Radiocirugía en Schwanomas vestibulares con Gamma Knife y Acelerador Lineal

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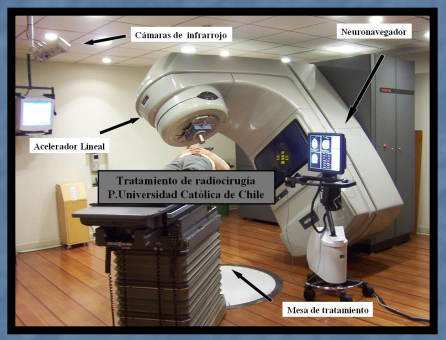
Red de salud UCChristus
Santiago , Chile.

Declaración de conflictos

- No tengo compromisos con la industria
- No he percibido pago por esta presentación
- Trabajo con 2 plataformas:

LINAC (PUC de Chile)



Gamma Knife

Gamma Knife Chile

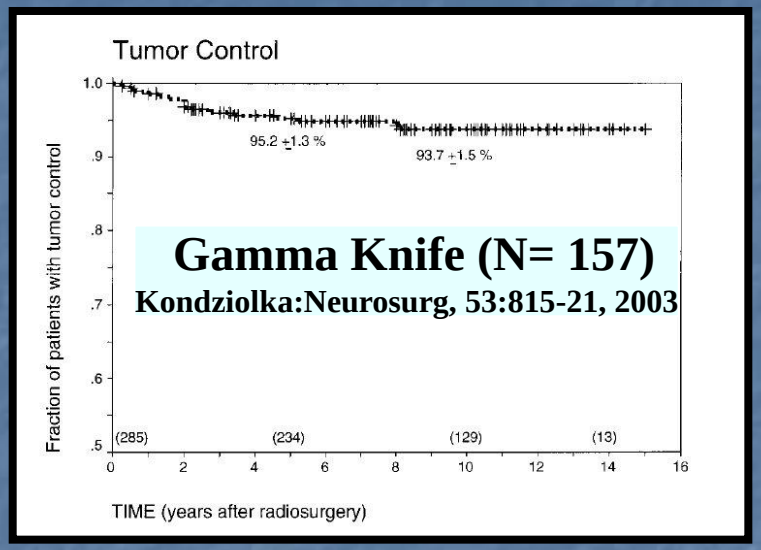
Clínica Dávila

Literatura antigua clásica

Control tumoral

- **Control tumoral actuarial a 15 años:**

  (90% - 93,7%)



Gamma Knife (N= 157)

Kondziolka:Neurosurg, 53:815-21, 2003

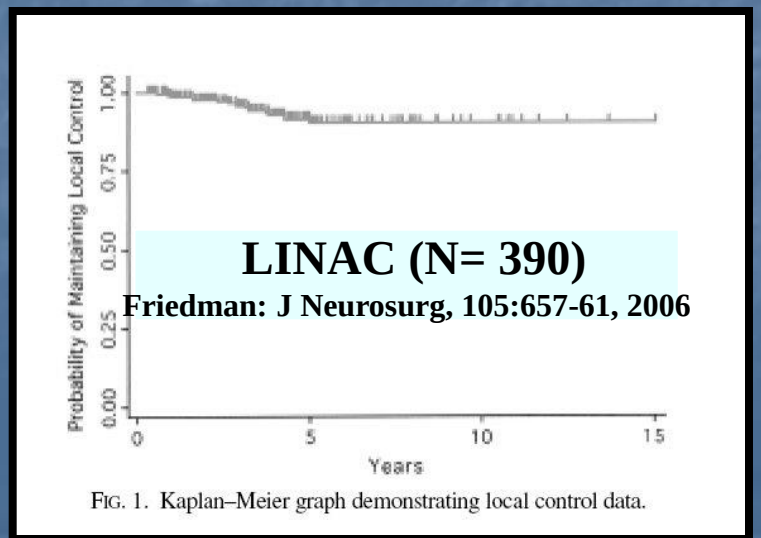
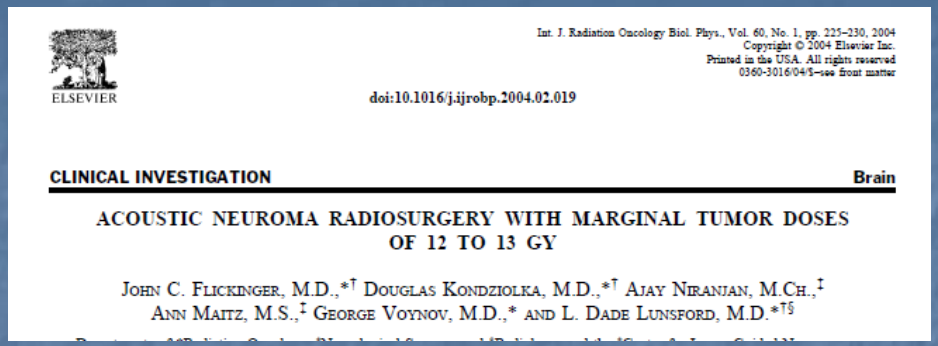


FIG. 1. Kaplan–Meier graph demonstrating local control data.

LINAC (N= 390)

Friedman: J Neurosurg, 105:657-61, 2006

- Flickinger et al (Int J Rad Onc 60: 225 - 230, 2004)



Int. J. Radiation Oncology Biol. Phys., Vol. 60, No. 1, pp. 225–230, 2004

0360-3016/04/$–see front matter

ELSEVIER

doi:10.1016/j.ijrobp.2004.02.019

CLINICAL INVESTIGATION Brain

ACOUSTIC NEUROMA RADIOSURGERY WITH MARGINAL TUMOR DOSES OF 12 TO 13 GY

JOHN C. FLICKINGER, M.D.,*† DOUGLAS KONDZIOLKA, M.D.,*† AJAY NIRANJAN, M.CH.,‡
ANN MAITZ, M.S.,‡ GEORGE VOYNOV, M.D.,* AND L. DADE LUNSFORD, M.D.*†§

- 313 pacientes
- Dosis 12 – 13 Gy

- Control tumoral actuarial a 6 años: 98,6 %
- Preservación de N. Facial: 100 %
- Preservación de audición: 78,6 %
- Neuropatía trigeminal: 4,4 %

See the corresponding editorial in this issue, pp 550–556.

J Neurosurg 118:557–565, 2013

Long-term safety and efficacy of stereotactic radiosurgery for vestibular schwannomas: evaluation of 440 patients more than 10 years after treatment with Gamma Knife surgery

Clinical article

Toshinori Hasegawa, M.D., Yoshihisa Kida, M.D., Takenori Kato, M.D., Hiroshi Iizuka, M.D., Shunichiro Kuramitsu, M.D., and Takashi Yamamoto, M.D.

Hasegawa 2013

Estudia diámetros

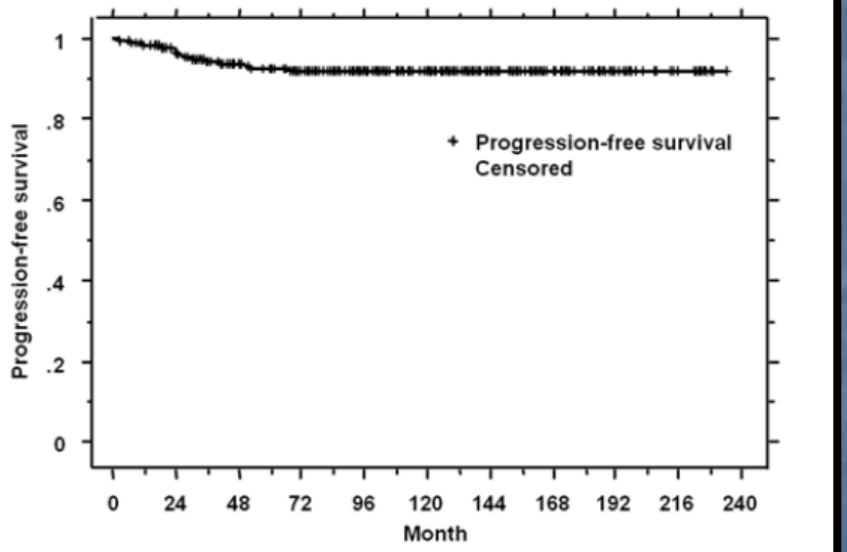


Fig. 2. Kaplan-Meier curve demonstrating PFS in 427 patients in whom follow-up radiological studies were available.

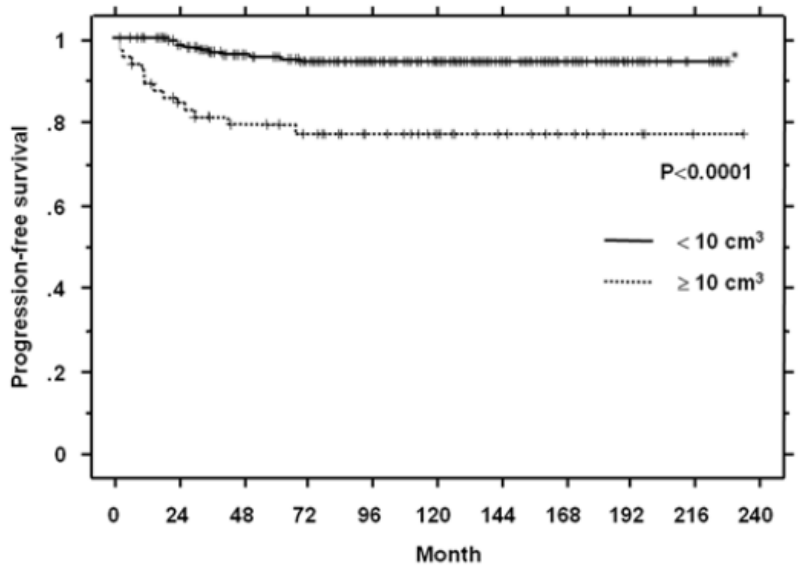


Fig. 3. A comparison of Kaplan-Meier curves showing PFS between patients with Types A, B, or C and Type D tumors **(upper)**, and between patients with tumors < 10 cm^3 and ≥ 10 cm^3 **(lower)**.

Literatura actualizada

▸ Int J Radiat Oncol Biol Phys. Author manuscript; available in PMC: 2022 Sep 15.

Published in final edited form as: Int J Radiat Oncol Biol Phys. 2020 Dec 26;110(1):100–111. doi: 10.1016/j.ijrobp.2020.11.019

Stereotactic Radiosurgery for Vestibular Schwannomas: Tumor Control Probability Analyses and Recommended Reporting Standards

Scott G Soltys [1], Michael T Milano [2], Jinyu Xue [3], Wolfgang A Tomé [4], Ellen Yorke [5], Jason Sheehan [6], George X Ding [7], John P Kirkpatrick [8], Lijun Ma [9], Arjun Sahgal [10], Timothy Solberg [11], John Adler [12], Jimm Grimm [13,14], Issam El Naqa [15]

Conclusions

With current typical SRS doses of 12 Gy in 1 fraction, 18 Gy in 3 fractions, and 25 Gy in 5 fractions, 3- to 5-year TCP exceeds 91%. To

CNS Neurosurgery

VESTIBULAR SCHWANNOMA GUIDELINES

Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Radiosurgery and Radiation Therapy in the Management of Patients With Vestibular Schwannomas

Germano, Isabelle M MD; Sheehan, Jason MD, PhD; Parish, Johnathan MD; Atkins, Tyler MD; Asher, Anthony MD; Hadjipanayis, Constantinos G MD, PhD; Burri, Stuart H MD; Green, Sheryl MBBCh; Olson, Jeffrey J MD

Author Information

Neurosurgery 82(2):p E49-E51, February 2018. | ***DOI:*** 10.1093/neuros/nyx515

Question

Is there a difference in outcome based on the number of fractions?

Recommendation

As there is no difference in radiographic control and clinical outcome using single or multiple fractions, no recommendations can be given.

Question

Is there a difference in outcome based on radiosurgery equipment used: Gamma Knife (Elekta, Stockholm, Sweden) vs linear accelerator-based radiosurgery vs proton beam?

Recommendation

There are no studies that compare 2 or all 3 modalities. Thus, recommendations on outcome based on modality cannot be made.

Meta-Analysis

Treatment for vestibular schwannoma: Systematic review and single arm meta-analysis

Nghia Le Ba Thai et al. Am J Otolaryngol. 2022 Mar-Apr.

Conclusion: Our analysis suggested gamma knife radiosurgery could be the most ideal treatment for vestibular schwannoma based on stabilizing hearing capability, increasing hearing capability,

NEUROSURGERY
THE REGISTER OF THE NEUROSURGICAL MEME

Neurosurgery. 2023 Feb 3;92(6):1130–1141. doi: 10.1227/neu.0000000000002354

Long-Term Hearing Outcome After Radiosurgery for Vestibular Schwannoma: A Systematic Review and Meta-Analysis

Anne Balossier [‡,§,✉], Constantin Tuleasca [‖,¶,#], Christine Delsanti [‡], Lucas Troude [**], Jean-Marc Thomassin [††], Pierre-Hugues Roche [**], Jean Régis [‡,§]

Author information · Article notes

PMCID: PMC10150847 PMID: 36735500

CONCLUSION:

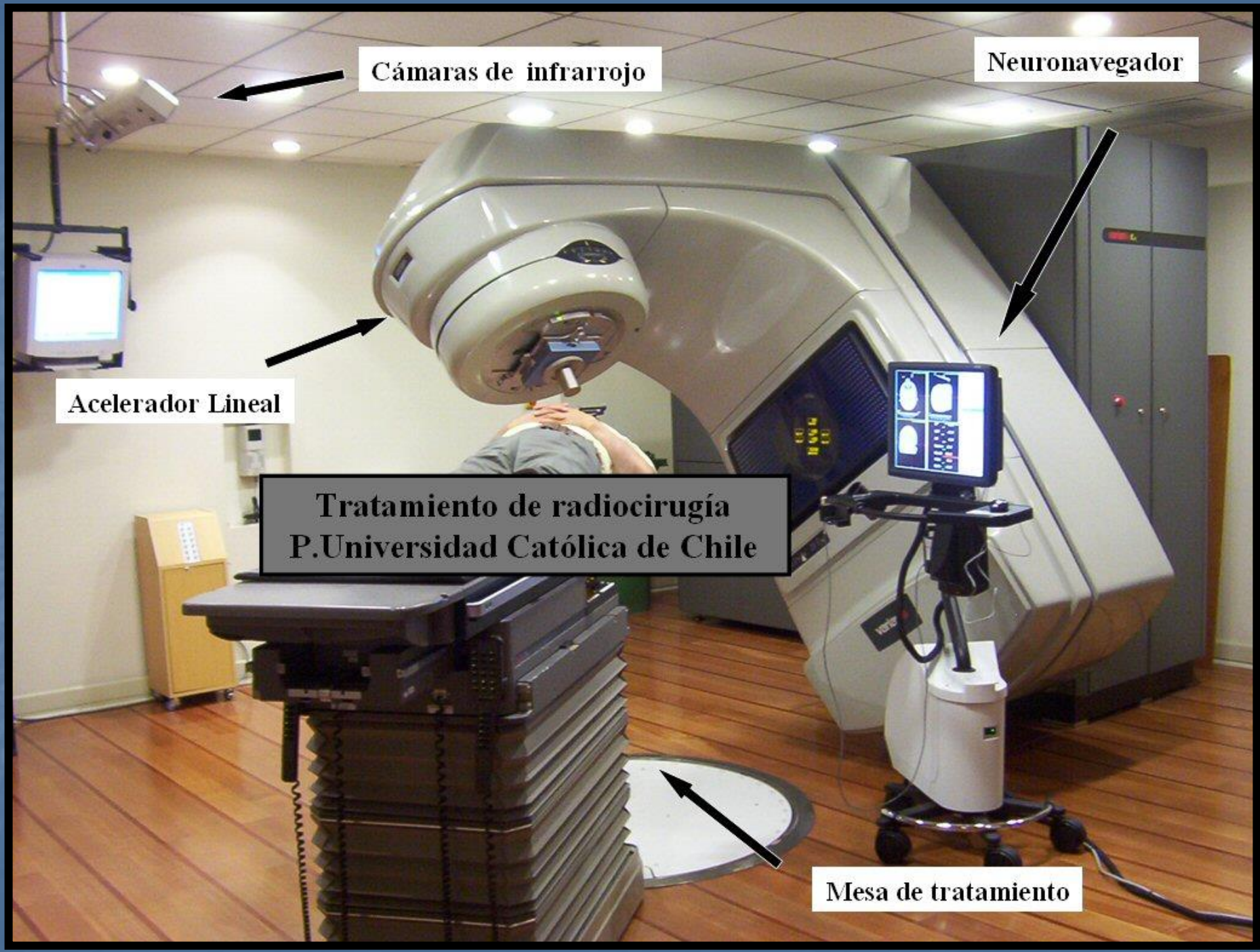
Long-term hearing preservation remains one of the main issues after SRS, with a major impact on health-related quality of life. Our meta-analysis suggests that hearing preservation can be achieved in almost 60% of patients after a median follow-up of 6.7 years, irrespective of the technique.

Experiencia personal

Período 1

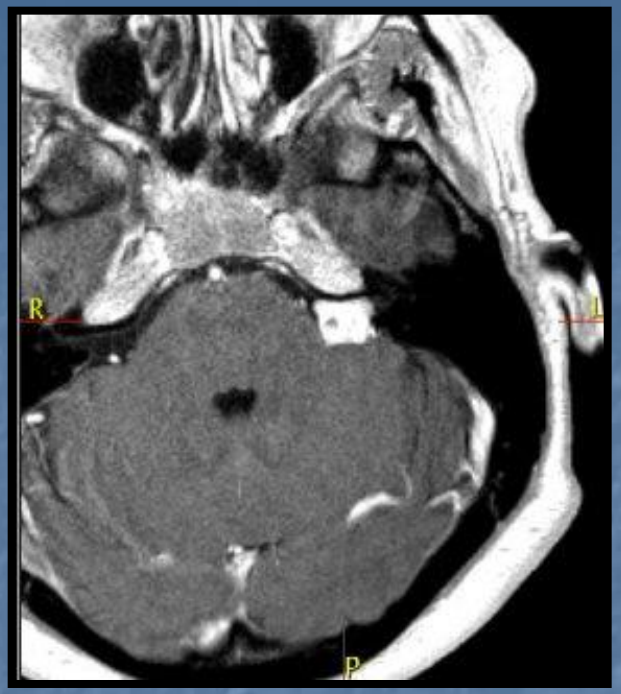
- **Marzo 2006 – Julio 2011**
- **52 pacientes consecutivos**
- **radiocirugía con acelerador lineal (conos).**
- **Centro de cáncer P. U. católica de Chile**

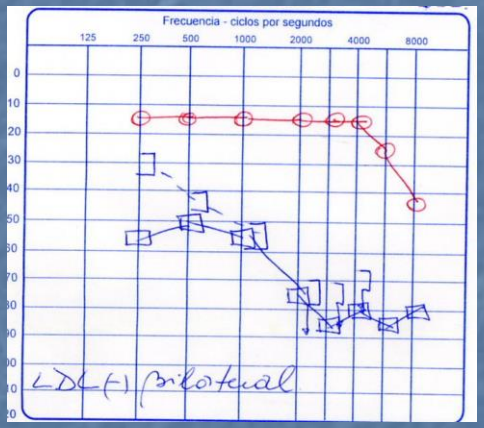
- **dosis 12,5 Gray.**
- **volumen tumoral al tratamiento y seguimiento**
- **software OSIRIX y OROS.**


Cámaras de infrarrojo
Neuronavegador
Acelerador Lineal
Tratamiento de radiocirugía
P.Universidad Católica de Chile
Mesa de tratamiento

Caso 1

- Mujer
- 44 años
- Vértigos
- Hipoacusia
- Tinitus

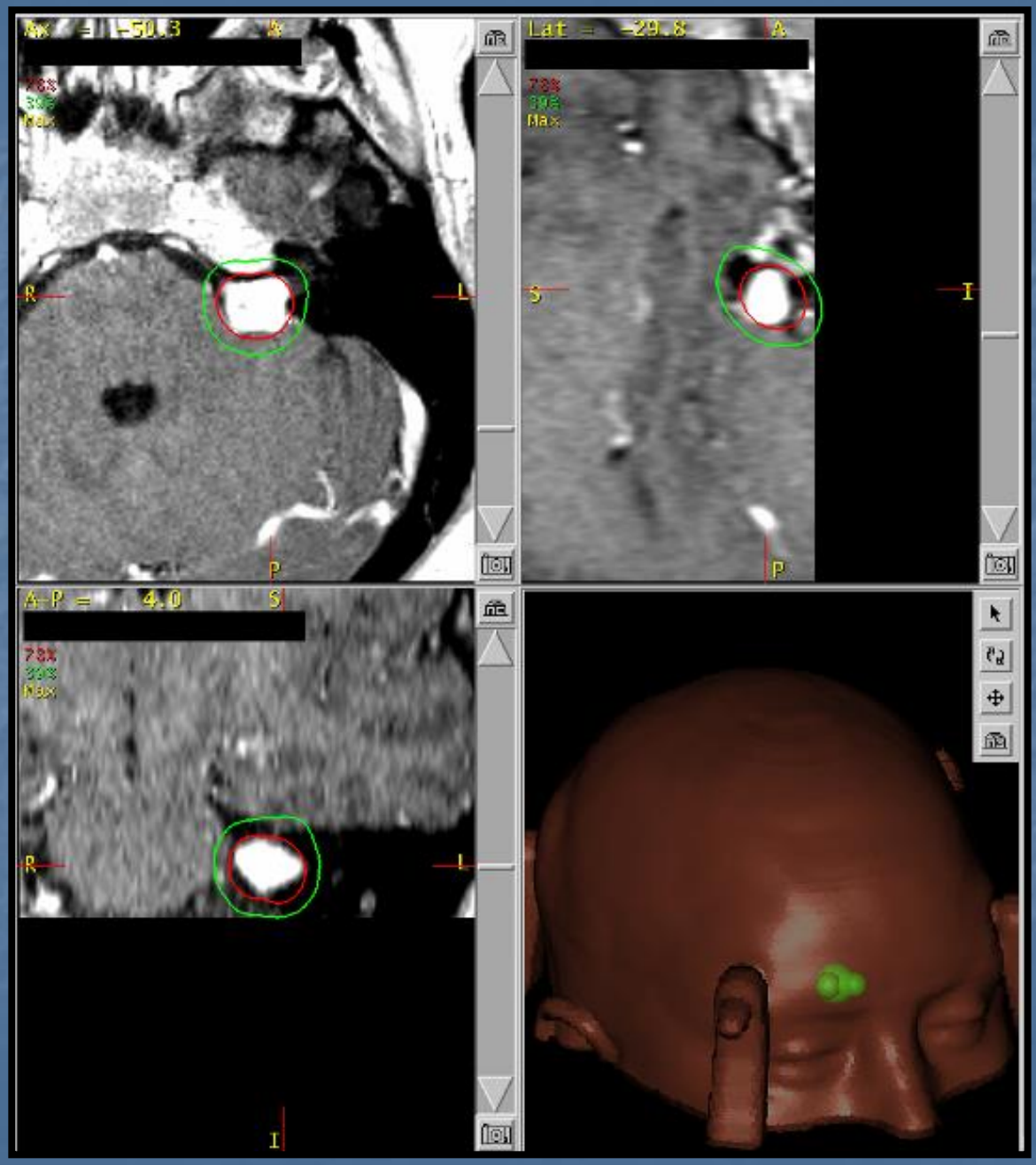




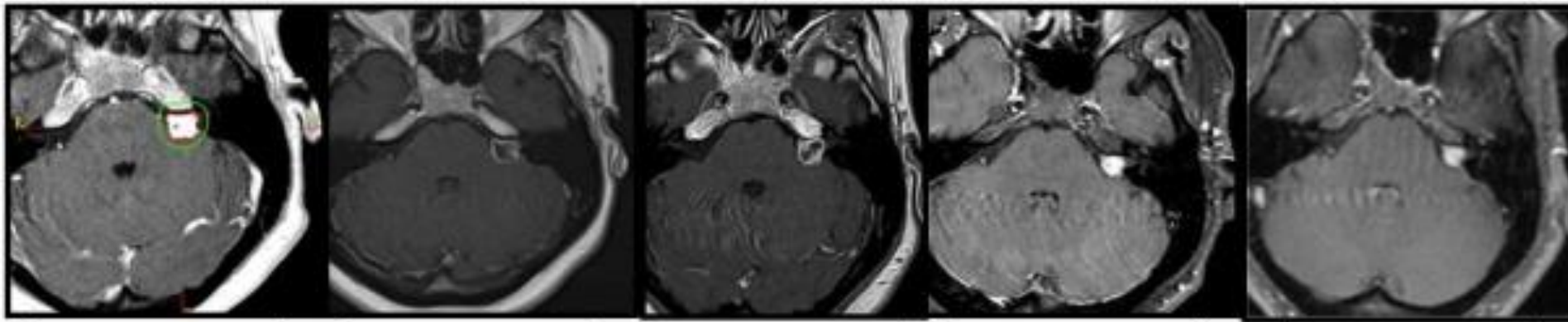
Discriminación: 96%

G-R: 3

Caso 1



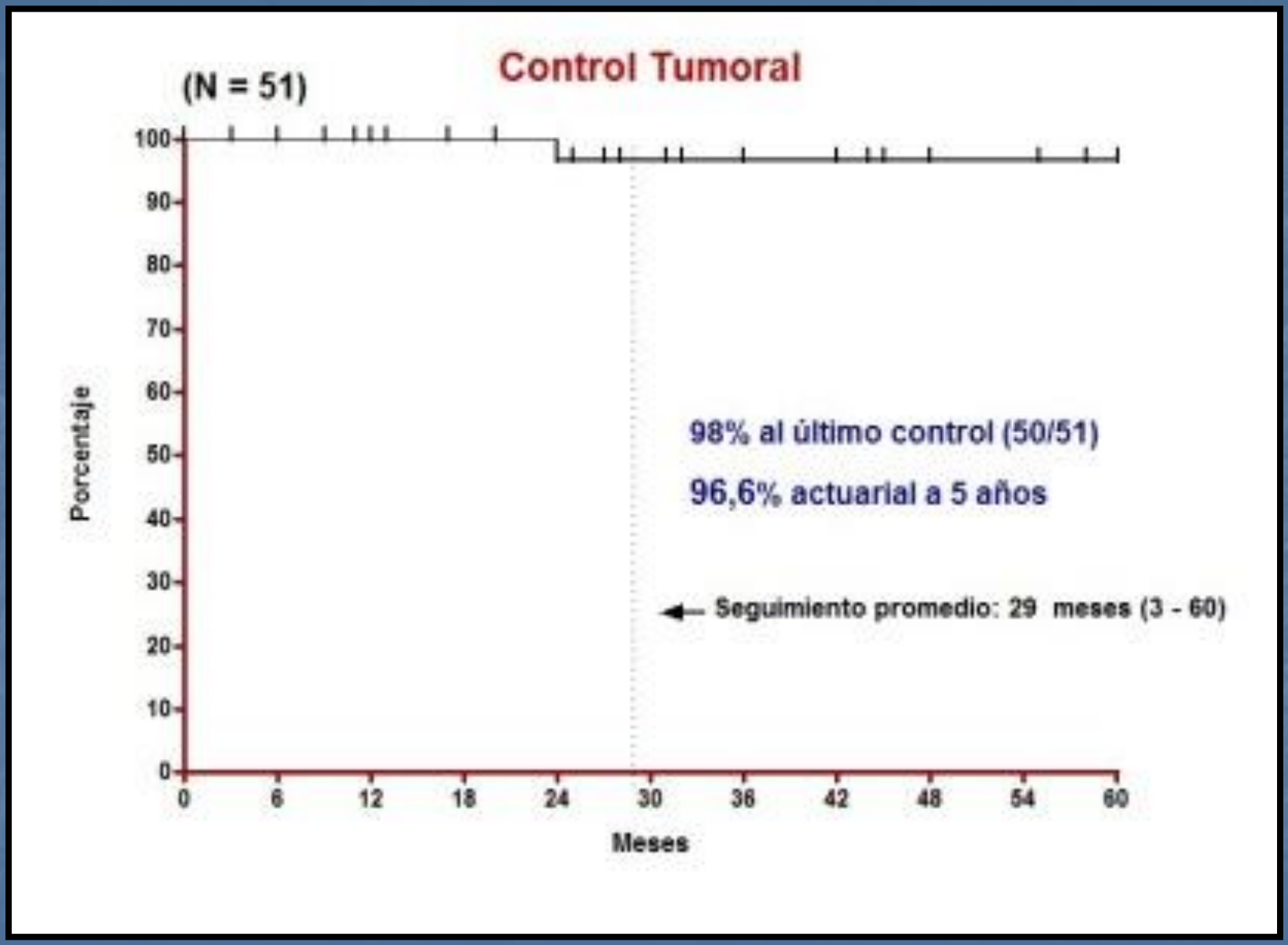
Caso 1



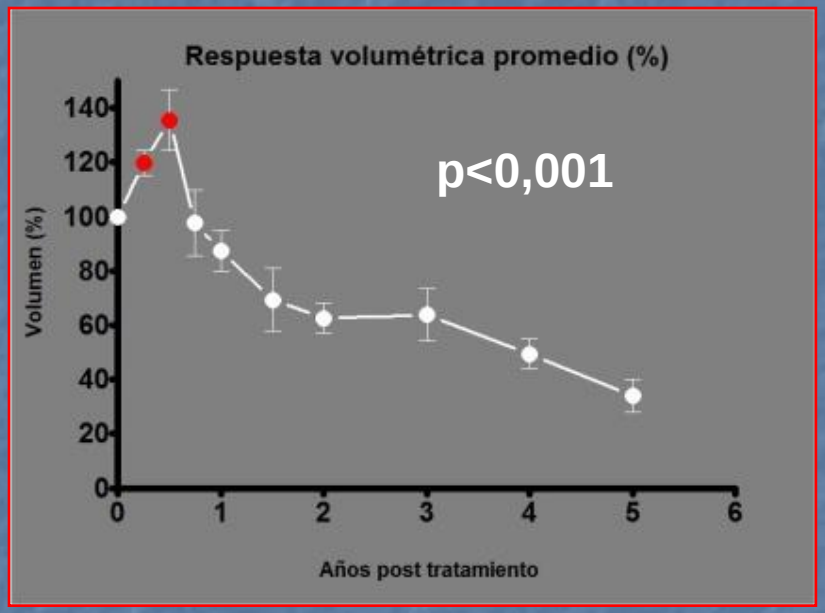
Tratamiento	6 meses	1 año	2 años	4 años
0,76 cc	0,88 cc	0,74cc	0,47 cc	0,44 cc
100%	116%	98%	63%	58%

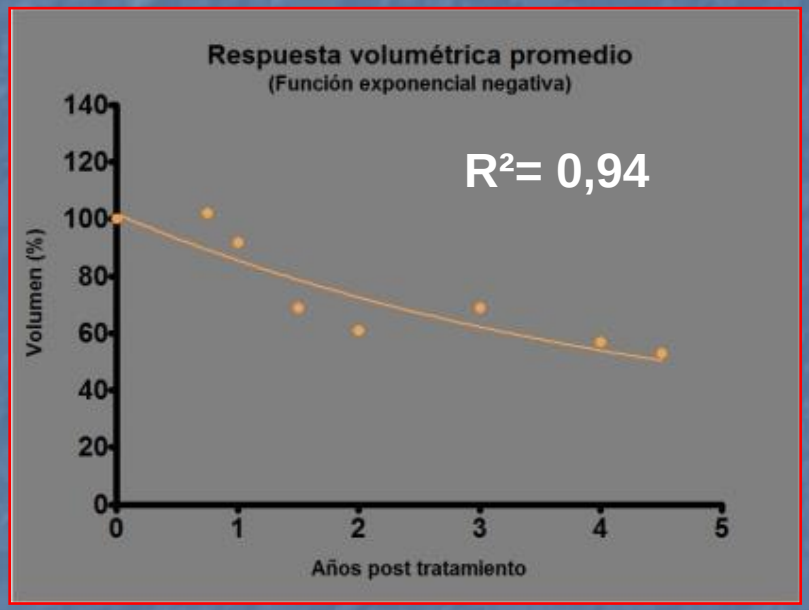
RESULTADOS PRELIMINARES

- Seguimiento clínico promedio 14 años (11,5 – 16,6)
- Seguimiento radiológico a 5 años.
- 2 paciente perdidos de seguimiento radiológico
- Un paciente (2%) presentó crecimiento tumoral progresivo. (Requirió cirugía)

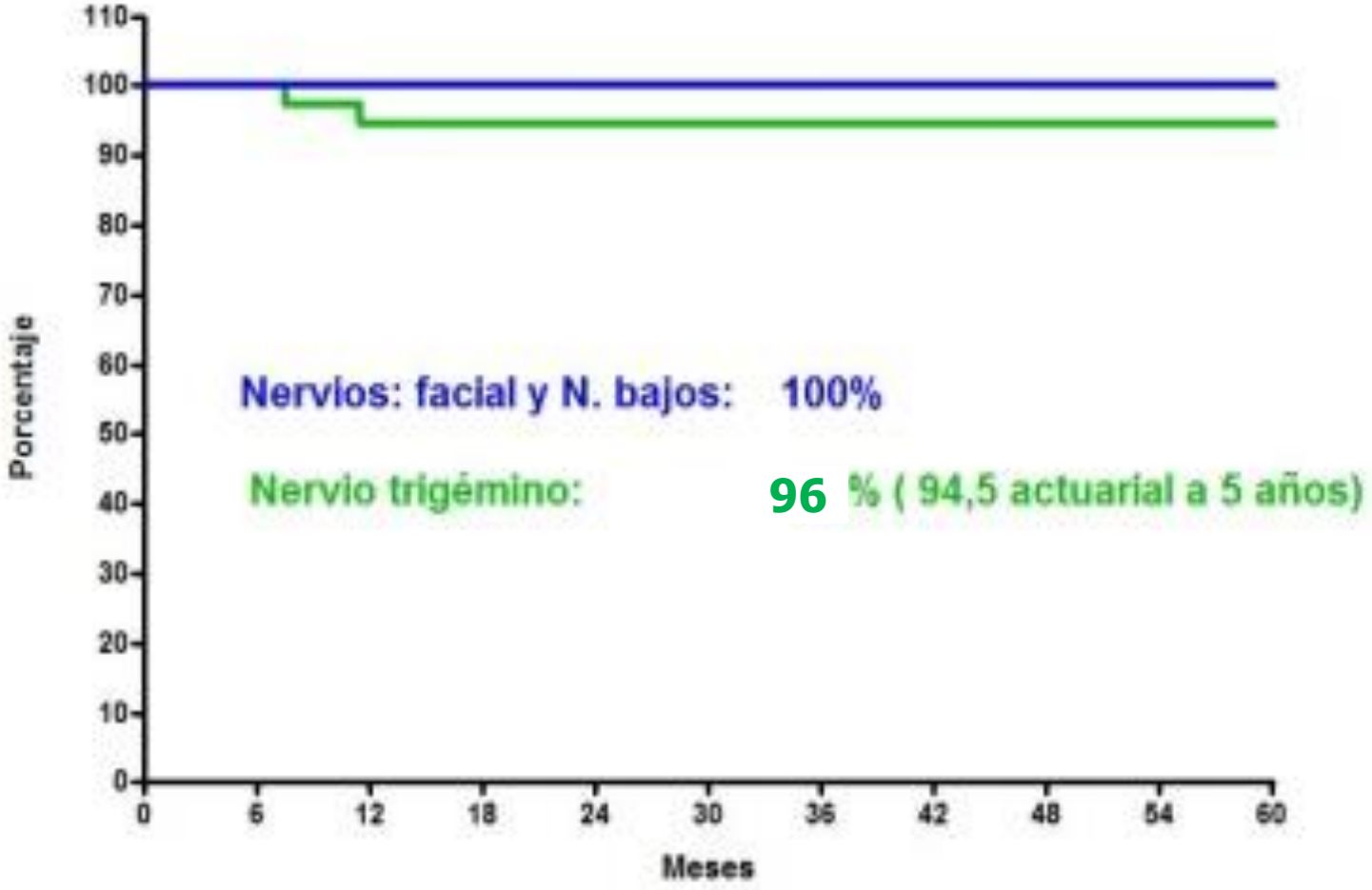

Control Tumoral
(N = 51)
Porcentaje
100
90
80
70
60
50
40
30
20
10
0
0
6
12
18
24
30
36
42
48
54
60
Meses
98% al último control (50/51)
96,6% actuarial a 5 años
Seguimiento promedio: 29 meses (3 - 60)


Respuesta volumétrica promedio
160
140
120
100
80
60
40
20
0
%
0
12
24
36
48
60
Meses


Respuesta volumétrica promedio (%)
p<0,001
Volumen (%)
140
120
100
80
60
40
20
0
0
1
2
3
4
5
6
Años post tratamiento

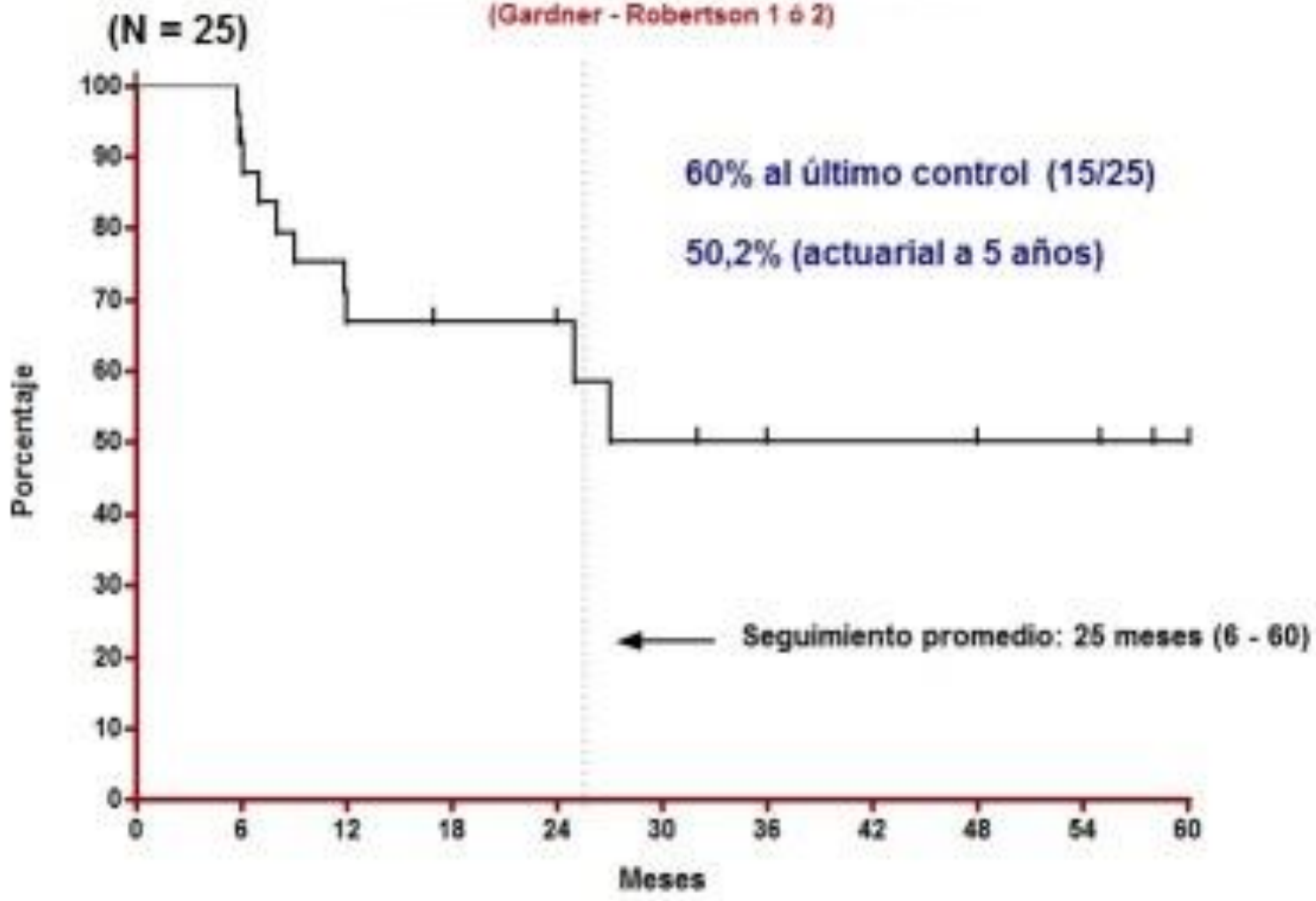

Respuesta volumétrica promedio
(Función exponencial negativa)
R²= 0,94
Volumen (%)
140
120
100
80
60
40
20
0
0
1
2
3
4
5
Años post tratamiento

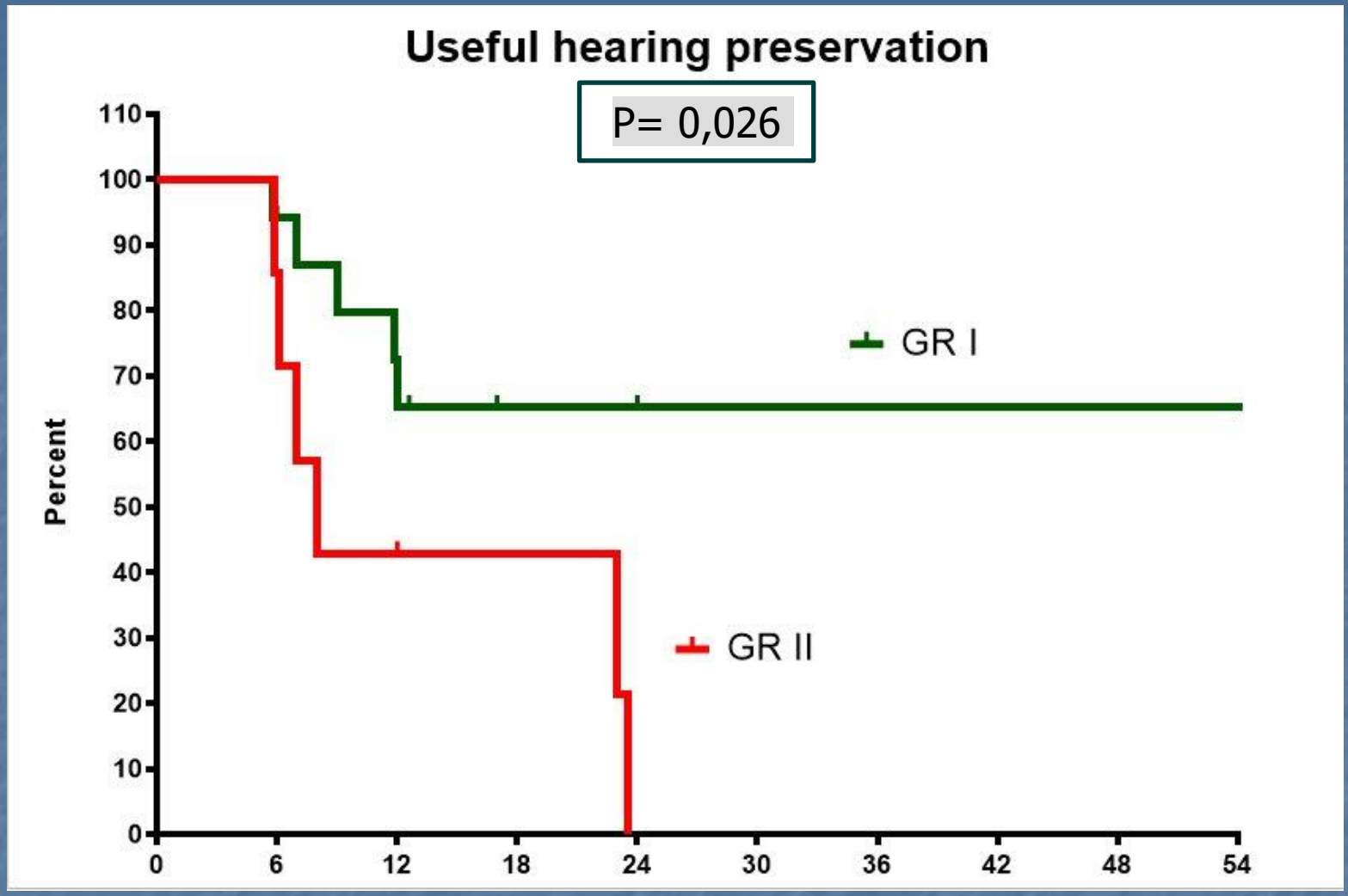
Preservación de la función de nervios craneanos



Preservación de audición útil

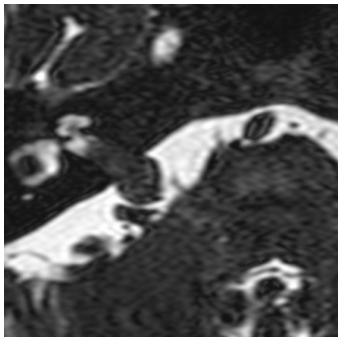
(Gardner - Robertson 1 ó 2)

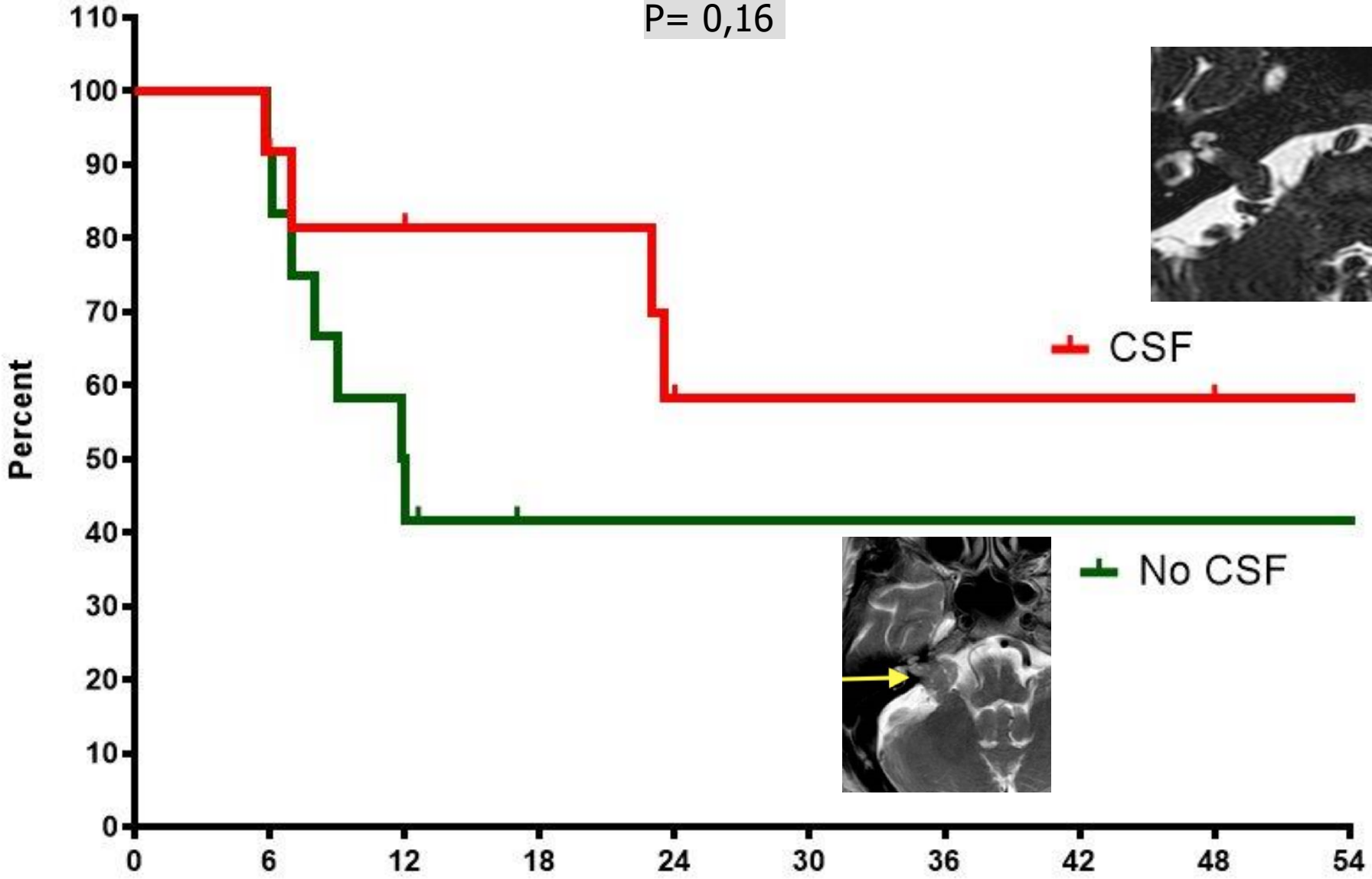



Useful hearing preservation
P= 0,026
Percent
110
100
90
80
70
60
50
40
30
20
10
0
0
6
12
18
24
30
36
42
48
54
GR I
GR II

Useful hearing preservation

P= 0,16





Período 2

Experiencia en Gamma Knife Chile

2011 - 2018

Gamma Knife Experiencia 2011 - 2018

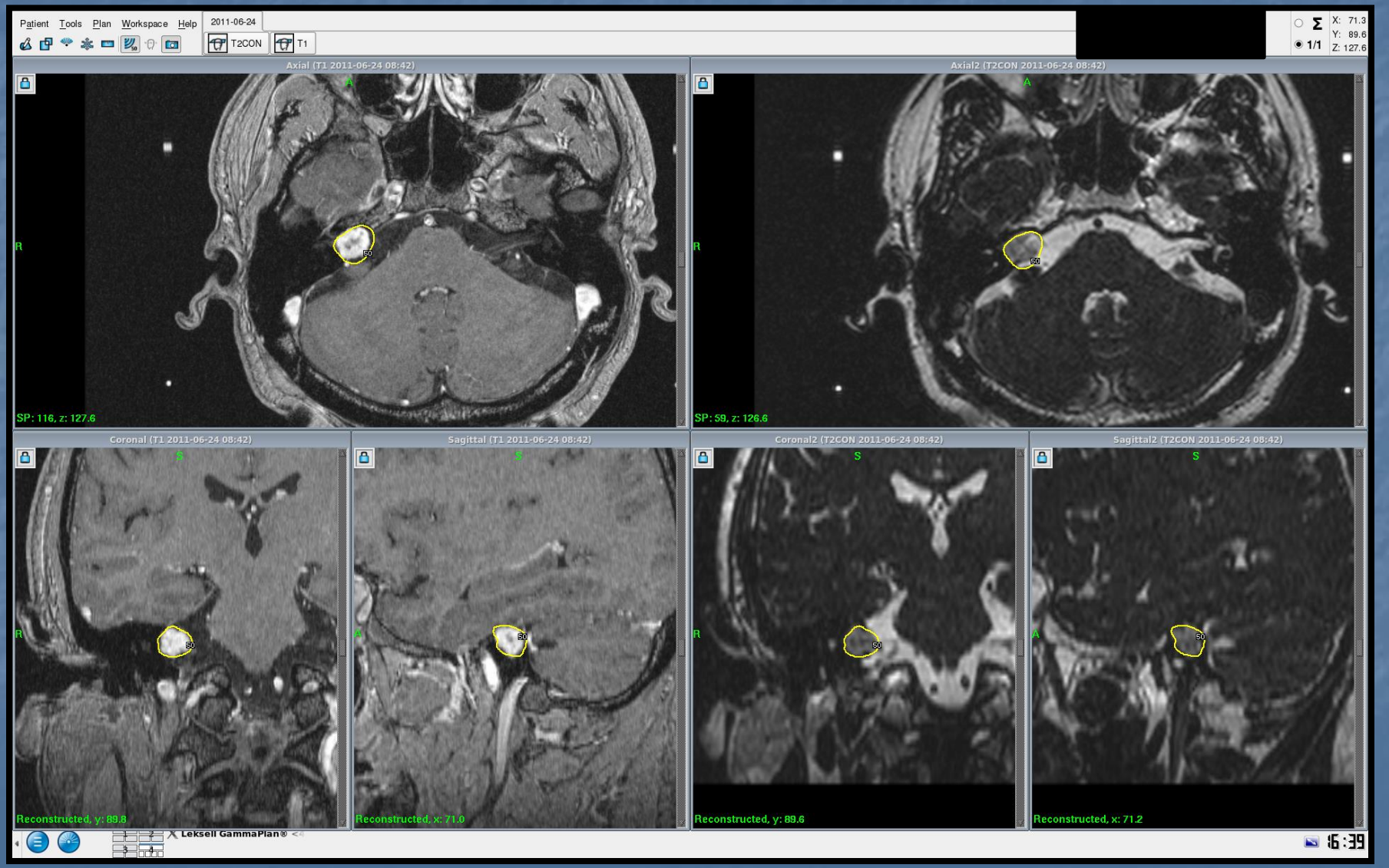
110 schwanomas vestibulares

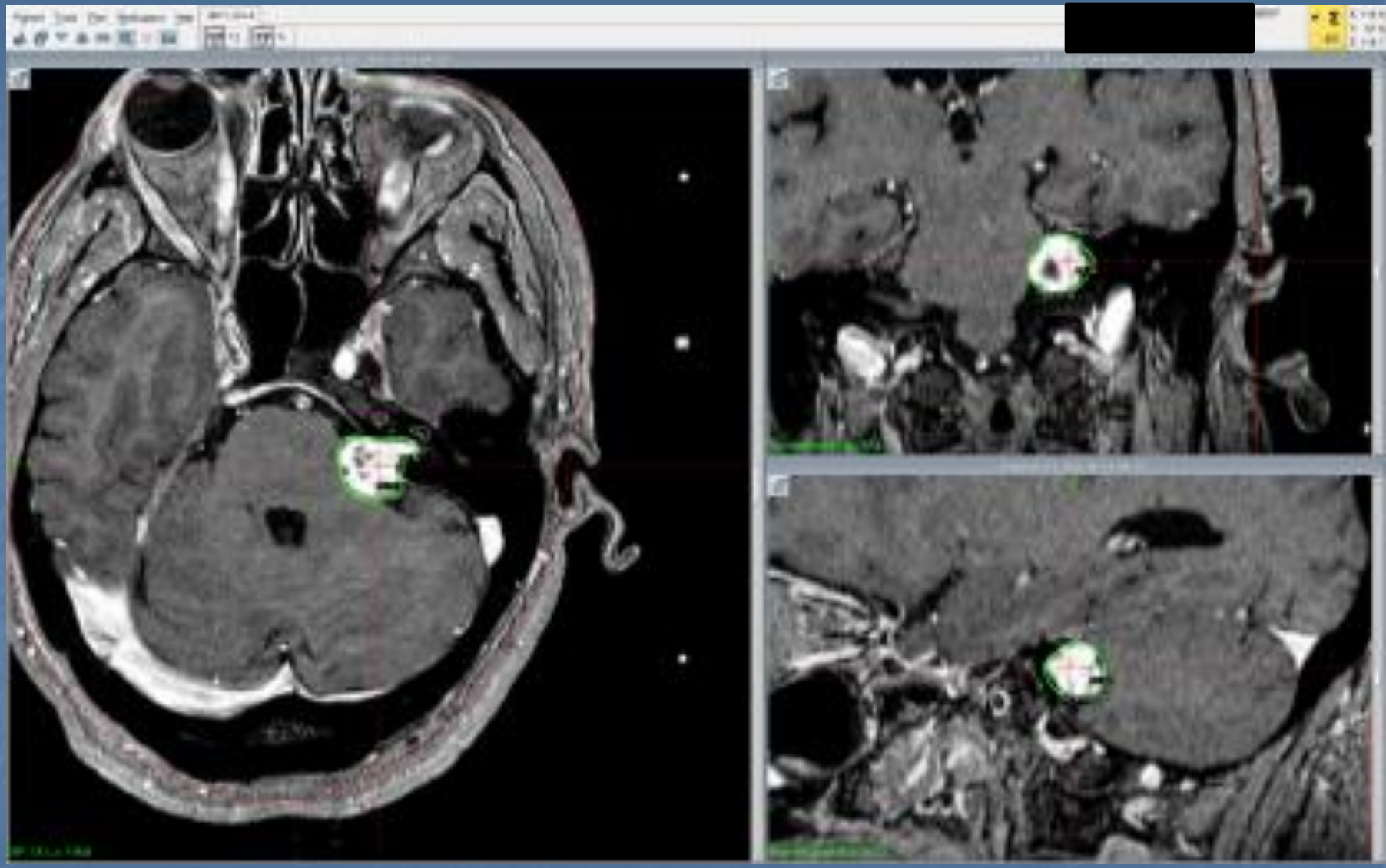
Dosis única 12,5 Gy

Control tumoral :	106/110	(96%)
Parálisis facial:	1/110	(0,9%)

Audición no tabulada

Experiencia local (Schwanoma vestibular)





Período 3
LINAC VMAT (2019 – 2025)

82 schwanomas vestibulares

Dosis única 12,5 Gy, Hipofraccionado 25Gy/5 Fx

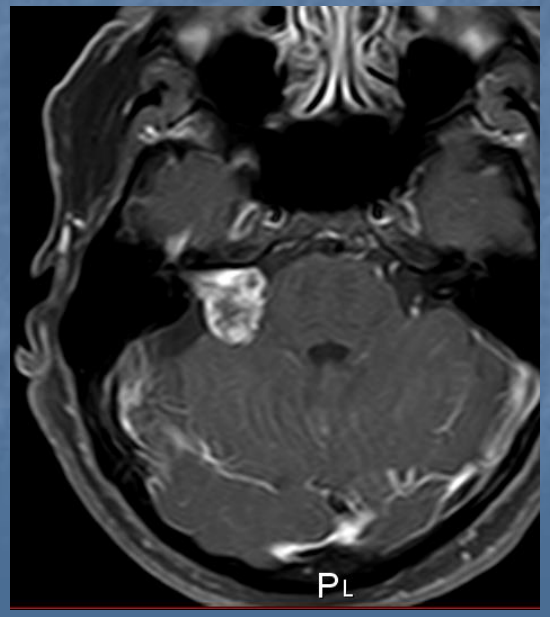
Control tumoral : 82/82 (100%)

Parálisis facial: 1/82 (1,2%)

Audición no tabulada

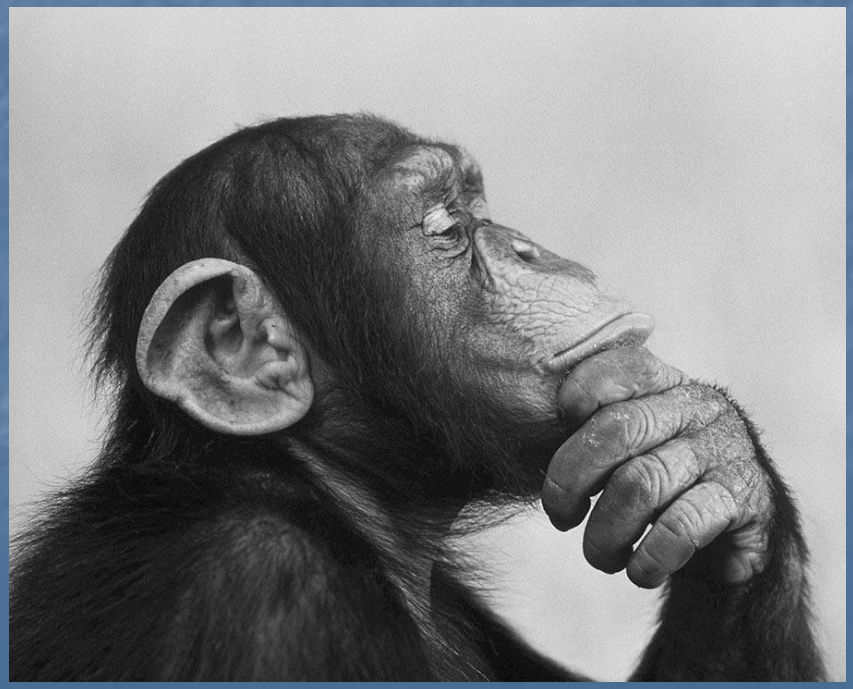

vms_srs:0
Ax = -30.1 A
VALENZUELA_ROJAS_CARLOS_HERNAN
35%
70%
Max
R
P


GADOLINIO
P


PL

Dudas y escepticismo

- Tiempo de tratamiento (VMAT)
- Dosis a la cóclea y audición…



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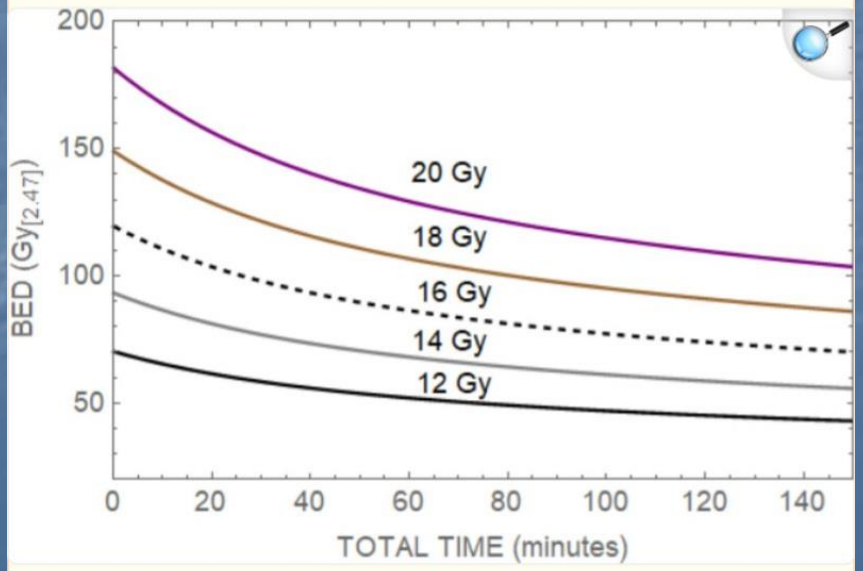
▸ Br J Radiol. 2018 Aug 21;92(1093):20180111. doi: 10.1259/bjr.20180111

Modelling the influence of treatment time on the biological effectiveness of single radiosurgery treatments: derivation of "protective" dose modification factors

Bleddyn Jones [1,2,1,2,✉], John W Hopewell [2]

Figure 2.



Hearing preservation after Gamma Knife radiosurgery for cerebellopontine angle meningiomas

Amr M N El-Shehaby et al. J Neurosurg. 2018.

Hearing outcome is better with CPA meningiomas than with VSs. Further long-term prospective

Radiosurgery for para-IAC meningiomas: the effect of radiation dose to the cochlea on hearing outcome

Young-Hoon Kim et al. Int J Radiat Oncol Biol Phys. 2012.

Conclusions: The radiation dose to the cochlea may have the minimal toxic effect on the hearing outcome in patients who undergo radiosurgery for para-IAC meningiomas.

Impact of cochlear modiolus dose on hearing preservation following stereotactic radiosurgery for non-vestibular schwannoma neoplasms of the lateral skull base: a cohort study

Lucas P Carlstrom et al. J Neurosurg. 2019.

hearing loss appear to vary by pathology, with paragangliomas and petroclival meningiomas demonstrating decreased risk of hearing loss compared to CPA meningiomas that may directly compress the cochlear nerve similarly to VS.

MUCHAS

GRACIAS