Associazione Italiana
Radioterapia Oncologica
Gruppo Interregionale
Lazio/Abruzzo/Molise

Le terapie di supporto in Radioterapia:
Verso una Guida Pratica
Lunedì 4 Dicembre 2017
Centro Studi Cardello
Via del Cardello 24 – Roma

Presidi di prevenzione e trattamento

Silvia Chiesa

Gemelli
Fondazione Policlinico Universitario A. Gemelli
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ART
Advanced Radiation Therapy

Bullet point

- ❑ Edema cerebrale
- ❑ Danno neurocognitivo
- ❑ Alopecia

Bullet point

- Edema cerebrale

  Quale farmaco?
  Quale efficacia?
  Quale dose?
  Presidi di prevenzione e trattamento
  Keep in mind!

Edema cerebrale: Quale farmaco?

Terapia cortisonica

Diuretici osmotici

- Galicich JH, French LA, Melby JC. *Use of dexamethasone in treatment of cerebral edema associated with brain tumors*. Lancet. **1961**; 81:46–53.
- Bell BA, Smith MA, Kean DM, et al. *Brain water measured by magnetic resonance imaging. Correlation with direct estimation and changes after mannitol and dexamethasone*. Lancet. **1987**; 1(8524):66–69. [PubMed: 2879175]

Grado di raccomandazione: **B**

1960

Terapia cortisonica: DESAMETASONE → Diuretici osmotici: Mannitolo

- Galicich JH, French LA, Melby JC. *Use of dexamethasone in treatment of cerebral edema associated with brain tumors*. Lancet. **1961**; 81:46–53.

- Bell BA, Smith MA, Kean DM, et al. *Brain water measured by magnetic resonance imaging. Correlation with direct estimation and changes after mannitol and dexamethasone*. Lancet. **1987**; 1(8524):66–69. [PubMed: 2879175]

Grado di raccomandazione: **B**

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Terapia cortisonica: DESAMETASONE → Diuretici osmotici: Mannitolo

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- Bell BA, Smith MA, Kean DM, et al. *Brain water measured by magnetic resonance imaging. Correlation with direct estimation and changes after mannitol and dexamethasone*. Lancet. **1987**; 1(8524):66–69. [PubMed: 2879175]

Grado di raccomandazione: **B**

- Maggiore potere antinfiammatorio
- Attività mineralcorticoide nulla o trascurabile
- Emivita 24-48h

1970

24-48 h!

DESAMETASONE → MANNITOLO

- Miller JD, Leech P. Effects of mannitol and steroid therapy on intracranial volume–pressure relationships in patients. J Neurosurg. **1975**; 42(3):274–281. [PubMed: 1117324]

- Miller JD, Sakalas R, Ward JD, et al. Methylprednisolone treatment in patients with brain tumors. Neurosurgery. **1977**; 1(2):114–117. [PubMed: 210416]

- Yeung WT, Lee TY, Del Maestro RF, Kozak R, Bennett J, Brown T. Effect of steroids on iopamidol blood–brain transfer constant and plasma volume in brain tumors measured with x-ray computed tomography. J Neurooncol. **1994**; 18(1):53–60. [PubMed: 8057135]

Grado di raccomandazione: **B**

DESAMETASONE

Randomizzato

- Vecht CJ, Hovestadt A, Verbiest HB, van Vliet JJ, van Putten WL. *Dose–effect relationship of dexamethasone on Karnofsky performance in* **metastatic *brain tumors***: *a randomized study of doses of **4, 8, and 16** mg per day*. Neurology. **1994**; 44(4):675–680. [PubMed: 8164824]

  1+

The only randomized trial addressing the optimal therapeutic dosage of dexamethasone found the same degree of neurologic improvement at 4, 8, or 16 mg/day [8, Class I].

Prospettici

- Wolfson AH, Snodgrass SM, Schwade JG, et al. *The role of steroids in the management of **metastatic carcinoma** to the brain. A pilot prospective trial*. Am J Clin Oncol **1994**; 17:234–238

  2+

- Marantidou A, Levy C, Duquesne A, et al. *Steroid requirements during radiotherapy for **malignant gliomas***. J Neurooncol. **2010**; 100(1):89–94. [PubMed: 20186461

  2+

DESAMETASONE

Retrospettivo

- Hempem C., Weiss E., Hess CF *Dexamethasone treatment in patients with brain metastases and primary brain tumors: do the benefit outweight the side effect?* Support Care Cancer 2002: 10(4): 322-324 Retrospective

1-

Sistematic review and Practice guidelines

- Soffietti R, Cornu P, Delattre JY et al (2006) **EFNS guidelines** on diagnosis and treatment of brain metastases: report of an EFNS task force. Eur J Neurol 13(7): 674–681

2+

- Ryken TC, McDermott M, Robinson PD, et al. *The role of steroids in the management of brain metastases: a **systematic review** and **evidence-based clinical practice guideline**.* J Neurooncol 2010; 96:103–114

2+

- Gaspar LE, Gutin PH, Rogers L, et al (2000) Pre-irradiation evaluation and management of brain metastases. **American College of Radiology. ACR** appropriateness criteria. Radiology 215(Suppl):1105–1110

2+

- National Comprehensive Cancer Network (nccn). **NCCN Clinical Practice Guidelines** in Oncology: Central Nervous System Tumours. Ver. 2.**2017**. Fort Washington, PA: nccn; 2017. [Current version available online at https://www.nccn.org/professionals/physician_gls/default.aspx)

2+

Patient selection

	Desametasone
Asyntomatic (G0-1)	**None**
Mild symptom (G1)	**4-8 mg/day**
Severe symptom (G3)	**8-16 mg/day**

Grado di raccomandazione: C

DESAMETASONE

Clinical practice guidelines

TABLE III Recommendations for dexamethasone dosing from published clinical practice guidelines.

Guideline developer	*Recommendations*
American College of Radiology, 1999[10]	For patients with minimal neurologic symptoms, the committee recommends starting either with 4–8 mg dexamethasone daily or with 16 mg dexamethasone daily, but tapering after a few days. In all cases, steroids should be tapered as clinically indicated and tolerated.
BC Cancer Agency, 2004[15]	Dexamethasone is most commonly used in a dose range of 2–16 mg daily (divided dosing of 2 or more times daily) depending on symptom severity. In emergent situations, higher doses of dexamethasone may be used, and mannitol may also be used. During radiation therapy, a tapering dose of dexamethasone, as clinically tolerated (to alleviate symptoms of brain edema), is prescribed, and the lowest effective dose is used. After completion of radiation therapy, the dexamethasone is usually tapered and discontinued over 2–4 weeks.
Australian Cancer Network, 2009[16]	The usual starting dose is 16 mg daily. Dexamethasone should gradually be tapered to the lowest dose that controls the patient's symptoms; dexamethasone should not be discontinued abruptly.
U.S. National Comprehensive Cancer Network, 2013[17]	In general, the lowest dose of steroids should be used for the shortest time possible. Downward titration of the dose should be attempted whenever possible.

CURRENT ONCOLOGY—VOLUME 21, NUMBER 3, JUNE 2014 | 2+

Review

Steroids in neurooncology: actions, indications, side-effects 2+

Patrick Roth[a], Wolfgang Wick[b] and Michael Weller[a]

Current Opinion in Neurology 2010, 23:597–602

Patient selection

	Desametasone
Asyntomatic (G0-1)	None
Mild symptom (G1)	**4-8 mg/day**
Severe symptom (G3)	**8-16 mg/day**

Grado di raccomandazione: **C**

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Patient selection

	Desametasone
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Mild symptom (G1)	**4-8 mg/day**
Severe symptom (G3)	**8-16 mg/day**
Prophylactic use ?	No concluding guidelines

Grado di raccomandazione: **C**

DESAMETASONE

National Comprehensive Cancer Network®

NCCN Guidelines Version 1.2017
Central Nervous System Cancers

NCCN Guidelines Index
Table of Contents
Discussion

PRINCIPLES OF BRAIN TUMOR MANAGEMENT (2 of 3)

Medical Management

1. Corticosteroids
   - Steroid therapy should be carefully monitored. If a patient is asymptomatic, steroids may be unnecessary. Careful questioning for subtle symptoms should be undertaken if edema is extensive on imaging. In general, the lowest dose of steroids should be used for the shortest time possible.[2] Downward titration of the dose should be attempted whenever possible. Patients with extensive mass effect should receive steroids for at least 24 h before radiation therapy. Patients with a high risk of GI side effects (perioperative patients, prior history of ulcers/ GI bleed, receiving NSAIDS or anticoagulation) should receive H_2 blockers or proton pump inhibitors. Care should be taken to watch for development of steroid side effects.[3]

	Desametasone
Asyntomatic (G0-1)	None
Mild symptom (G1)	**4-8 mg/day**
Severe symptom (G3)	**8-16 mg/day**

Grado di raccomandazione: **C**

Presidi di prevenzione

Asintomatico

No terapia di profilassi
RL: C

Lesione edemigena, sintomatica, con effetto massa significativo

Somministrazione terapia cortisonica 24 h prima dell'inizio della radioterapia e a seguire
RL: C

Principio attivo: desametasone
Nome commerciale: soldesam

Dosaggio minimo efficace: 4-8mg/die
RL: C

N.B. Somministrare la dose efficace più bassa per il minor tempo possibile

RL: livello di raccomandazione

Presidi di prevenzione

Asintomatico

No terapia di profilassi

RL: C

Lesione edemigena, sintomatica, con effetto massa significativo

Somministrazione terapia cortisonica 24 h prima dell'inizio della radioterapia e a seguire

RL: C

Radiochirurgia

RL: livello di raccomandazione

Presidi di prevenzione

Survey

Table 2 Respondent recommendations on corticosteroid use for single-fraction SRS

Recommendation	No. of physicians agreeing (%) [a]
Corticosteroids should be administered prophylactically for patients undergoing SRS	
Always	37 (33.0)
Usually	22 (19.6)
Sometimes	32 (28.6)
Rarely	14 (12.5)
Never	7 (6.3)
Corticosteroid medication recommended for use with SRS	
Dexamethasone	99 (95.2)
Methylprednisolone	4 (3.8)
Prednisone	1 (1.0)
Maximum daily dose of prophylactic corticosteroids used with SRS (dexamethasone equivalent, in mg)	
Median (range)	8 (4-40)
Duration of prophylactic corticosteroid use recommended for SRS (d)	
1-3	30 (29.1)
4-6	20 (19.4)
7-14	34 (33.0)
15-21	16 (15.5)
>21	3 (2.9)

Steroid and anticonvulsant prophylaxis for stereotactic radiosurgery: Large variation in physician recommendations

Nils D. Arvold MD [a, b], Nancy E. Pinnell BA [a], Anand Mahadevan MD [b, c], Sheila Connelly RN, BSN, OCN [a], Rachel Silverman RN, BSN, OCN [a], Stephanie E. Weiss MD [d], Paul J. Kelly MB, FFR, RCSI [e], Brian M. Alexander MD, MPH [a, b,*]

[a]*Department of Radiation Oncology, Dana-Farber/Brigham & Women's Cancer Center, Boston, Massachusetts*

Practical Radiation Oncology (2015)

Radiochirurgia

There was broad agreement on **dexamethasone** as the choice of corticosteroid.
There are **no clear guidelines** regarding appropriate prophylactic use of corticosteroid and anticonvulsivant for patients undergoing SRS.
There is **extreme variation in physician** recommendations.

Inconsistent data in the literature regarding the actuarial risk of neurologic toxicities following SRS

Presidi di prevenzione

Asintomatico

No terapia di profilassi
RL: C

Lesione edemigena, sintomatica, con effetto massa significativo

Somministrazione terapia cortisonica 24 h prima dell'inizio della radioterapia e a seguire
RL: C

Radiochirurgia

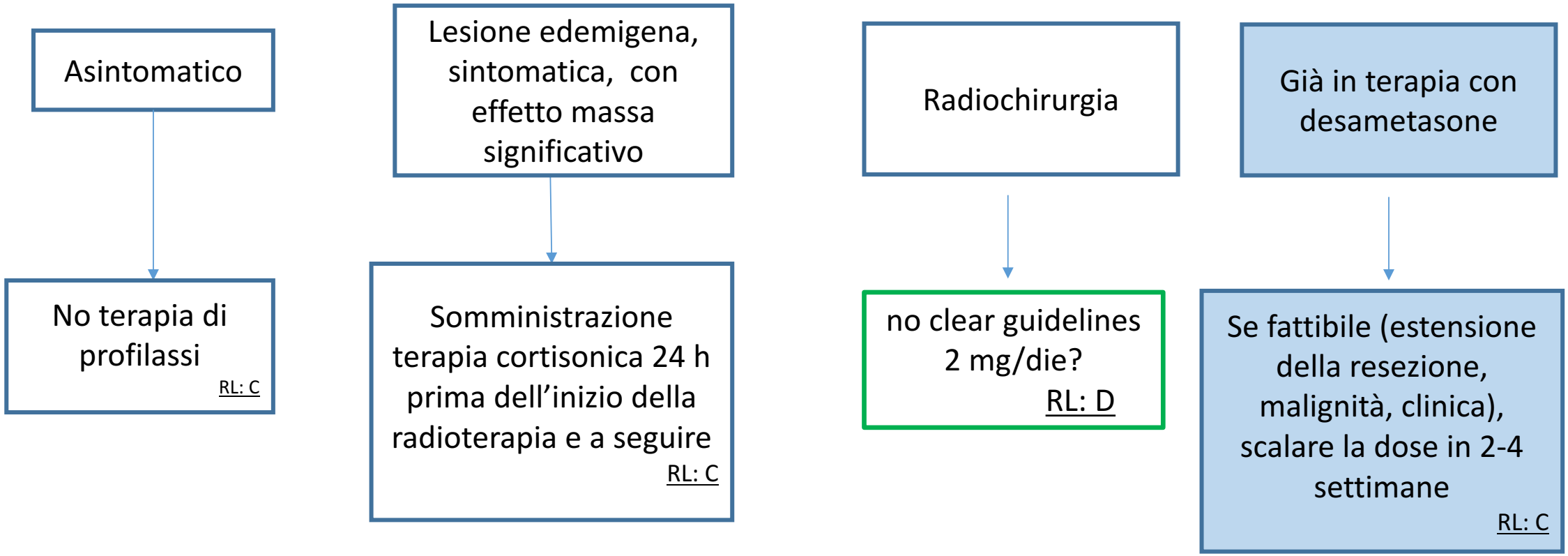
no clear guidelines
2 mg/die?
RL: D

Già in terapia con desametasone

Se fattibile (estensione della resezione, malignità, clinica), scalare la dose in 2-4 settimane
RL: C

RL: livello di raccomandazione

Presidi di prevenzione



RL: livello di raccomandazione

Presidi di trattamento

Asintomatico

No terapia di profilassi
RL: C

Sintomatologia lieve (G1CTCAE 4.3) con edema evidente all'imaging e/o residuo e/o KPS<80%

Terapia con corticosteroidi
RL: C

4-8mg/die

Sintomatologia moderata-severa (G3-4CTCAE 4.3)

Principio attivo: **desametasone**
Nome commerciale: **soldesam**

8-16 mg/die

In assenza di risposta soddisfacente
RL: C

Desametasone e.v.: 10-25 mg in bolo seguito da 4-10 mg qid oppure
Terapia con diuretico osmotico: **Mannitolo** 0,75-1g/kg (250mL of 20%solution)

Raccomandazioni per l'utilizzo del desametasone:

1. *somministrare la dose efficace più bassa per il minor tempo possibile*
2. *Prescrivere terapia di profilassi per la gastrite*
3. *Costante monitoraggio dei possibili effetti collaterali: iperglicemia, immunodepressione con comparsa di mughetto orale*

Presidi di trattamento

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Keep in mind!!!

Retrospective

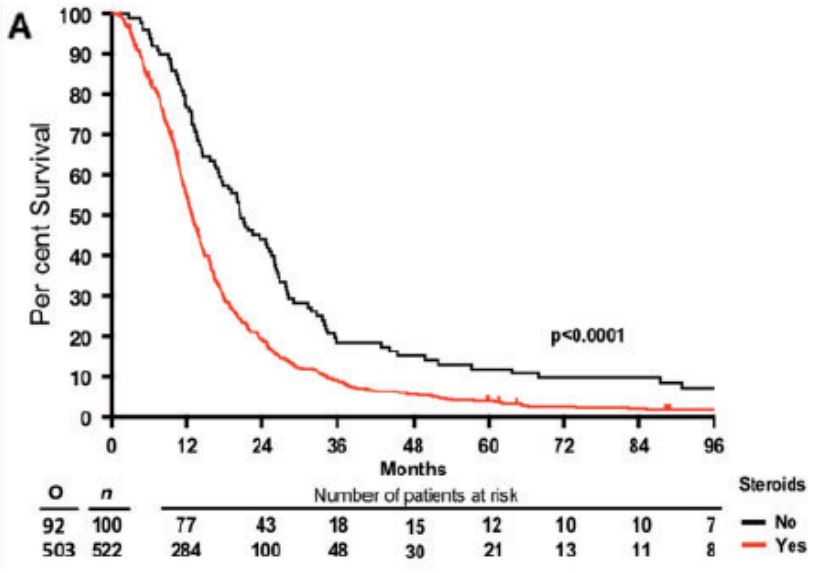
doi:10.1093/brain/aww046 BRAIN 2016: 139; 1458–1471 | 1458
BRAIN
A JOURNAL OF NEUROLOGY

Figure 1 Corticosteroid use at the start of radiotherapy without or with TMZ is an independent marker of poor prognosis in human glioblastoma patients from three independent cohorts. Overall survival of (**A**) MSKCC; (**B**) EORTC 26981/22981 NCIC CE.3; and (**C**) GGN patient cohorts.

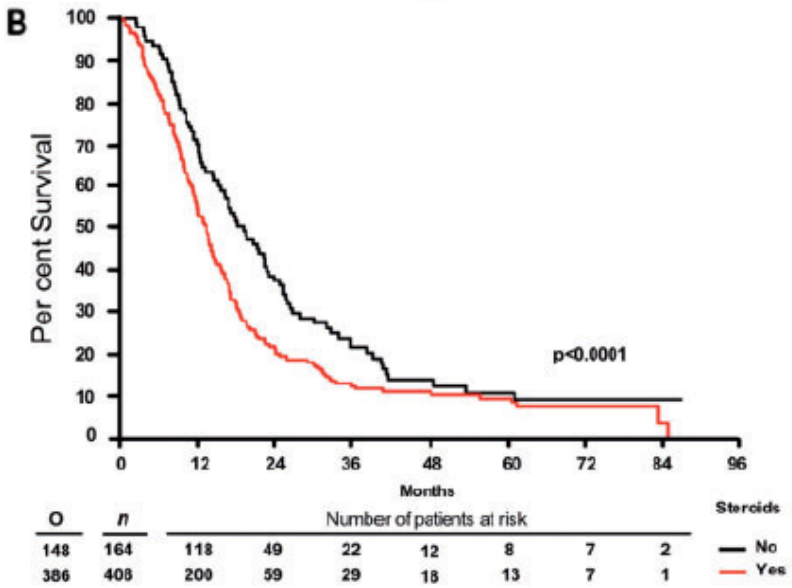
Corticosteroids compromise survival in glioblastoma

Kenneth L. Pitter,[1,*] Ilaria Tamagno,[2,*] Kristina Alikhanyan,[3] Amira Hosni-Ahmed,[4,†] Siobhan S. Pattwell,[5] Shannon Donnola,[2,§] Charles Dai,[2] Tatsuya Ozawa,[5] Maria Chang,[6] Timothy A. Chan,[6,7] Kathryn Beal,[6,7] Andrew J. Bishop,[6] Christopher A. Barker,[6] Terreia S. Jones,[4] Bettina Hentschel,[8] Thierry Gorlia,[9] Uwe Schlegel,[10] Roger Stupp,[11] Michael Weller,[12,#] Eric C. Holland[5,13,14,#] and Dolores Hambardzumyan[2,3,#]

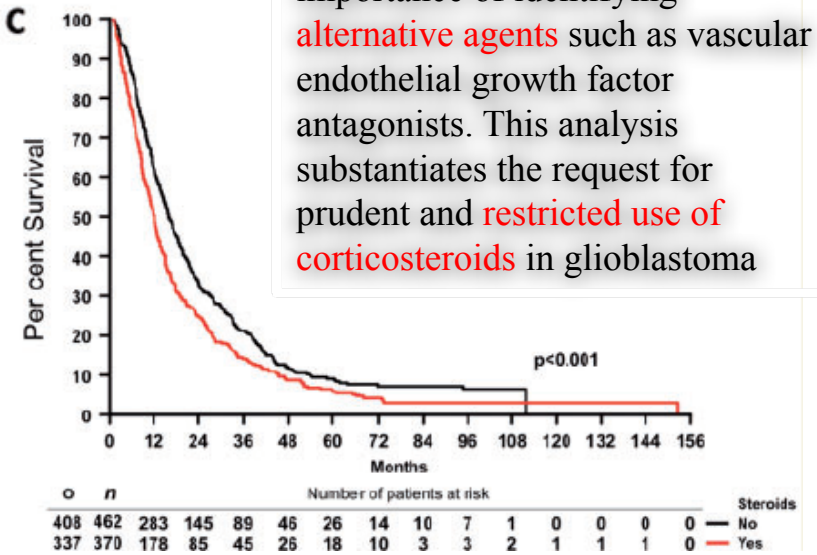
MSKCC



EORTC 26981/22981



GGN



This study highlights the importance of identifying alternative agents such as vascular endothelial growth factor antagonists. This analysis substantiates the request for prudent and restricted use of corticosteroids in glioblastoma

Bullet point

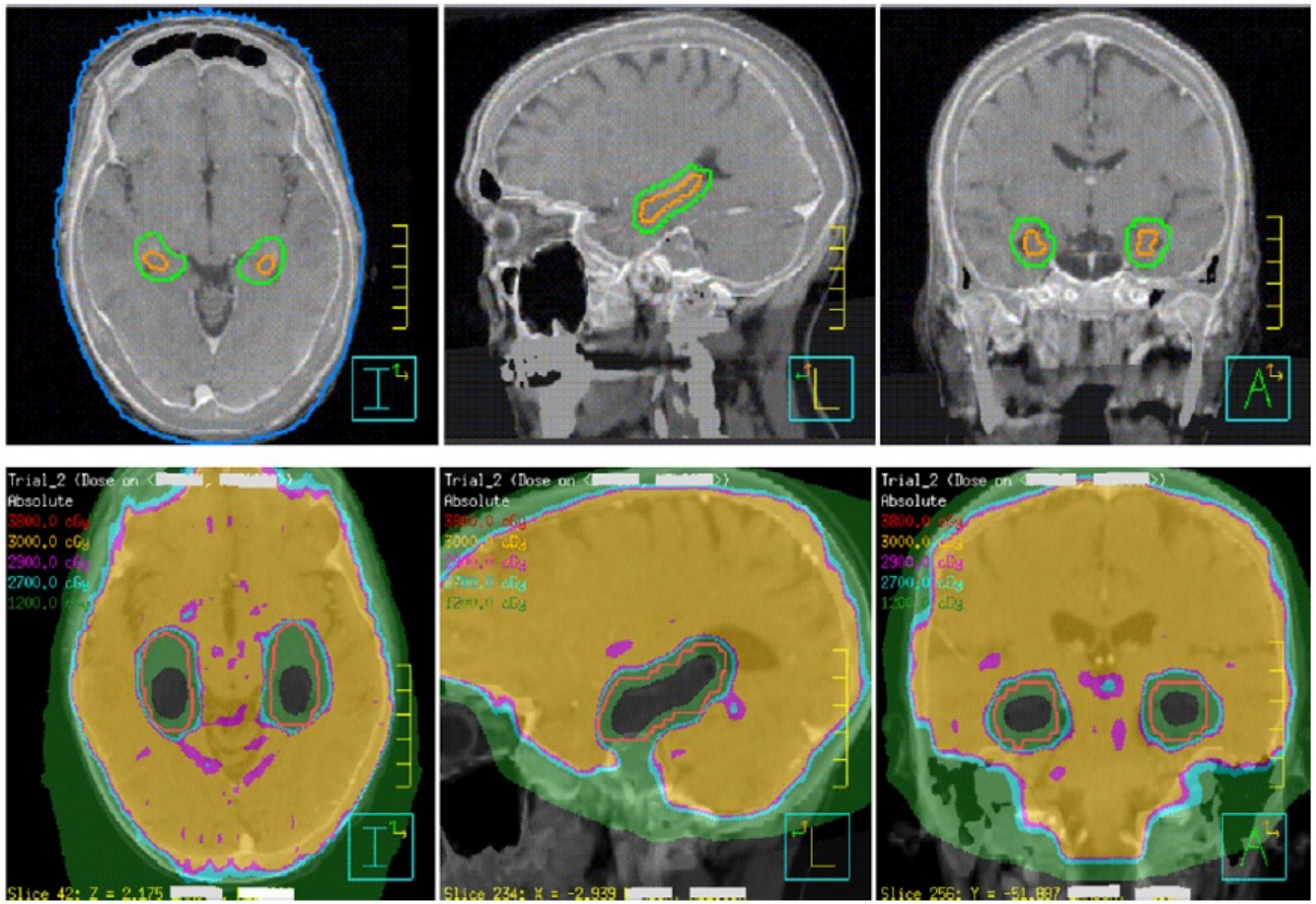
- ❑ Edema cerebrale
- ❑ Danno neurocognitivo
- ❑ Alopecia

Bullet point

- Danno neurocognitivo

  Presidi di prevenzione
  Quale razionale?
  Quale tecnica?

F. Oskan[1,2] · U. Ganswindt[1] · S.B. Schwarz[1] · F. Manapov[1] · C. Belka[1] · M. Niyazi[1]
[1] Department of Radiation Oncology & CCC Neuro-Oncology, University of Munich
[2] Department of Radiation Oncology, Saarland University Medical Center, Homburg/Saar



Hippocampus sparing in whole-brain radiotherapy

A review

Tab. 1 Distribution of brain metastases within neural stem cell (NSC) regions

Study	Marsh et al. [23]	Gondi et al. [14]	Ghia et al. [11]	Wan et al. [37]
Number of metastases	679	1133	272	2270
Number of patients	107	371	100	488
Number of hippocampal metastases (%)	16 (2.3%)	0 (0%)	0 (0%)	7 (1.4%)
Number of patients with hippocampal metastases (%)	16 (15%)	0 (0%)	0 (0%)	7 (0.3%)
Number of perihippocampal metastases (%)	NA	34 (3%)	9 (3.3%)	7 (0.3%)
Number of patients with perihippocampal metastases (%)	NA	22 (8.6%)	8 (8.0%)	NA
Number of subventricular metastases (%)	NA	NA	NA	18 (0.8)
Number of patients with subventricular metastases (%)	NA	NA	NA	18 (3.7%)

NA not available.

3

F. Oskan[1,2] · U. Ganswindt[1] · S.B. Schwarz[1] · F. Manapov[1] · C. Belka[1] · M. Niyazi[1]

[1] Department of Radiation Oncology & CCC Neuro-Oncology, University of Munich

[2] Department of Radiation Oncology, Saarland University Medical Center, Homburg/Saar

Hippocampus sparing in whole-brain radiotherapy

A review

CLINICAL INVESTIGATION Brain

DISTRIBUTION OF BRAIN METASTASES IN RELATION TO THE HIPPOCAMPUS: IMPLICATIONS FOR NEUROCOGNITIVE FUNCTIONAL PRESERVATION

Amol Ghia, M.D.,* Wolfgang A. Tomé, Ph.D.,* Sayana Thomas, B.S.,* George Cannon, M.D.,* Deepak Khuntia, M.D.,* John S. Kuo, M.D., Ph.D.,† and Minesh P. Mehta, M.D.*

Departments of *Human Oncology and †Neurological Surgery, University of Wisconsin, Madison, WI

Only **3.3%** of intracranial **metastases** were located **within 5mm of the hippocampus**; they concluded that it is reasonable to exclude this structure from WBRT when it is not involved by disease.

Livello di raccomandazione: **D**

F. Oskan[1,2] · U. Ganswindt[1] · S.B. Schwarz[1] · F. Manapov[1] · C. Belka[1] · M. Niyazi[1]
[1] Department of Radiation Oncology & CCC Neuro-Oncology, University of Munich
[2] Department of Radiation Oncology, Saarland University Medical Center, Homburg/Saar

Tab. 2 Summary of in silico studies using different techniques for hippocampus sparing

Study	Number of patients	Radiation techniques	Dose constraints: mean dose to hippocampus	Comment
Blomstard et al. [4]	6	Protons IMRT IMAT Opposing fields	42.3%[a] 77.1%[a] 88.0%[a] NA	CTV coverage was least affected for IMPT plans, suggesting that that OARs can be spared to a greater extent with the proton technique. Of the highly conformal photon techniques, IMRT was slightly more effective than IMAT at sparing neurocognitive OARs
Tarnawski et al. [35]	10	IMRT Tomotherapy Rapid arc	NA NA NA	Both helical tomotherapy and LINAC-based IMRT reduced radiation dose to NSC regions by approximately 45%, while maintaining the full dose to the rest of the brain
Gondi et al. [13]	5	Tomotherapy LINAC-based IMRT	5.5 Gy 7.8 Gy	Target coverage and homogeneity were acceptable with both IMRT modalities; differences were largely attributable to more rapid dose falloff with helical tomotherapy
Gutierrez et al. [17]	10	SIB tomotherapy	5.9±1.3 Gy	Composite tomotherapy plans achieved three objectives: homogeneous whole-brain dose distribution equivalent to conventional WBRT; conformal hippocampal avoidance and radiosurgery-equivalent dose distributions to individual metastases
Hsu et al. [18]	10	SIB-VMAT	5.23±0.39 Gy	VMAT was able to achieve adequate whole brain coverage with conformal hippocampal avoidance and radiosurgery-quality dose distributions for 1–3 brain metastases
Prokic et al. [25]	10	SIB SC	7.55±0.62 Gy 9.8±1.75	Both SIB and SC were able to achieve adequate whole brain coverage and radiosurgery-equivalent dose distributions to individual brain metastases. SIB achieved better sparing of the hippocampus, particularly when a 10-mm hippocampal avoidance region was used

Hippocampus sparing in whole-brain radiotherapy

A review

All modern techniques, such as tomotherapy, proton therapy and LINAC-based IMRT/VMAT yielded **similar dosimetric results**.

The **clinical relevance** of these deviations remains an **open question**.

ONGOING TRIAL

- Memantine Hydrochloride and Whole-Brain Radiotherapy with or without **Hippocampal Avoidance** in Reducing **Neurocognitive Decline** in Patients with Brain Metastases

NCI-2015-00030, NCT02360215

- **Genu-Sparing** Whole-Brain Radiotherapy in Preserving Cognition and Neuropsychiatric Functioning in Patients with Solid Tumors with Brain Metastases

NCI-2017-01516, CRMS-66070, IRB00128471, NCT03223922

Practice Contouring Guidelines

RTOG Atlas
https://www.rtog.org/CoreLab/ContouringAtlases.aspx

A Radiation Oncologist's Guide to Contouring the Hippocampus

Bhishamjit S. Chera, MD, Robert J. Amdur, MD, Pretesh Patel, MD, and William M. Mendenhall, MD

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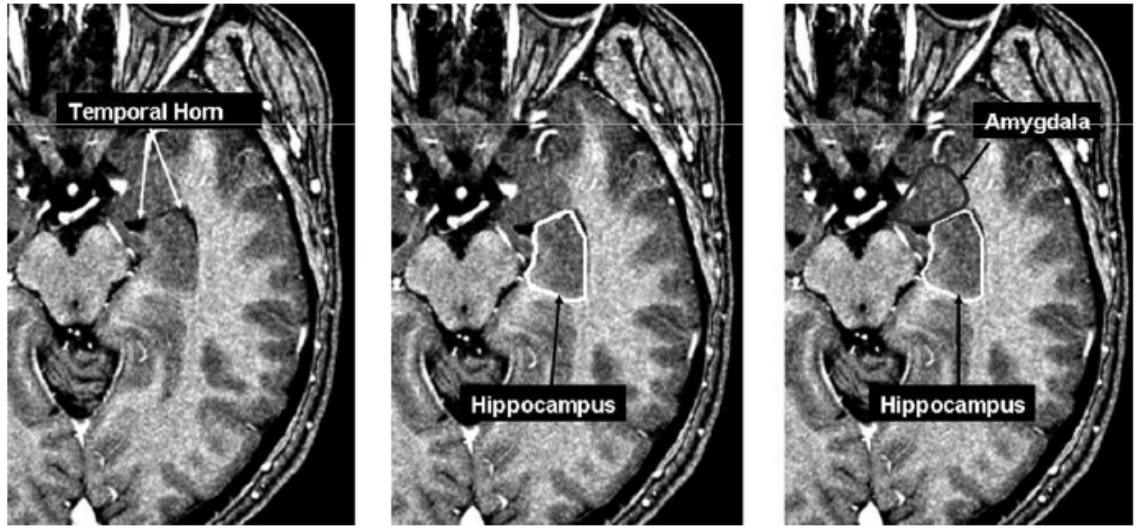

PHYSICS CONTRIBUTION

HIPPOCAMPAL-SPARING WHOLE-BRAIN RADIOTHERAPY: A "HOW-TO" TECHNIQUE USING HELICAL TOMOTHERAPY AND LINEAR ACCELERATOR–BASED INTENSITY-MODULATED RADIOTHERAPY

Vinai Gondi, M.D.,* Ranjini Tolakanahalli, M.S.,† Minesh P. Mehta, M.D.,* Dinesh Tewatia, M.S.,*† Howard Rowley, M.D.,‡ John S. Kuo, M.D., Ph.D.,*§ Deepak Khuntia, M.D.,* and Wolfgang A. Tomé, Ph.D.*†

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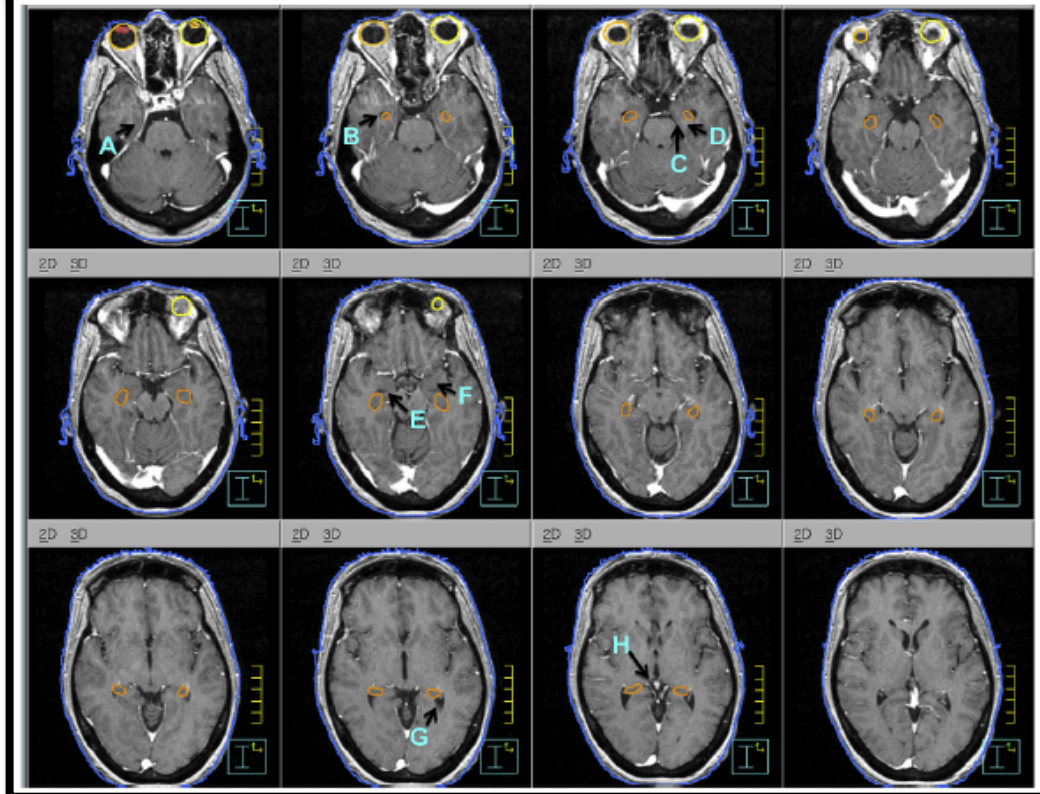


Table 3 Association between hippocampal dosimetry and impairment in Wechsler Memory Scale-III Word Lists Delayed Recall at 18 months

Dosimetry	Dosimetric cut point	No impairment	Impairment*	*p* value
Bilateral hippocampi				
Maximum	≤24.7 Gy	66.7%	33.3%	0.500
	>24.7 Gy	55.6%	44.4%	
D30%	≤8.2 Gy	77.8%	22.2%	0.167
	>8.2 Gy	44.4%	55.6%	
D40%	≤7.3 Gy	88.9%	11.1%	0.025
	>7.3 Gy	33.3%	66.7%	
D50%	≤3.8 Gy	66.7%	33.3%	0.500
	>3.8 Gy	55.6%	44.4%	
D80%	≤0.5 Gy	55.6%	44.4%	0.500
	>0.5 Gy	66.7%	33.3%	
D100%	≤0.0 Gy	76.9%	23.1%	0.047
	>0.0 Gy	20.0%	80.0%	
Left hippocampus				
Maximum	≤15.0 Gy	55.6%	44.4%	0.500
	>15.0 Gy	66.7%	33.3%	
D30%	≤6.2 Gy	66.7%	33.3%	0.500
	>6.2 Gy	55.6%	44.4%	
D40%	≤5.9 Gy	77.8%	22.2%	0.167
	>5.9 Gy	44.4%	55.6%	
D50%	≤5.7 Gy	77.8%	22.2%	0.167
	>5.7 Gy	44.4%	55.6%	
D80%	≤4.7 Gy	77.8%	22.2%	0.167
	>4.7 Gy	44.4%	55.6%	
D100%	≤0.0 Gy	44.4%	55.6%	0.167
	>0.0 Gy	77.8%	22.2%	
Right hippocampus				
Maximum	≤12.5 Gy	55.6%	44.4%	0.500
	>12.5 Gy	66.7%	33.3%	
D30%	≤6.4 Gy	66.7%	33.3%	0.500
	>6.4 Gy	55.6%	44.4%	
D40%	≤5.8 Gy	66.7%	33.3%	0.500
	>5.8 Gy	55.6%	44.4%	
D50%	≤4.7 Gy	66.7%	33.3%	0.500
	>4.7 Gy	55.6%	44.4%	
D80%	≤1.1 Gy	77.8%	22.2%	0.167
	>1.1 Gy	44.4%	55.6%	
D100%	≤0.0 Gy	57.1%	42.9%	0.485
	>0.0 Gy	75.0%	25.0%	

Clinical Investigation: Central Nervous System Tumor

Hippocampal Dosimetry Predicts Neurocognitive Function Impairment After Fractionated Stereotactic Radiotherapy for Benign or Low-Grade Adult Brain Tumors

Vinai Gondi, M.D.,* Bruce P. Hermann, Ph.D.,† Minesh P. Mehta, M.D., FASTRO,¶ and Wolfgang A. Tomé, Ph.D., FAAPM*,‡,§

*Departments of *Human Oncology, †Neurology, ‡Medical Physics, and §Biomedical Engineering, University of Wisconsin, Madison, WI; and ¶Department of Radiation Oncology, Northwestern University Feinberg School of Medicine, Chicago, IL*

D40%<7.3Gy (bilateral)

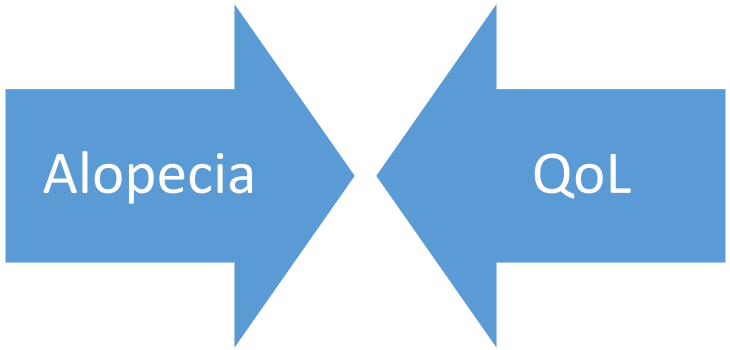
Bullet point

- ❑ Edema cerebrale
- ❑ Danno neurocognitivo
- ❑ Alopecia

Bullet point

- Alopecia

  Quale razionale?
  Quale tecnica?
  Presidi di prevenzione


Alopecia
QoL

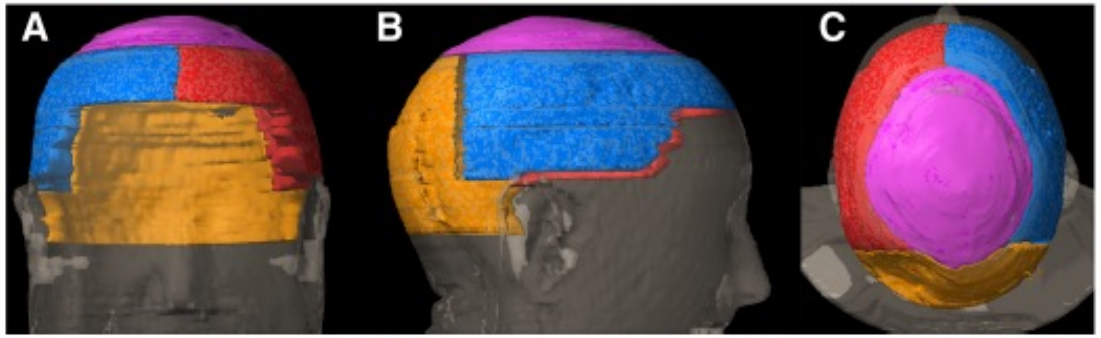
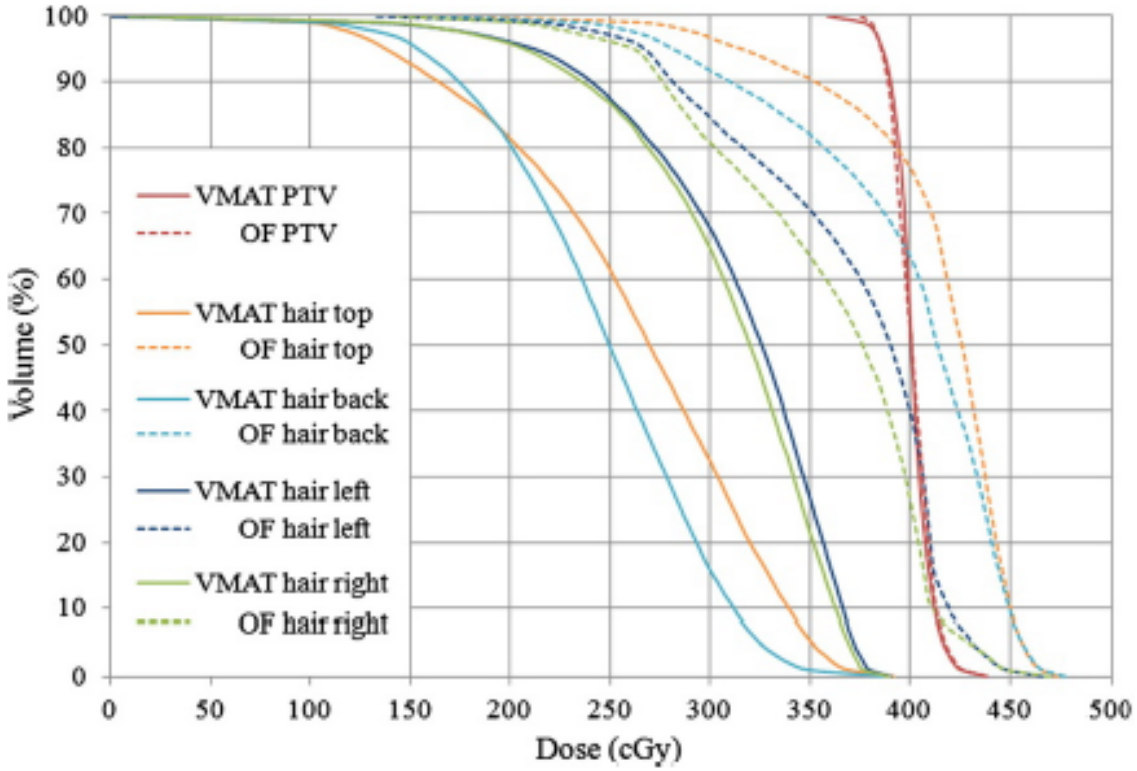


Figure 1 The hair follicle volume was defined as the tissue underlying the skin up to the outer table of the skull. An au

RESEARCH Open Access

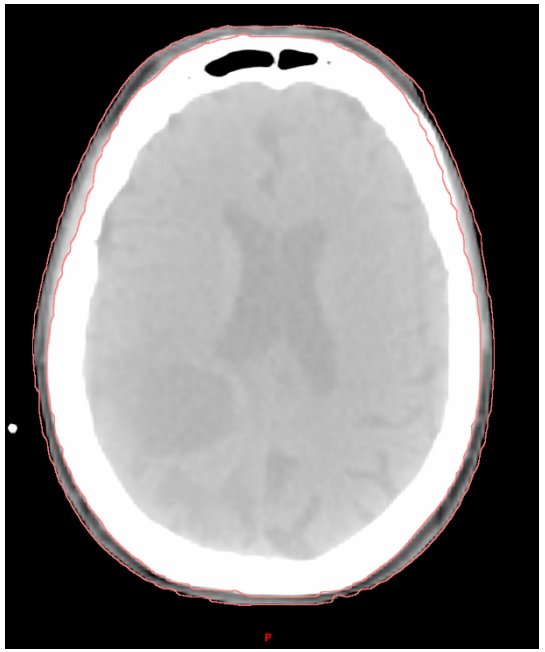
Hair-sparing whole brain radiotherapy with volumetric arc therapy in patients treated for brain metastases: dosimetric and clinical results of a phase II trial

Annemieke De Puysseleyr[1], Joris Van De Velde[2], Bruno Speleers[1], Tom Vercauteren[3], Anneleen Goedgebeur[1], Tom Van Hoof[2], Tom Boterberg[1,3], Wilfried De Neve[1,3], Carlos De Wagter[1,3] and Piet Ost[1,3*]



VMAT vs OF

10 pazienti!



Livello di raccomandazione: **D**

Valproic acid reduces hair loss and improves survival in patients receiving temozolomide-based radiation therapy for high-grade glioma

Shinichi Watanabe[1] · Yui Kuwabara[1] · Satoshi Suehiro[2] · Daisuke Yamashita[2] · Mamoru Tanaka[1] · Akihiro Tanaka[1] · Shiro Ohue[3] · Hiroaki Araki[1]

Treating the Contents and Not the Container: Dosimetric Study of Hair-sparing Whole Brain Intensity Modulated Radiation Therapy

David Roberge, M.D.[1,*]
William Parker, M.Sc.[2]
Tamim M. Niazi, M.D.[1]
Marina Olivares, M.Sc.[1]

www.tcrt.org

Intensity-modulated radiation therapy or volumetric-modulated arc therapy to reduce alopecia, xerostomia, and otitis after whole brain radiation therapy for brain metastases: a planning analysis

Brandon R. Mancini · J. Ben Wilkinson · Leonard H. Kim · Simona F. Shaitelman · Di Yan · Dan Ionascu · Inga S. Grills

ONGOING STUDY

Efficacy Study of Tempol **to Prevent Hair Loss** From Radiotherapy to the Brain

NCI-2012-00422, NCT00801086

Dosimetric analysis of the alopecia preventing effect of hippocampus sparing whole brain radiation therapy

Anand Mahadevan[1*], Carrie Sampson[1], Salvatore LaRosa[1], Scott R. Floyd[1], Eric T. Wong[2], Erik J. Uhlmann[2], Soma Sengupta[2] and Ekkehard M. Kasper[3]

Bullet point

- ❑Edema cerebrale
- ❑Deficit neurocognitivo
- ❑Alopecia

ASSOCIAZIONE ITALIANA RADIOTERAPIA ONCOLOGICA

Metodologia per la stesura di linee guida AIRO v. 2015 (rev. 0.1 del 2017)

Livello di evidenza: **2-3**
Grado di raccomandazione: **B-C**

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ART Advanced Radiation Therapy