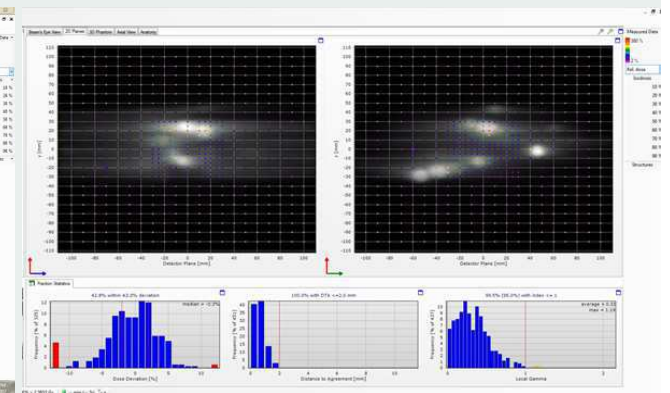
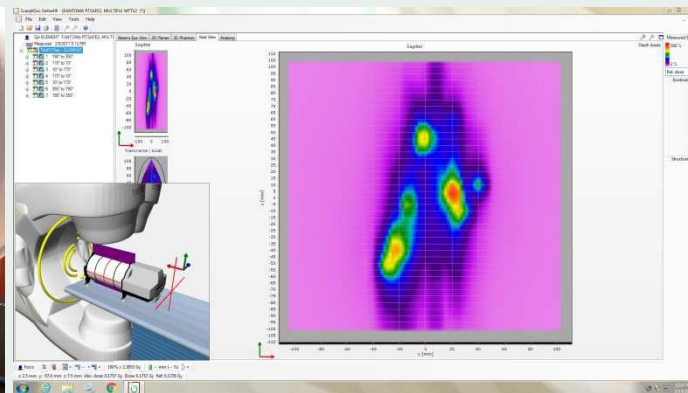
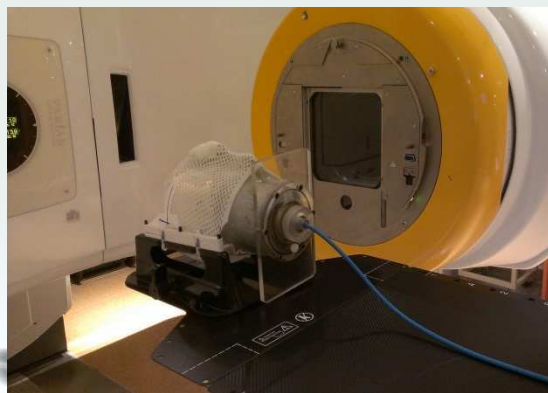
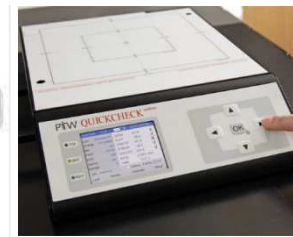
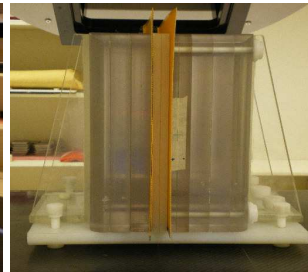


Distance (mm)

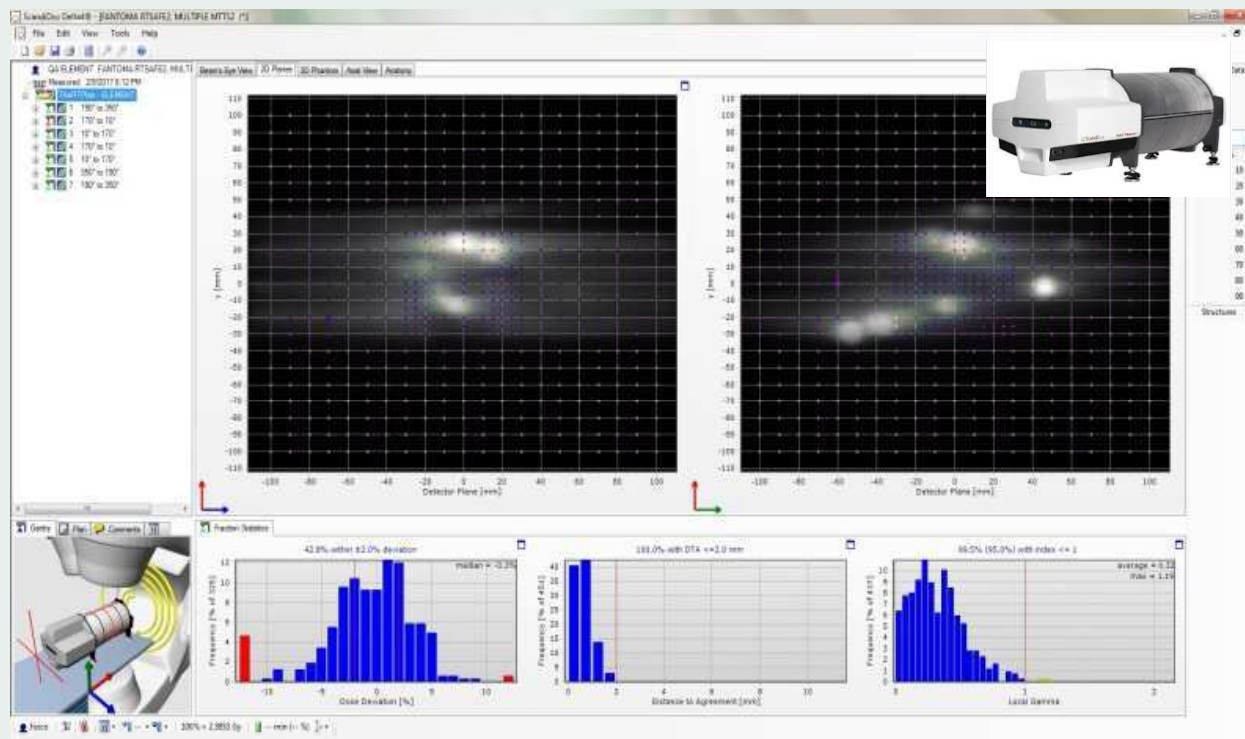


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Control de calidad



Control de calidad ELEMENT



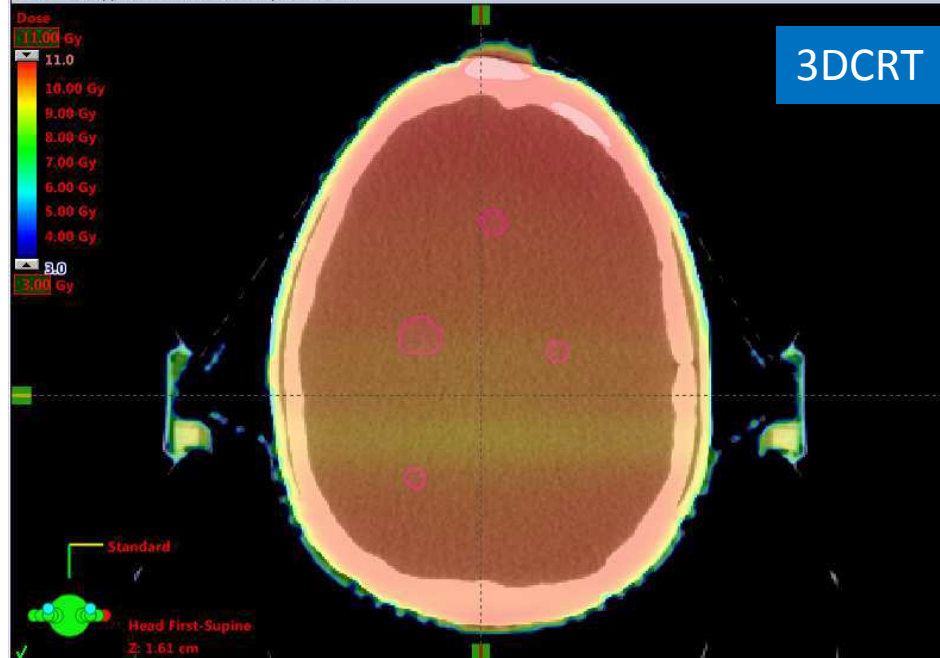
	γ local – Delta4 (2%-2mm)	γ global – Delta4 (2%-2mm)	Absolute ΔD (ion chamber)
ELEMENT	99.5%	99.8%	2.2%



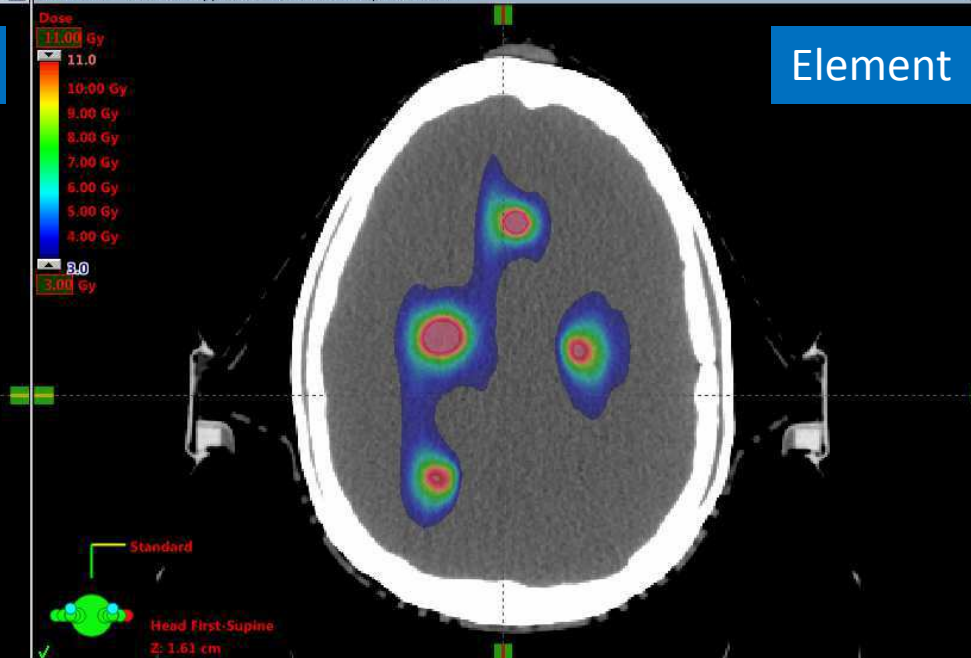
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Tolerancia $\gamma < 95\%$
 Δ Dosis $< 5\%$

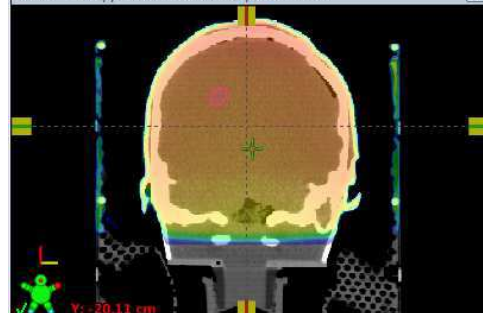
3DCRT - Unapproved - Transversal - RtSpecificTreatm



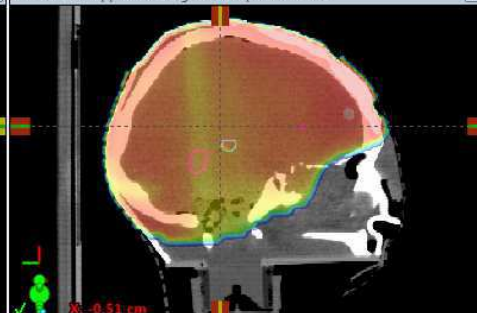
TheRTPlan - Treatment Approved - Transversal - RtSpecificTreatm



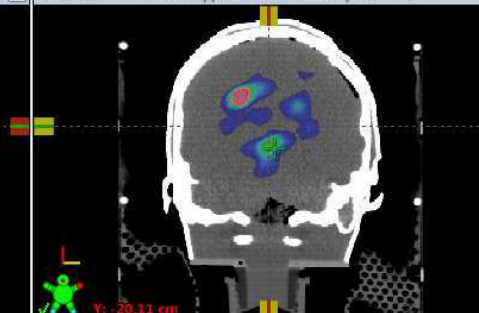
3DCRT - Unapproved - Frontal - RtSpecificTreatm



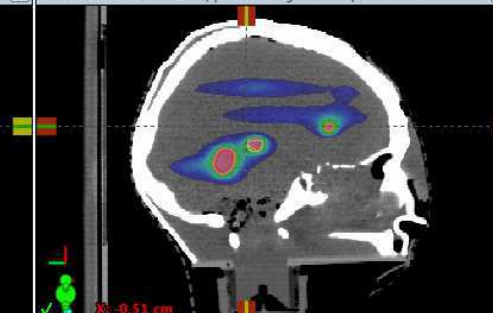
3DCRT - Unapproved - Sagittal - RtSpecificTreatm



TheRTPlan - Treatment Approved - Frontal - RtSpecificTreatm

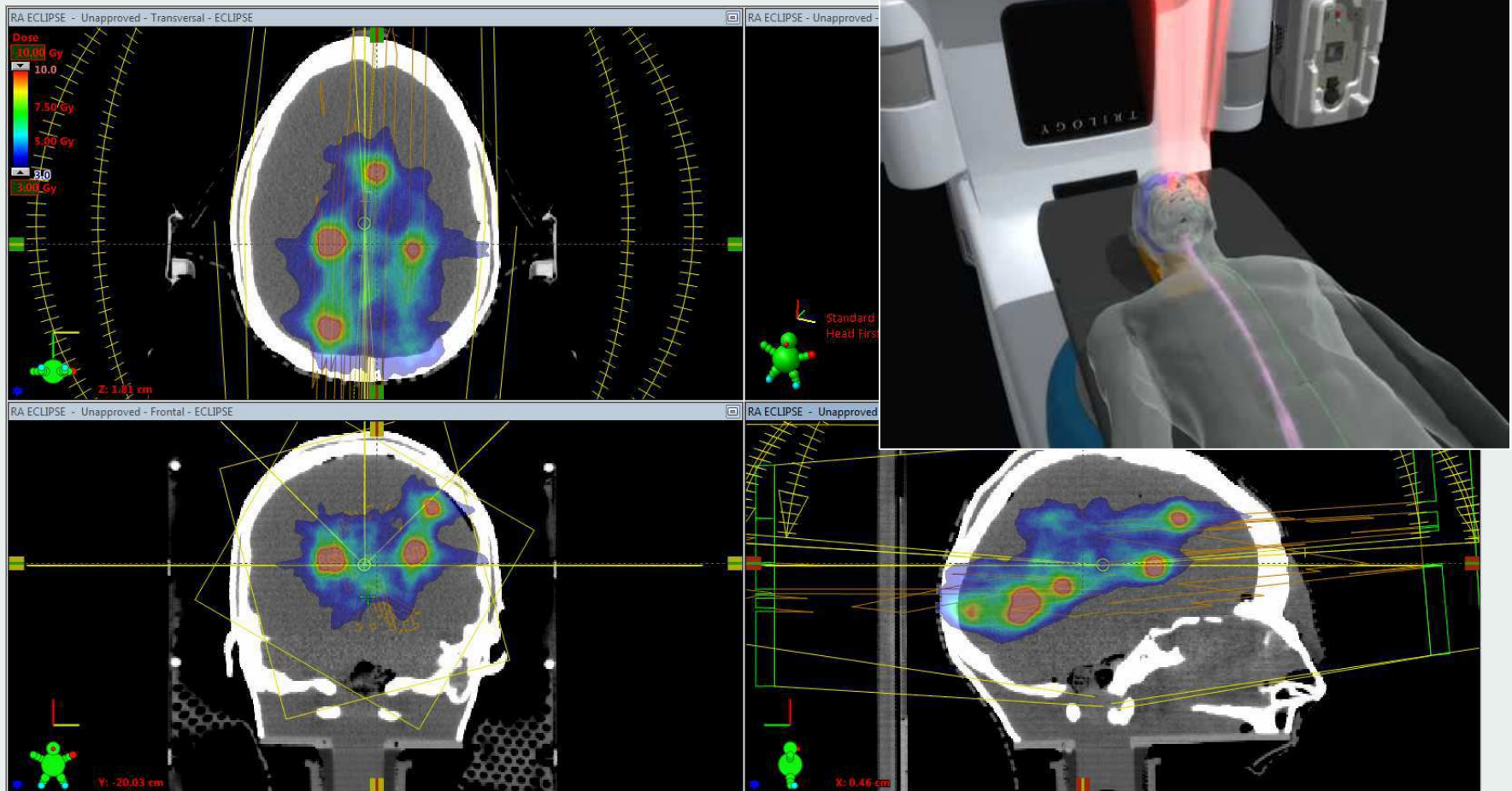


TheRTPlan - Treatment Approved - Sagittal - RtSpecificTreatm



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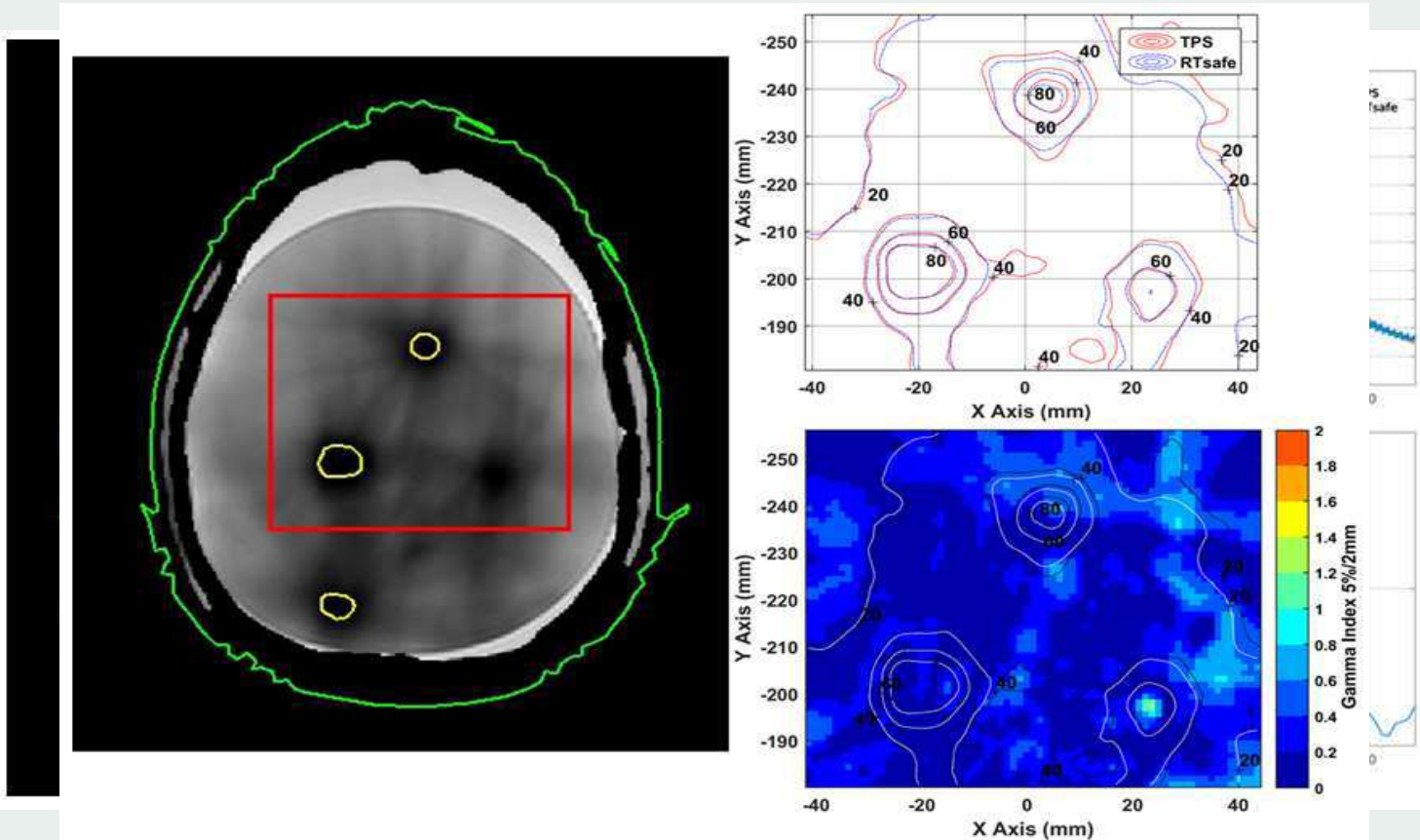
SRS Múltiple Mts - RapidARC



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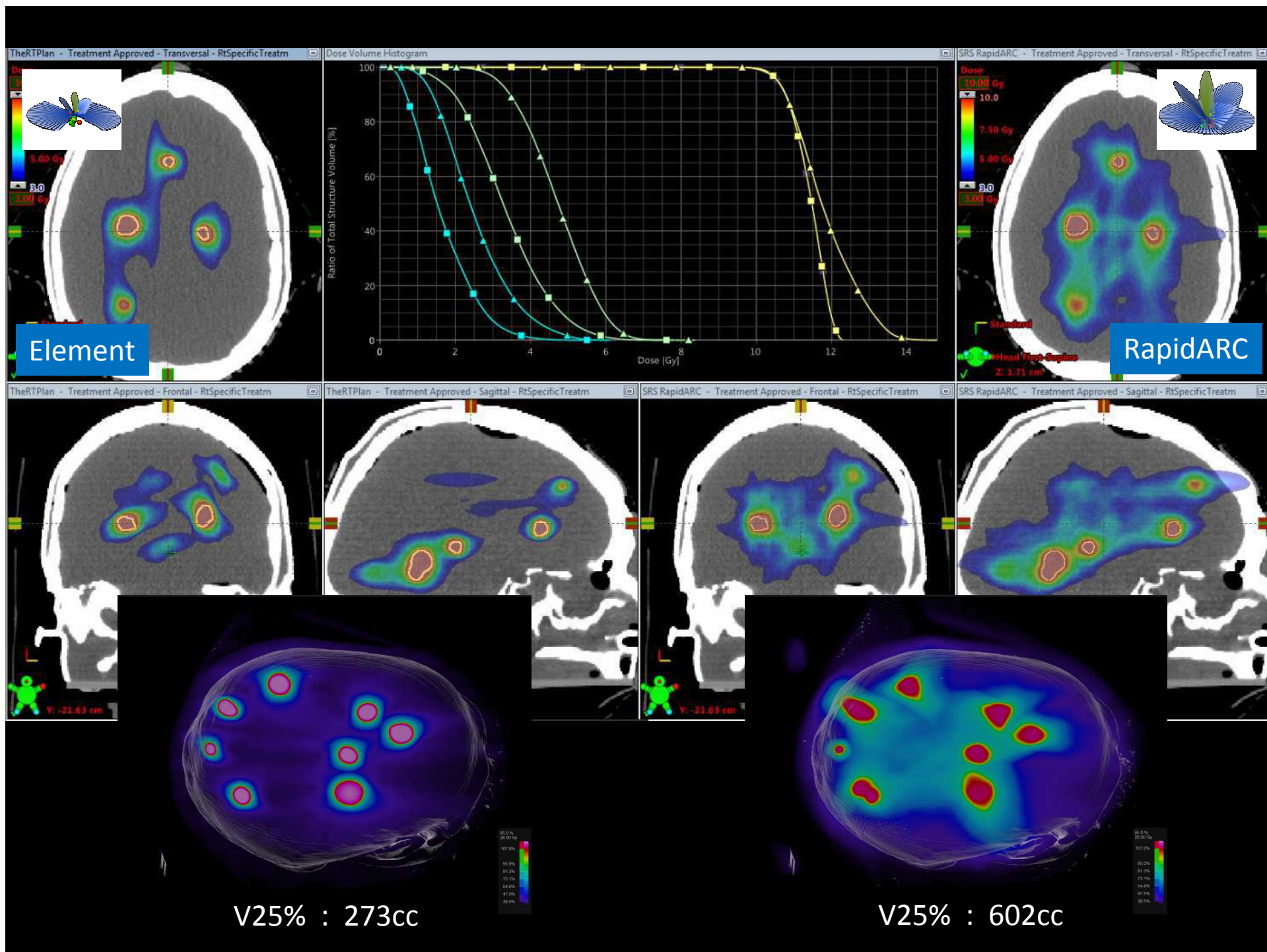
Grant M. Clark, et al. Plan quality and treatment planning technique for single isocenter cranial radiosurgery with volumetric modulated arc therapy. *Practical Radiation Oncology* (2012) 2, 306-313

Verificación RapidARC



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Conclusiones

- ELEMENT es un flujo de trabajo que incluye
 - Fusión
 - Corrección en RNM por distorsión de imagen
 - Segmentación automática de OAR
 - Delimitación automática de blancos
 - Planificación automática basada en Protocolos
 - Control de calidad
- ELEMENT permite el tratamiento de hasta 15 metástasis cerebrales en forma simultánea
- La modalidad de DCA es ideal para blancos tipo esférico, blancos muy irregulares cercanos a OAR técnicas moduladas
- ELEMENT es la técnica de tratamiento con menor dosis en cerebro sano y corto tiempo de tratamiento

