

CONVEGNO AIRO LOMBARDA 

TUMORI DEL
DISTRETTO CERVICO-CEFALICO
DALLA DEFINIZIONE DEI VOLUMI DI TRATTAMENTO ALL'ADAPTIVE RADIOTHERAPY

22 giugno 2013 ore 8:30
Via Francesco Nava 31, 20159 Milano

ORGANIZZAZIONE
MATERIALE E LOGISTICA
Stefano Caviglioli - Milano

CONVEGNO
MATERIALE E LOGISTICA
Trattamenti Condizionati
Stefano Caviglioli - Bergamo
MATERIALE E LOGISTICA
MATERIALE E LOGISTICA
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MATERIALE E LOGISTICA

ORGANIZZAZIONE
MATERIALE E LOGISTICA
MATERIALE E LOGISTICA
MATERIALE E LOGISTICA
MATERIALE E LOGISTICA



Carlo Pietro Soatti

 **FONDAZIONE OPERA SAN CAMILLO**
CASA DI CURA SAN PIO X
Auditorium Michelangelo

II SESSIONE - pomeridiana
Radioterapia Esclusiva: volumi e adaptive radiotherapy
Moderatori: M. Bignardi (BS) - M. Palazzi (MI)

14.15 Nuove tecniche di radioterapia (appropriatezza) – G. Soatti (Casalpusterleno, LO)

14.45 Adaptive radiotherapy: le variazioni dei volumi tumorali – I. Alongi (Hozzano, MI)

15.15 Adaptive radiotherapy: le variazioni degli organi a rischio e dell'anatomia del paziente – F. Ricchietti (Negrar, VR)

15.45 Il ruolo dell'imaging integrato: dalla definizione dei volumi di trattamento al set-up - D. Ciardo (MI)

16.05 Le terapie di supporto nei trattamenti integrati – M. Molteni (VA)


16.30 Tavola rotonda: sostenibilità in termini di tempo e risorse delle tecniche avanzate
Antognoni (VA) – M. Bignardi (BS) - S. Castiglioni (MI) - F. Cazzaniga (BG) - D. Cosentino (CO) – N. Di Muzio (MI) - R. Orecchia (MI) – M. Palazzi (MI)

17.30 Chiusura convegno

 **AZIENDA OSPEDALIERA DELLA PROVINCIA DI LODI**

Un incubo....

II SESSIONE - pomeridiana
Radioterapia Esclusiva: volumi e adaptive radiotherapy
Moderatori: M. Bignardi (BS) - M. Palazzi (MI)




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- Il titolo:
“nuove tecniche di radioterapia (appropriatezza)”
- I moderatori:

M.Bignardi: esame RT testa collo 199x,
correlatore tesi di specialità (trattamenti ORL)

M.Palazzi: condiviso qualche anno gruppo di studio testa collo AIRO Lomb.

 **AZIENDA OSPEDALIERA DELLA PROVINCIA DI LODI**

Carlo Pietro Soatti
USC Radioterapia

Abbiamo un documento AIRO...



ASSOCIAZIONE ITALIANA DI RADIOTERAPIA ONCOLOGICA

L'APPROPRIATEZZA IN RADIOTERAPIA ONCOLOGICA:
INDICAZIONI E CONSIDERAZIONI
DELL'ASSOCIAZIONE ITALIANA DI RADIOTERAPIA
ONCOLOGICA (AIRO)



Carlo Pietro Soatti
USC Radioterapia

APPROPRIATEZZA CLINICA O SPECIFICA:

una prestazione viene considerata appropriata da un punto di vista clinico quando è efficace, indicata per il paziente che la riceve e produce benefici superiori ai possibili effetti negativi.



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APPROPRIATEZZA PRESCRITTIVA

Può essere considerata un aspetto dell'appropriatezza clinica ed è legata al comportamento del clinico quando prescrive una terapia o un'indagine diagnostico-strumentale; è legata alle abitudini prescrittive dei medici e al modo con cui essi reagiscono alla necessità di aggiornarsi.

APPROPRIATEZZA ORGANIZZATIVA

Una prestazione viene considerata appropriata da un punto di vista organizzativo quando la prestazione più efficace, più sicura, più gradita e meno costosa viene erogata nel miglior contesto possibile.


APPROPRIATEZZA ETICA



Una prestazione viene considerata eticamente appropriata quando tiene in debito conto l'aspetto umano e deontologico del rapporto medico-paziente e le conseguenze del gesto tecnico e professionale nella situazione data

APPROPRIATEZZA SCIENTIFICA - TECNICA:

rappresenta il grado di attendibilità scientifica delle conoscenze sulle quali il medico basa le proprie decisioni.

l'appropriatezza tecnica si occupa di valutare sia la adeguatezza della tecnologia medica, sia la corretta tecnica, tenendo conto di principi quali la sicurezza, la efficacia, il costo, il rapporto costo-beneficio e le implicazioni di tipo etico e di tipo legale.

<p>ISSN 1591-223X DOSSIER 199 - 2010</p> <p>Innovative radiation treatment in cancer: IGRT/IMRT</p> <p>Health Technology Assessment</p> <p>ORientamenti 2</p> <p> Osservatorio regionale per l'innovazione</p>	<p>Head and neck cancer Conclusions</p> <p>Four case series on Tomotherapy have been included.</p> <p>Sample sizes were small and patients were heterogeneous and at different stages of disease.</p> <p>Only preliminary information on initial clinical experience of very few centres was provided and <u>no definitive conclusions could be drawn</u> on either the safety or the efficacy of this technique.</p> <p>Studies of higher methodological quality, i.e. randomised parallel comparisons with the standard treatment with longer follow up, are needed.</p> <p><i>Carlo Pietro Soatti USC Radioterapia</i></p>
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<p>ISSN 1591-223X DOSSIER 221 - 2012</p> <p>Criteria for appropriate use of FDG-PET in head and neck cancer</p> <p>ORientamenti 7</p> <p> Osservatorio regionale per l'innovazione</p> <p> OSPEDALIERA DELLA PROVINCIA DI LODI</p>	<p>The panel agreed in judging appropriate the use of FDGPET in the <u>diagnosis and staging of suspect recurrence</u> in patients with unclear results from conventional imaging.</p> <p>Level of evidence for diagnostic accuracy of FDG-PET was found moderate, and sensitivity of FG-PET resulted higher than specificity.</p> <p><i>Carlo Pietro Soatti USC Radioterapia</i></p>
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E un'analisi dettagliata dell' Agenzia Americana AHRQ

Aggiornato il 14.06.2013!

Comparative Effectiveness and Safety of Radiotherapy Treatments for Head and Neck Cancer

Prepared for:

Agency for Healthcare Research and Quality (AHRQ)

www.ahrq.gov

 Effective Health Care Program



Carlo Pietro Soatti
USC Radioterapia

Comparative Effectiveness Review
Number 20

Comparative Effectiveness and Safety of Radiotherapy Treatments for Head and Neck Cancer

Chi sono?....

Prepared for:
Agency for Healthcare Research and Quality
U.S. Department of Health and Human Services
540 Gaither Road
Rockville, MD 20850
www.ahrq.gov

144 pagine

165 articoli analizzati

Technical Expert Panel

Avraham Eisbruch, M.D.
Professor, Department of Radiation Oncology
University of Michigan Comprehensive Cancer Center
Ann Arbor, MI

Arlene A. Forastiere, M.D.
Professor of Oncology, and Professor of Otolaryngology, Head and Neck Surgery, and Radiation
Oncology
Johns Hopkins University School of Medicine
Baltimore, MD

Martin Fuss, M.D.
Professor, Department of Radiation Medicine
Division of Radiation Oncology
Oregon Health & Science University
Portland, OR

Quynh-Thu Le, M.D.
Professor, Radiation Oncology/Radiation Therapy and Professor, Otolaryngology (Head and
Neck)
Stanford School of Medicine
Stanford, CA

William M. Mendenhall, M.D.
Resident Alumni Professorship in Radiation Oncology
University of Florida Health Science Center and Shands Hospital
Gainesville, FL

David G. Pfister, M.D.
Chief, Head and Neck Oncology Service
Memorial Sloan-Kettering Cancer Center
New York, NY



Bel lavoro.... quello che devo dire..., copio....

Key Clinical Questions Addressed by the Comparative Effectiveness Review of Radiotherapy for Head and Neck Cancer

- What is the comparative effectiveness of IMRT, 3DCRT, 2DRT, and proton beam therapy regarding tumor control and patient survival?
- What is the comparative effectiveness of IMRT, 3DCRT, 2DRT, and proton beam therapy regarding adverse events and quality of life?
- Are there differences in the comparative effectiveness of IMRT, 3DCRT, 2DRT, and proton beam therapy for specific patient and tumor characteristics?
- Is there variation in comparative effectiveness of IMRT, 3DCRT, 2DRT, and proton beam therapy because of differences in user experience, target volume delineation, or dosimetric parameters?

IMRT = intensity-modulated radiation therapy; 2DRT = two-dimensional radiation therapy;
3DCRT = three-dimensional conformal radiation therapy

Lawrence TS, et al. In: *Cancer: principles and practice of oncology*, 8th ed, Vol 1. 2008. p. 307-36; National Comprehensive Cancer Network Web site. Available at: http://www.nccn.org/professionals/physician_gls/f_guidelines.asp; Samson DJ, et al. AHRQ Comparative Effectiveness Review No. 20. Available at: <http://www.effectivehealthcare.ahrq.gov/index.cfm/search-for-guides-reviews-and-reports/?pageaction=displayproduct&productID=447>.



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ESC Radioterapia

Facile.....

Planned Comparisons

- IMRT vs. 3DCRT
- IMRT vs. 2DRT
- 3DCRT vs. 2DRT
- Proton beam therapy vs. 2DRT, 3DCRT, and IMRT

IMRT = intensity-modulated radiation therapy; 2DRT = two-dimensional radiation therapy;
3DCRT = three-dimensional conformal radiation therapy

Samson DJ, et al. AHRQ Comparative Effectiveness Review No. 20. Available at: <http://www.effectivehealthcare.ahrq.gov/index.cfm/search-for-guides-reviews-and-reports/?pageaction=displayproduct&productID=447>.



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ESC Radioterapia

AIUTOOOOOO

Comparative Effectiveness Regarding Improved Tumor Control or Survival

Comparison	Evidence on Tumor Control or Survival
IMRT vs. 3DCRT	Insufficient
IMRT vs. 2DRT	Insufficient
2DRT vs. 3DCRT	Insufficient

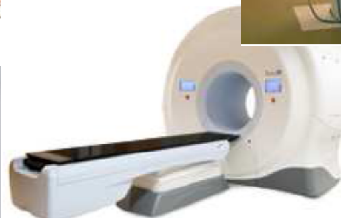
IMRT = intensity-modulated radiation therapy; 2DRT = two-dimensional radiation therapy; 3DCRT = three-dimensional conformal radiation therapy

Samson, DJ, et al. AHRQ Comparative Effectiveness Review No. 20. Available at: <http://www.effectivehealthcare.ahrq.gov/index.cfm/search-for-guides-reviews-and-reports/?pageaction=displayproduct&productID=447>



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BUTTIAMO TUTTO?



Un momento...leggiamo bene



Uno degli articoli citati nel documento e nei report ACR...



Int. J. Radiation Oncology Biol. Phys., Vol. 63, No. 5, pp. 1378–1386, 2005
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doi:10.1016/j.ijrobp.2005.05.018

CLINICAL INVESTIGATION

Head and Neck

RADICAL RADIOTHERAPY FOR EARLY GLOTTIC CANCER: RESULTS IN A SERIES OF 1087 PATIENTS FROM TWO ITALIAN RADIATION ONCOLOGY CENTERS. I. THE CASE OF T1N0 DISEASE

ENRICO CELLAI, M.D.,* PAOLO FRATA, M.D.,[†] STEFANO M. MAGRINI, M.D.,[†] FABIOLA PAIAR, M.D.,*
RAFFAELLA BARCA, M.D.,* SIMONA FONDELLI, M.D.,* CATERINA POLLI, M.D.,* LORENZO LIVI, M.D.,*
BARTOLOMEA BONETTI, M.D.,[†] ELISABETTA VITALI, M.D.,[†] AGOSTINA DE STEFANI, M.D.,[†]
MICHELA BUGLIONE, M.D.,[†] AND GIANPAOLO BITI, M.D.*

*Department of Radiation Oncology, Florence University Hospital, A.O. Careggi, Florence, Italy;

[†]Department of Radiation Oncology, Brescia University Hospital, Istituto del Radio "O. Alberti," Brescia, Italy



USC Radioterapia

Appropriatezza tecnica RT nel carcinoma laringeo Glottico: dati di riferimento significativi!

- Campo diretto di e-
- Campi contrapposti 2D di fotoni 4-6 MV

OTTIMI RISULTATI!!

NON E' UNA CRITICA AL TESTO DEI COLLEGHI ITALIANI,
ANZI

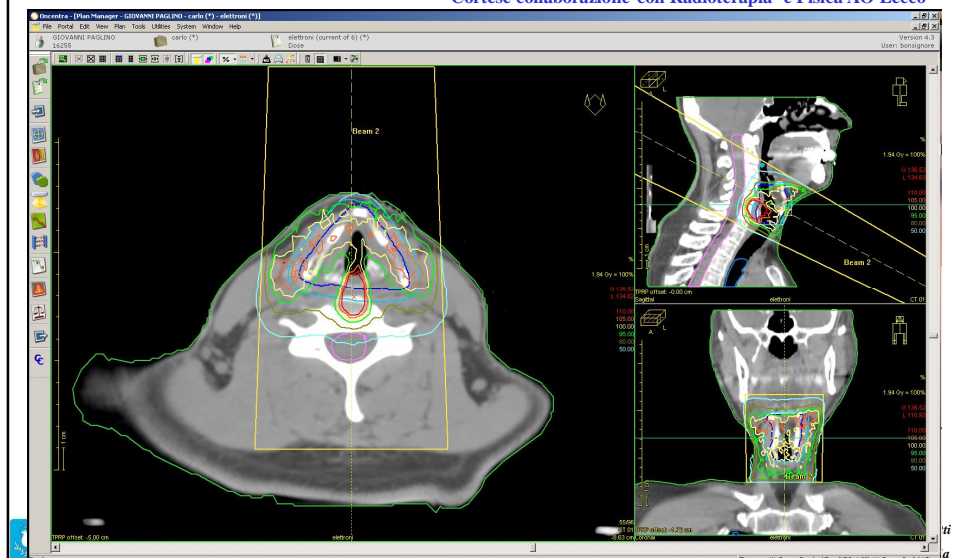
GRAZIE A LORO DEL BELLISSIMO LAVORO SVOLTO



Carlo Pietro Soatti
USC Radioterapia

Elettroni

Cortese collaborazione con Radioterapia e Fisica AO Lecco



.. e il “Pilota”....



AZIE
OSP
DEL
PRO
D.L.

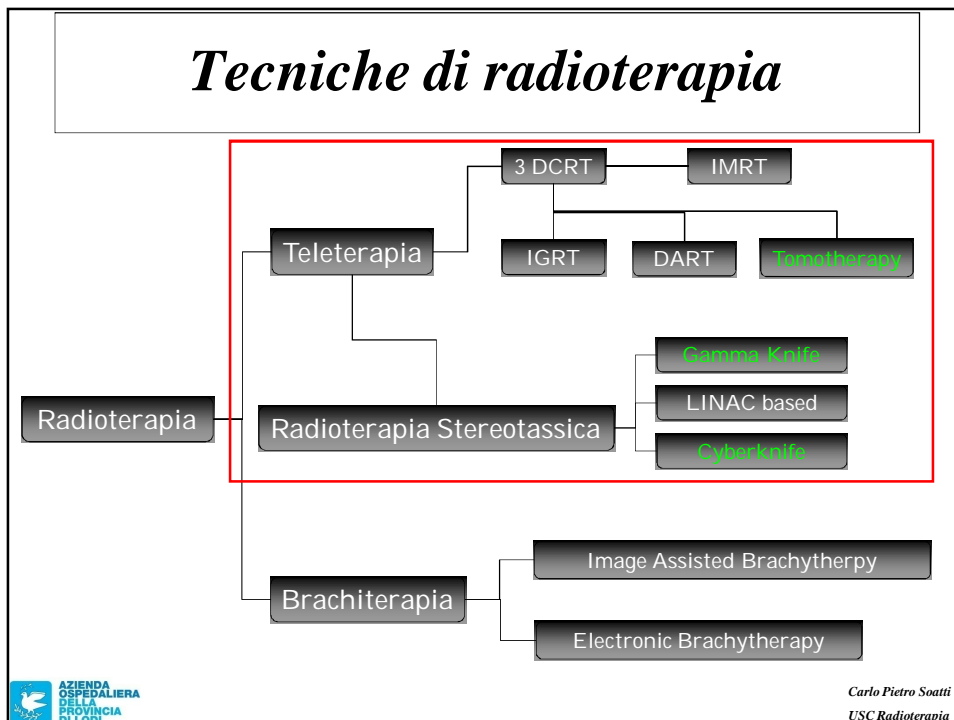
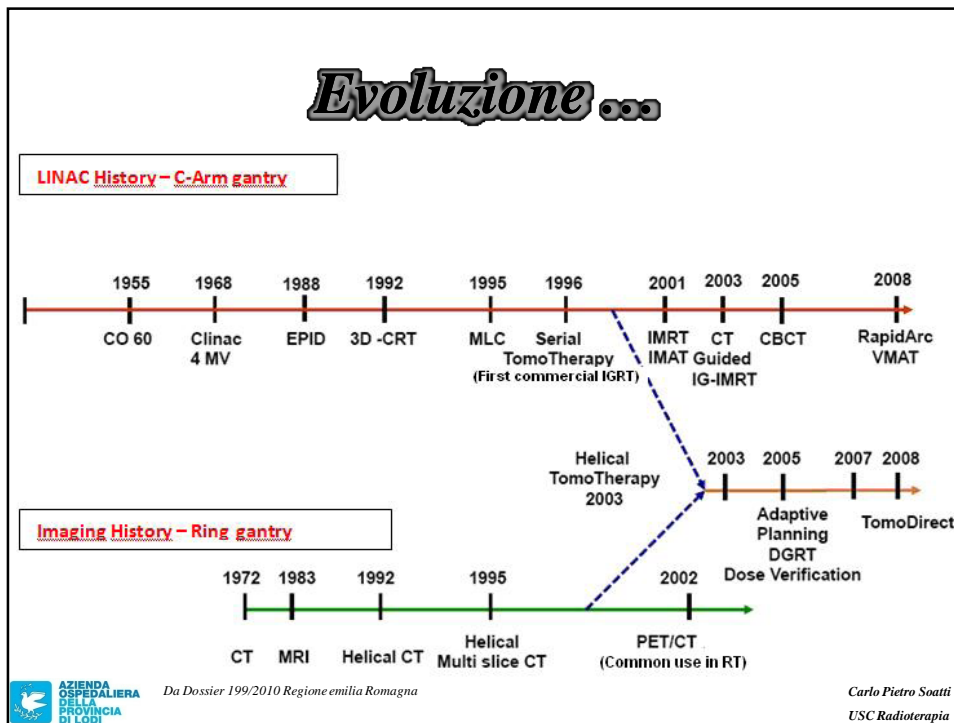
Pietro Soatti
radioterapia

Quale radioterapia?

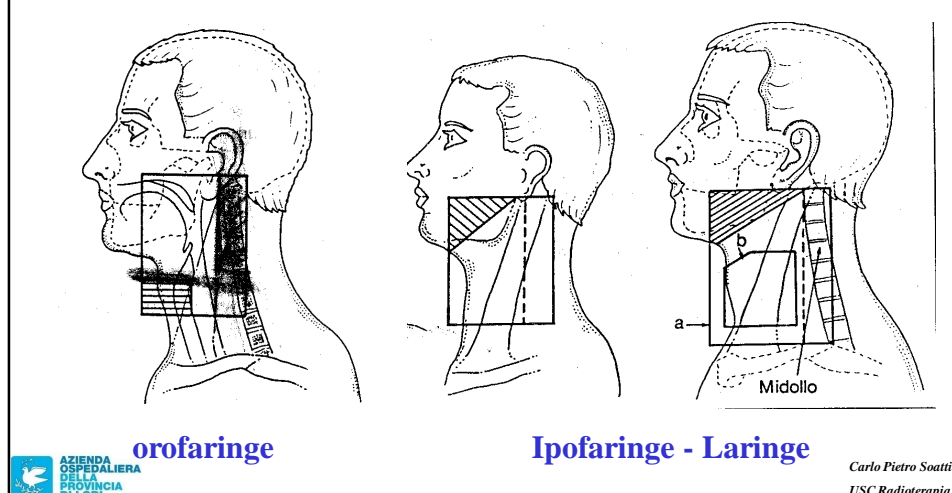


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Campi latero - laterali



Tecniche con pianificazione 2D

Nella maggior parte delle situazioni cliniche non possono garantire adeguata copertura dei volumi bersaglio ed è sempre impossibile documentare con la massima precisione la dose ricevuta dagli organi a rischio

Oggi potrebbero aver senso:

- Nei trattamenti palliativi
- Trattamenti radicali limitatamente ad alcune situazioni cliniche, es. neoplasie laringee limitate.

Tecnica conformazionale 3D standard

- La più diffusamente utilizzata nei tumori della testa e del collo pertanto è da considerare la tecnica di riferimento
- Nella maggior parte delle situazioni cliniche prevede due campi laterali contrapposti conformati e un campo anteriore su parte inferiore del collo
- Per evitare sopra o sottodosaggi alla giunzione si adopera la tecnica dell'emicampo (Shon JW et al., IJROBP, 1995)
- Dopo dose di tolleranza al midollo, si prosegue sui linfonodi posteriori (livelli IV e V b) con elettroni



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Concomitant chemoradiotherapy versus acceleration of radiotherapy with or without concomitant chemotherapy in locally advanced head and neck carcinoma (GORTEC 99-02): an open-label phase 3 randomised trial

Jean Bourhis, Christian Sire, Pierre Graff, Vincent Grégoire, Philippe Maingon, Gilles Calais, Bernard Gery, Laurent Martin, Marc Alfonsi, Patrick Desprez, Thierry Pignon, Etienne Bardet, Michel Rives, Lionel Geoffrois, Nicolas Daly-Schweitzer, Sok Sen, Claude Tuchais, Olivier Dupuis, Stéphane Guerif, Michel Lapeyre, Véronique Favrel, Marc Hamoir, Antoine Lusinchi, Stéphane Temam, Antonella Pinna, Yun Gan Tao, Pierre Blanchard, Anne Aupérin

Lancet Oncol 2012; 13: 145-53

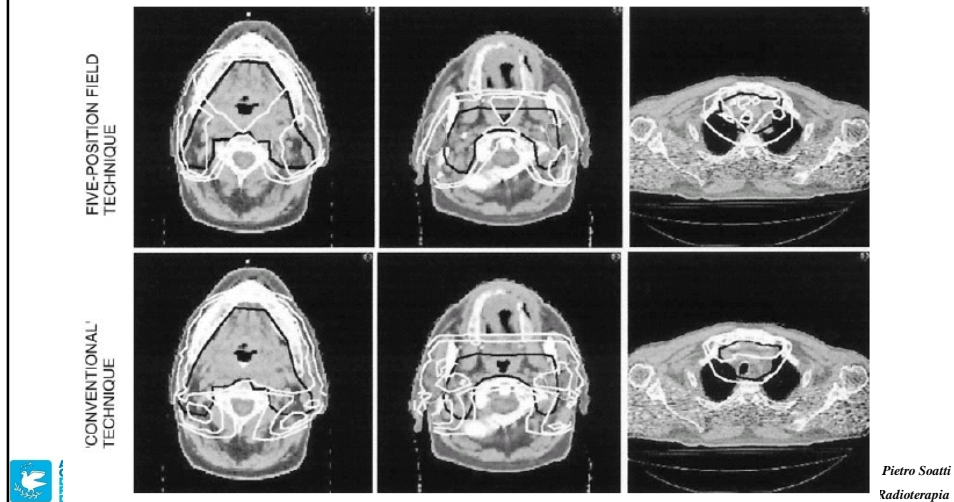
- Non si parla assolutamente di tecnica di radioterapia
- Dal testo possiamo dedurre si tratti di una xD... (with spinal cord exclusion at 40 Gy)
- **MEGLIO FARE RADIOCHEMIO!!**



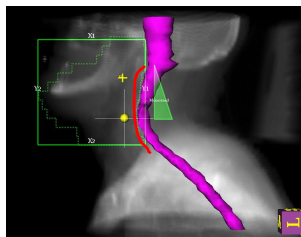
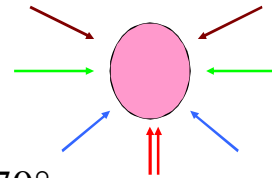
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Tecniche conformazionali 3D evolute

Tecnica Gruppo "Bellinzona"

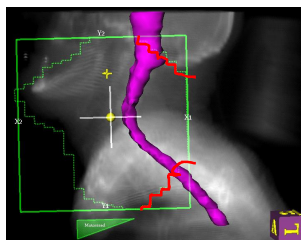


RT Lecco... manual - IMRT ...



CAMPO 90° - 270°

Cuneo long, midollo coperto,

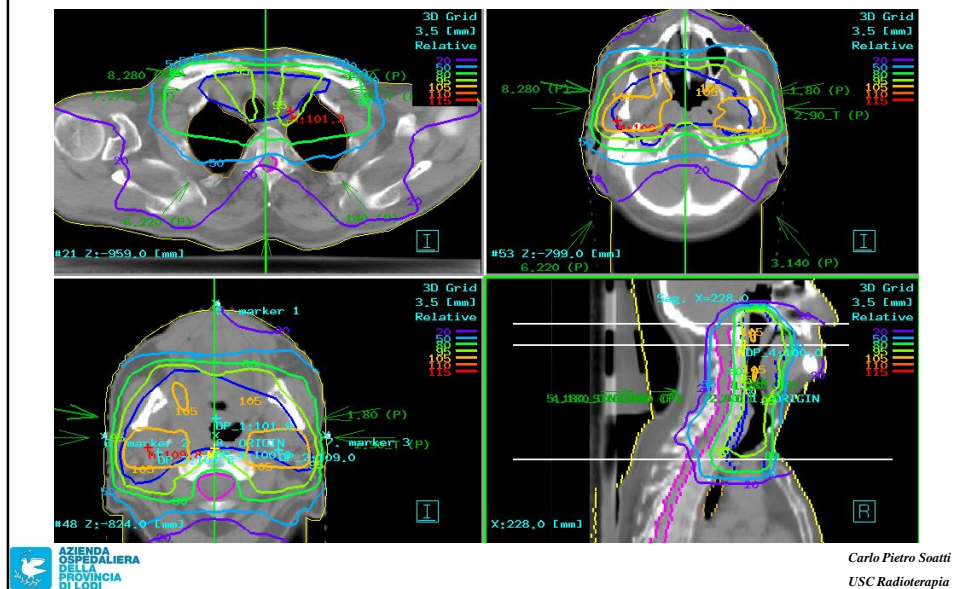


CAMPO 80° - 280°

Cuneo oriz., MLC su PTV

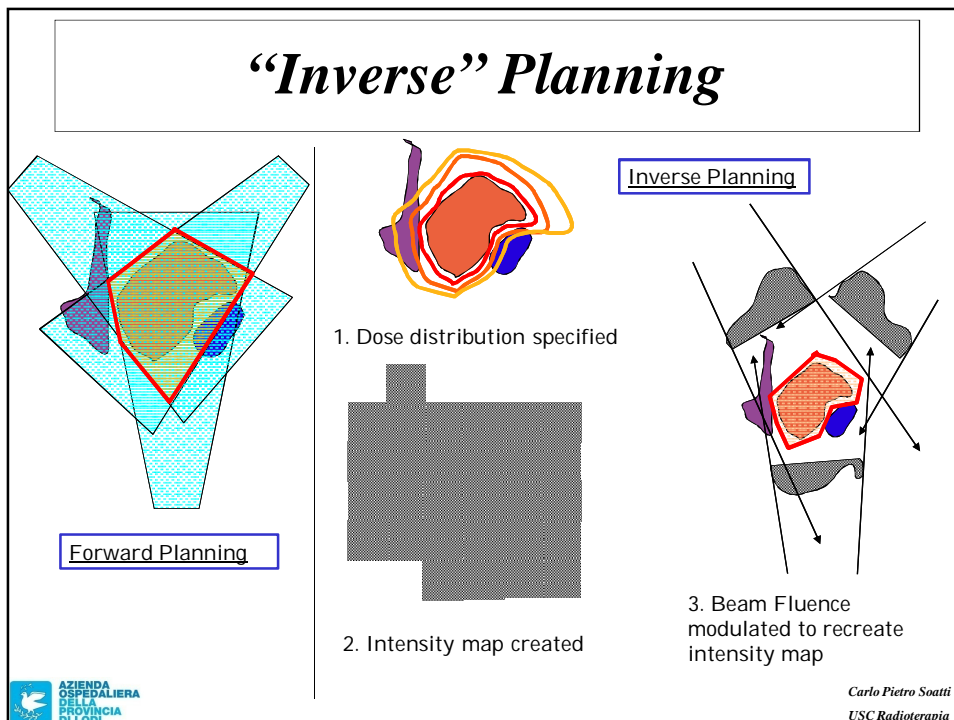
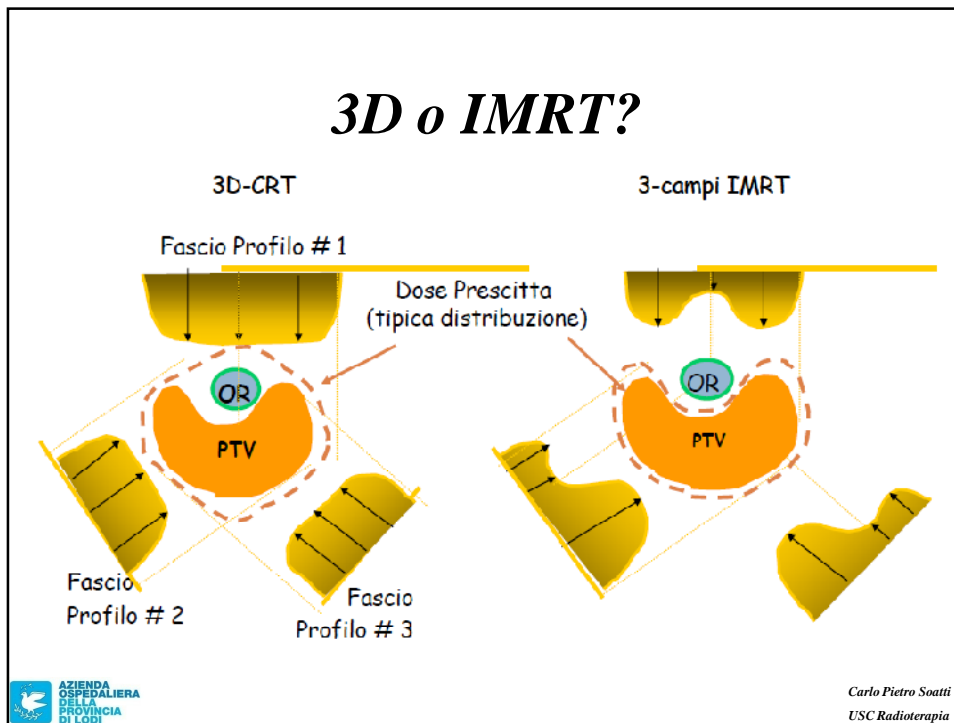
Rotazione del lettino 8° - 15°

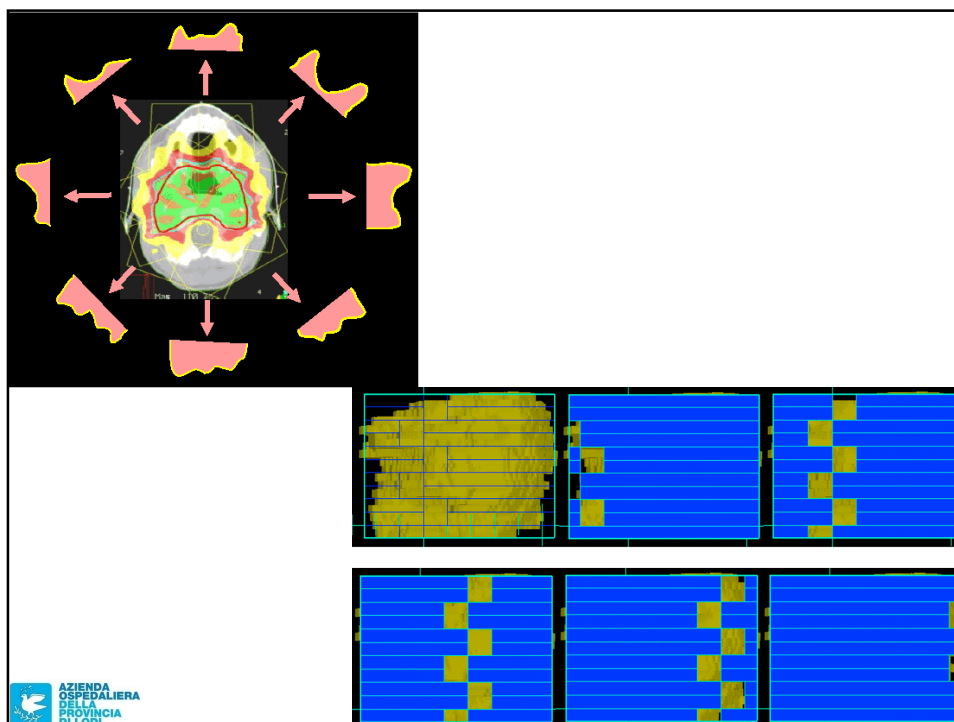
Base lingua



Radioterapia ad intensità modulata (IMRT)

- Con IMRT, rispetto alla 3DCRT, è possibile somministrare una dose maggiore al volume bersaglio, anche se di forma irregolare, e una dose minore agli organi critici.
- Il vantaggio è particolarmente evidente ove l'organo critico si trovi in una concavità del PTV (es. midollo o tronco encefalo nel volume di trattamento del rinofaringe); oppure nel risparmiare la irradiazione della parotide
- *Dimostrato un vantaggio rispetto alle tecniche standard nel controllo locale dei tumori della testa e del collo (Lee N et al, IJROBP, 2002; de Arruda FF et al, IJROBP, 2006)...*



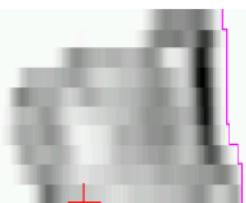
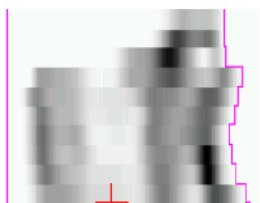


Esempio: 6 campi testa collo

gantry 0

gantry 30

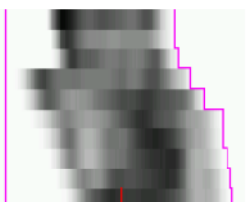
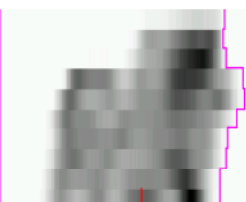
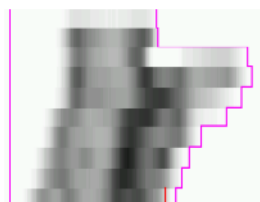
gantry 60

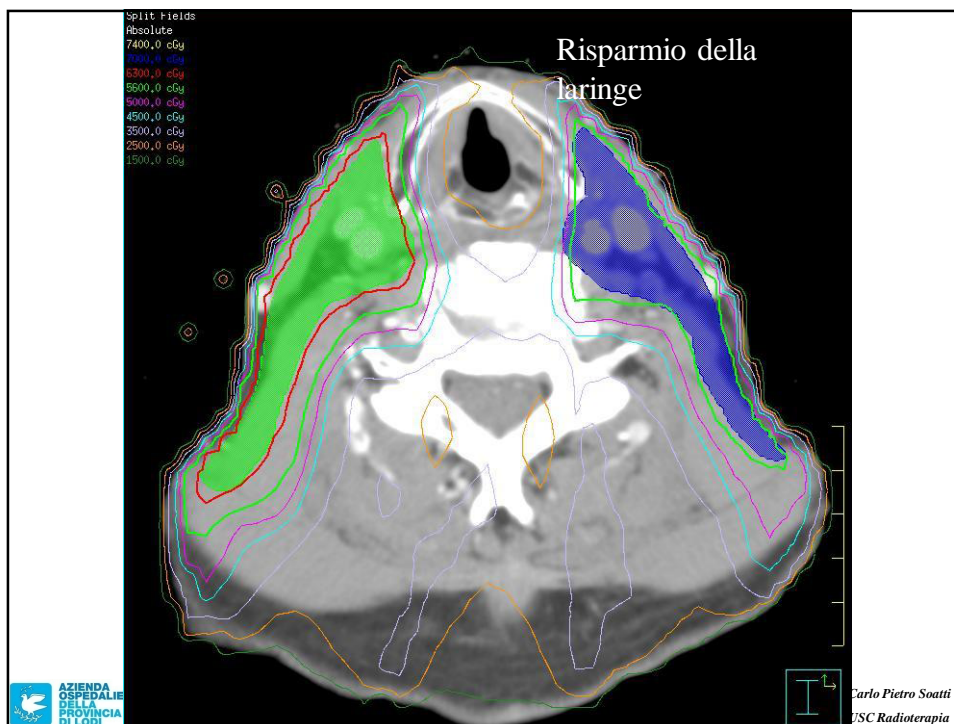
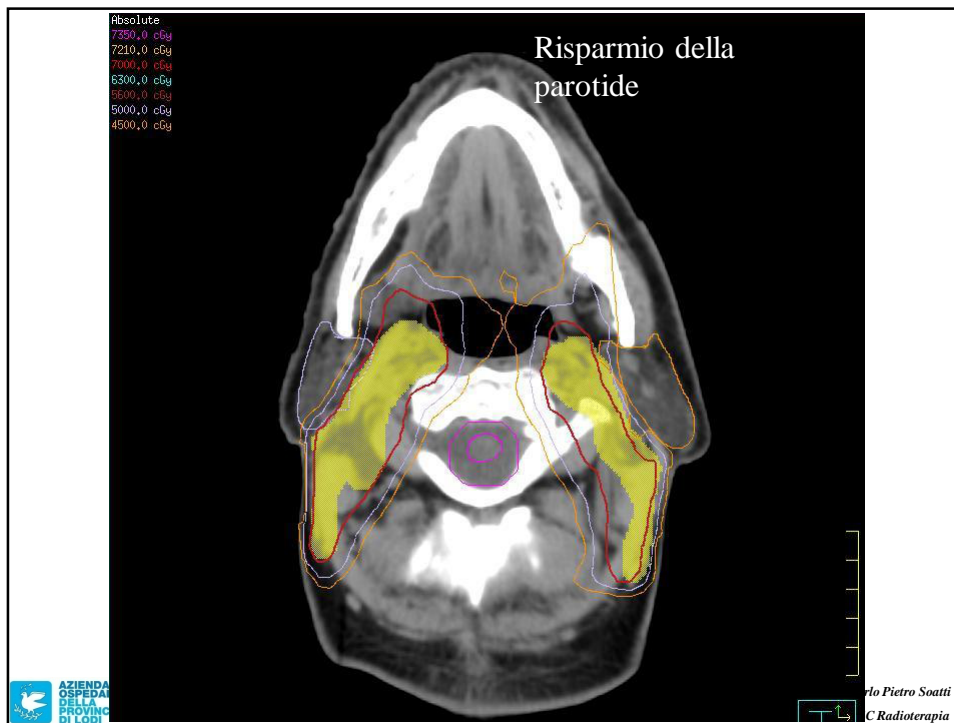


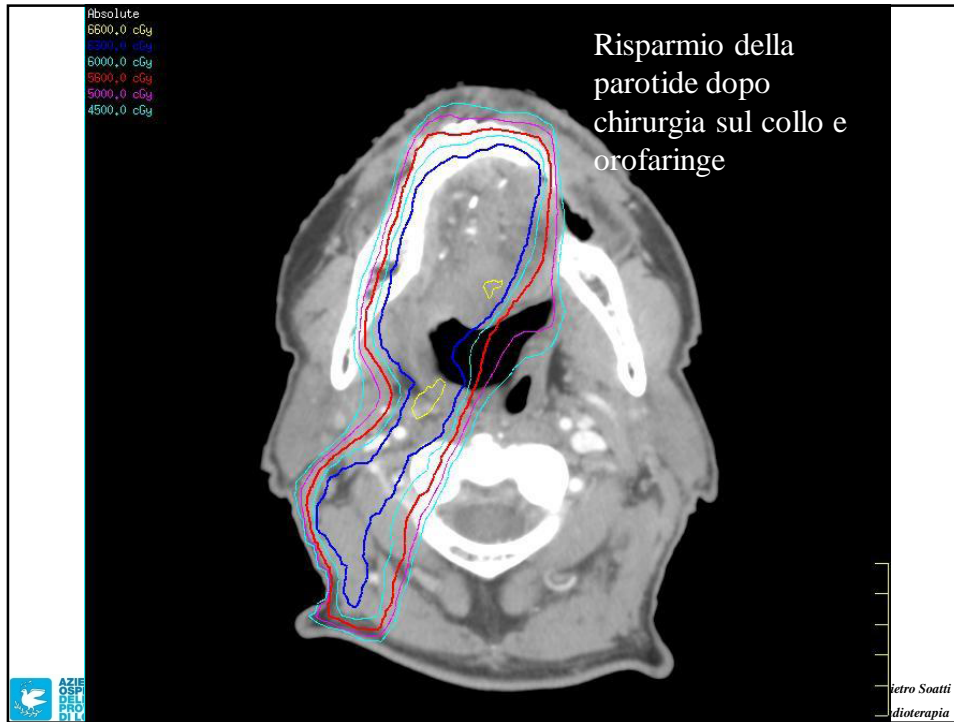
gantry 270

gantry 330

gantry 135







Tecnica IMRT



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doi:10.1016/j.ijrobp.2006.11.019

CLINICAL INVESTIGATION

Head and Neck

CHOOSING AN INTENSITY-MODULATED RADIATION THERAPY TECHNIQUE IN THE TREATMENT OF HEAD-AND-NECK CANCER

NANCY LEE, M.D.,* JAMES MECHALAKOS, PH.D.,† DEV R. PURI, M.D.,* AND MARGIE HUNT, M.S.†

*Department of Radiation Oncology and †Department of Medical Physics,
Memorial Sloan-Kettering Cancer Center, New York, NY

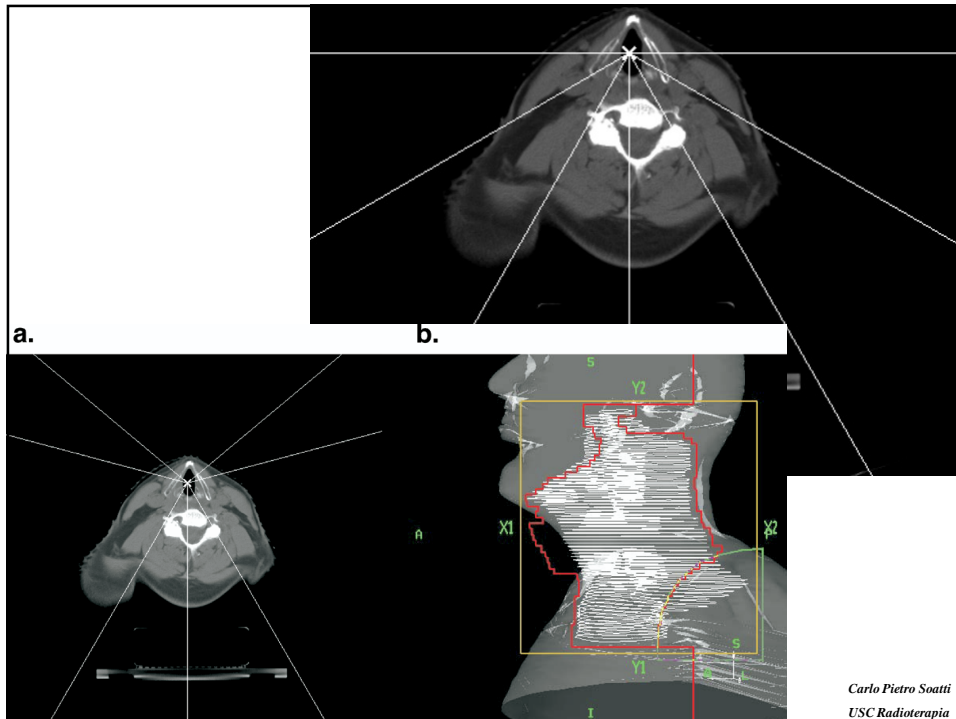


Carlo Pietro Soatti
USC Radioterapia

**Dosi
Volumi**

Table 2. Dose specifications for head-and-neck cancer at Memorial Sloan-Kettering Cancer Center

Target coverage	Acceptance criteria
PTV _{GTV} = 70 Gy	D95 ≥ prescription dose D05 ≤ 108% of prescription
PTV _{CTVhigh risk} = 59.4 Gy	D95 ≥ prescription dose D05 ≤ PTV _{GTV} prescription
PTV _{CTVlow risk} = 54 Gy	D95 ≥ prescription dose D05 ≤ PTV _{CTVhigh risk} Prescription
Normal tissue constraint	
Spinal cord	Dmax 45 Gy
Brain stem	Dmax 54 Gy
Optic nerves	Dmax 54 Gy
Optic chiasm	Dmax 54 Gy
Retina	Dmax 45 Gy
Cochlea	Dmax 50 Gy (D05 ≤ 55 Gy)
Parotid glands	Dmean ≤ 26 Gy
Oral cavity	Dmean 35-40 Gy
Brachial plexus	Dmax 65 Gy D05 60 Gy
Larynx (when not involved)	Dmax ≤ 105% of prescription Dmean 30-40 Gy



Riduzione della tossicità con incremento della dose



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 0360-3016/00/\$-see front matter

PII S0360-3016(99)00304-1

PHYSICS CONTRIBUTION

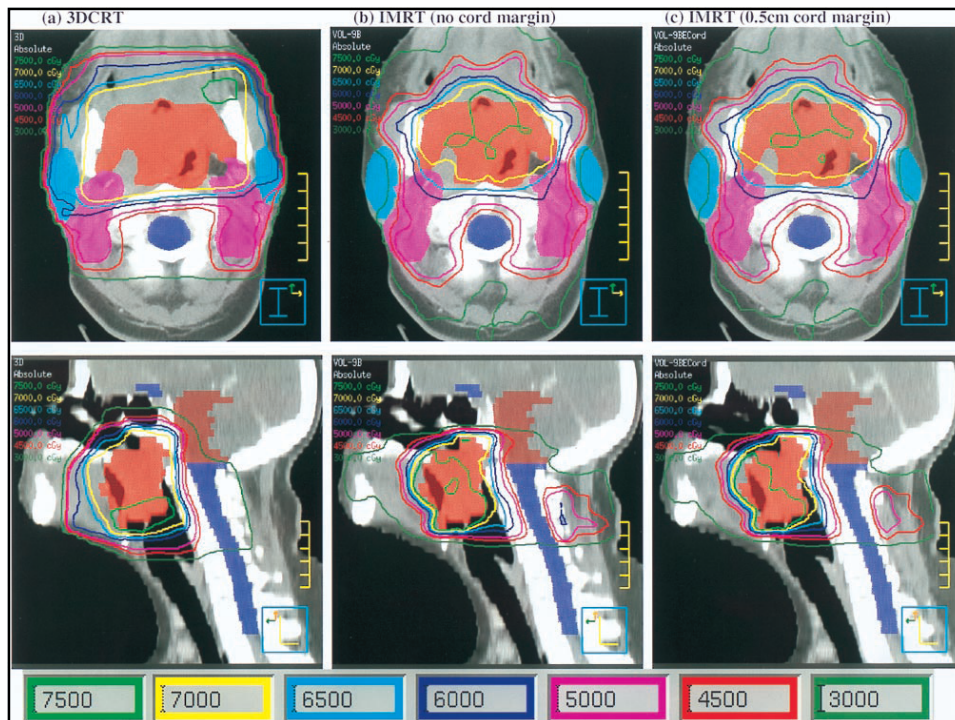
THE POTENTIAL FOR SPARING OF PAROTIDS AND ESCALATION OF BIOLOGICALLY EFFECTIVE DOSE WITH INTENSITY-MODULATED RADIATION TREATMENTS OF HEAD AND NECK CANCERS: A TREATMENT DESIGN STUDY

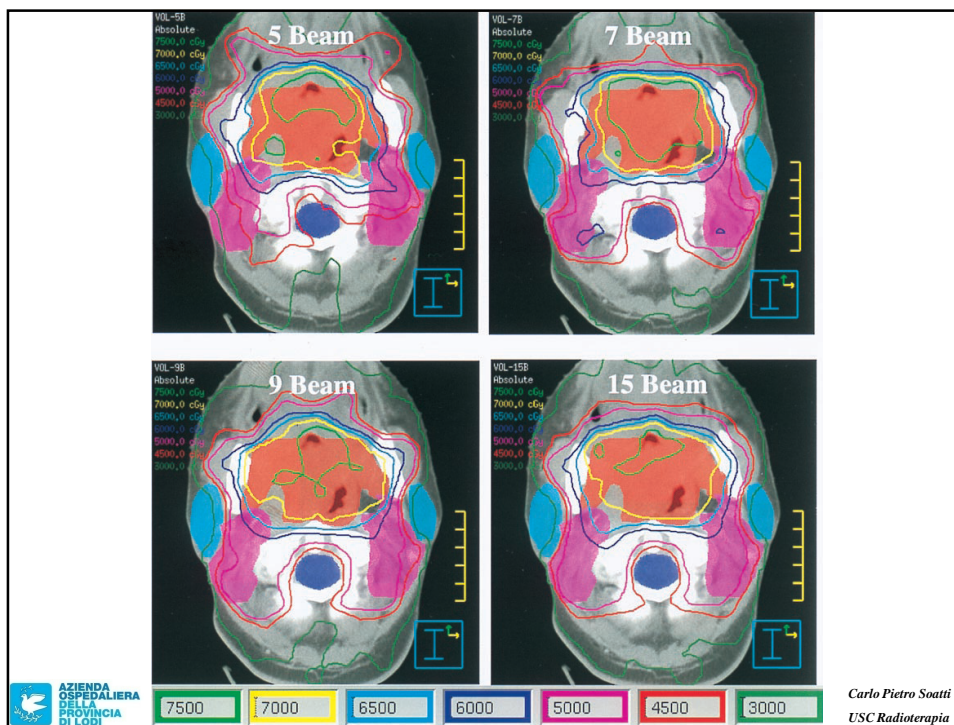
QIUWEN WU, PH.D., MATTHEW MANNING, M.D., RUPERT SCHMIDT-ULLRICH, M.D., AND RADHE MOHAN, PH.D.

Department of Radiation Oncology, Medical College of Virginia, Virginia Commonwealth University and McGuire VA Hospital, Richmond, VA

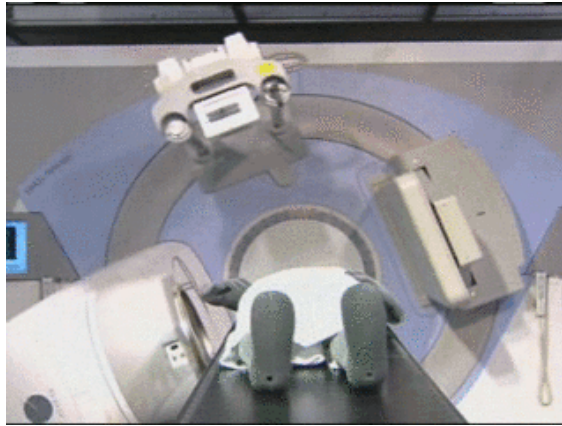


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 USC Radioterapia

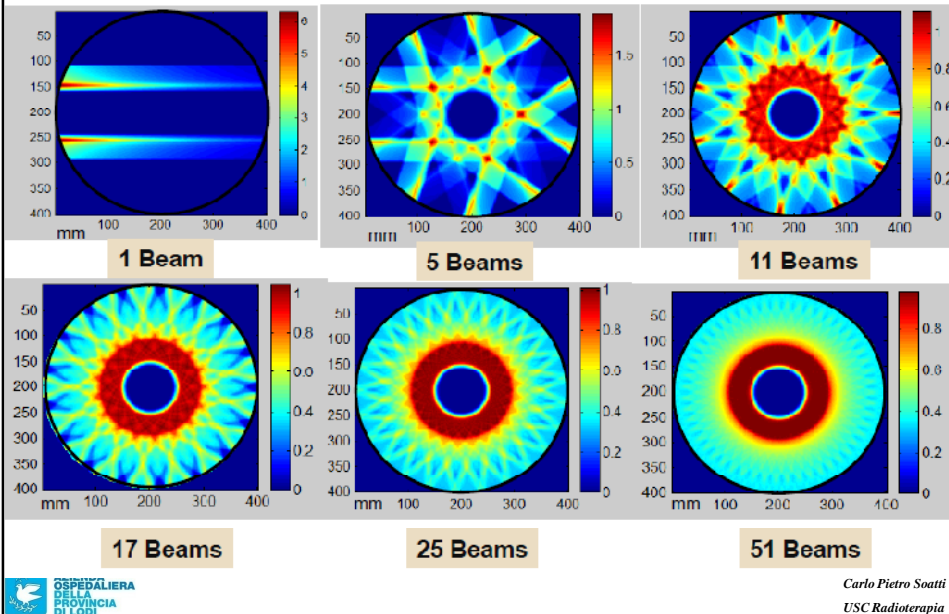




VMAT



Tanti campi...

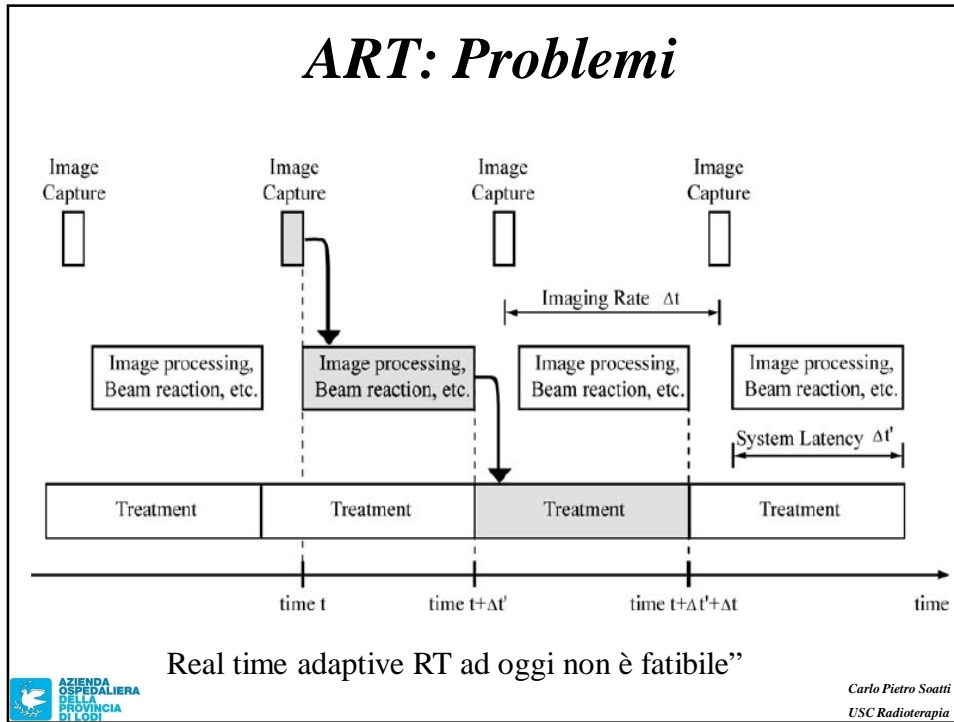


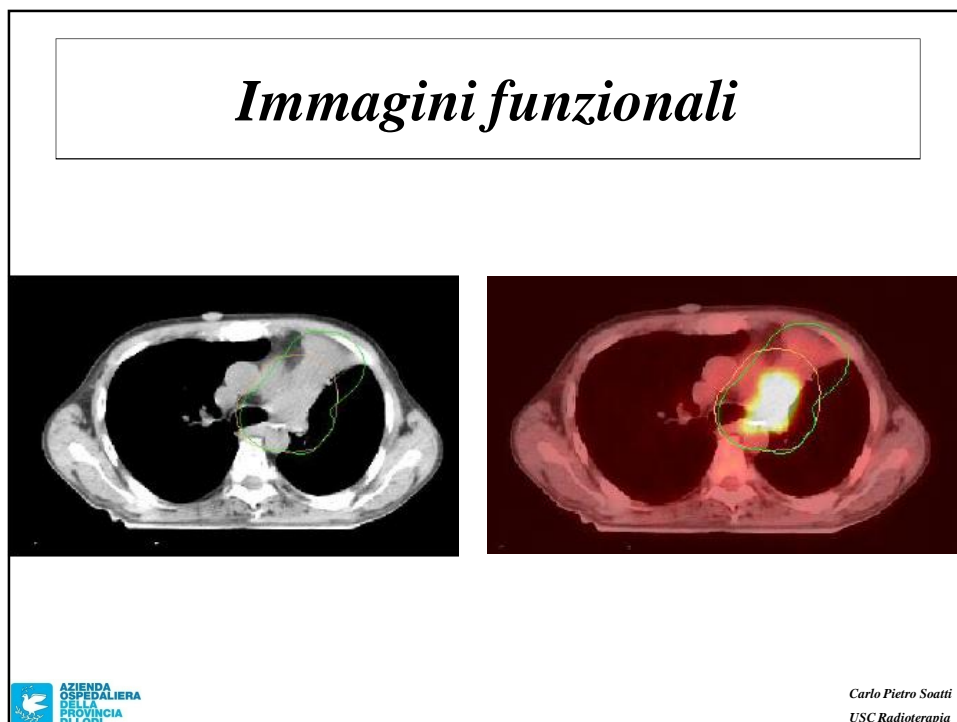
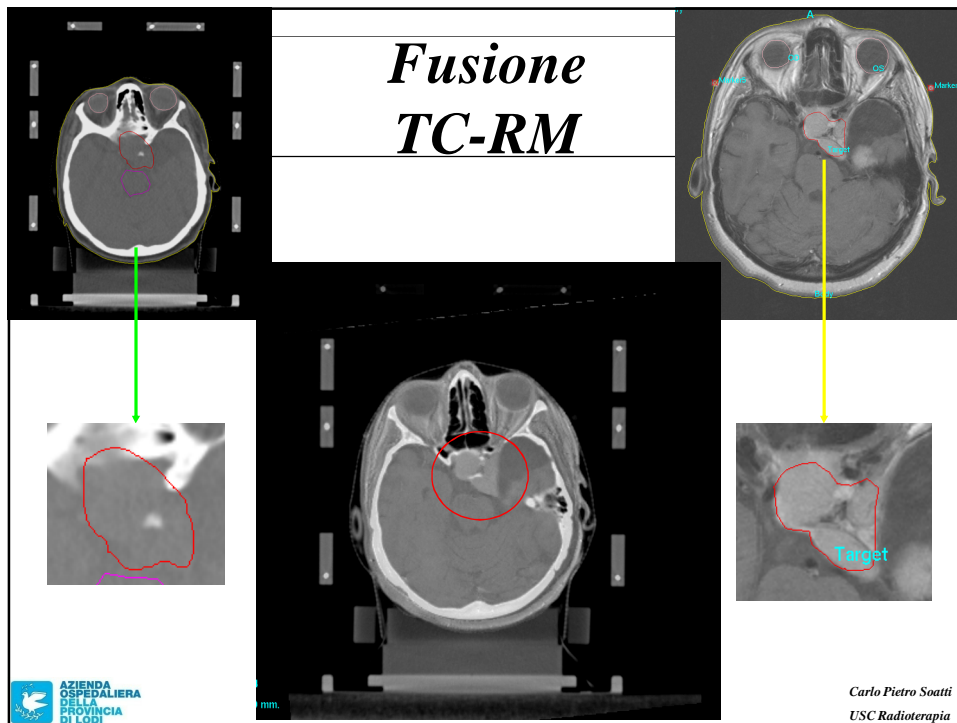
IMRT – VMAT Elekta Stock 2008

IMRT	Prostate	Anus	H&N
Segments	69	101	75
Beams	7	7	7
Total MU	417	419	419
Treatment Time	11 min	14 min	14 min
VMAT			
Sub Arcs	62	73	73
Arcs	2	1	1
Total MU	293	236	271
Treatment Time	5 min	6 min	8 min

Adaptive Radiotherapy (ART)

- la distribuzione di dose viene modificata per adattarsi ad un target mobile o deformabile.
- Due componenti
 - Seguire il movimento d'organo (IGRT)
 - Seguire la deformazione e cambio di volume di tumore e OAR.
- 4 soluzioni per mantenere la posizione del target
 - Muovere il lettino
 - Muovere il fascio elettronicamente
 - Muovere il braccio dell'acceleratore
 - Cambiare l'apertura dell' MLC





Volumi bersaglio

The diagram illustrates four nested target volumes within a grey circular field. From the center outwards, they are: a yellow circle labeled 'BTV', an orange ring labeled 'GTV', a pink ring labeled 'CTV', and an outer grey ring labeled 'PTV'.

- BTV: biologico
- GTV: macroscopico
- CTV: clinico
- PTV: pianificato per errori di set up o movimento d'organo

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USC Radioterapia*

Target biologico..

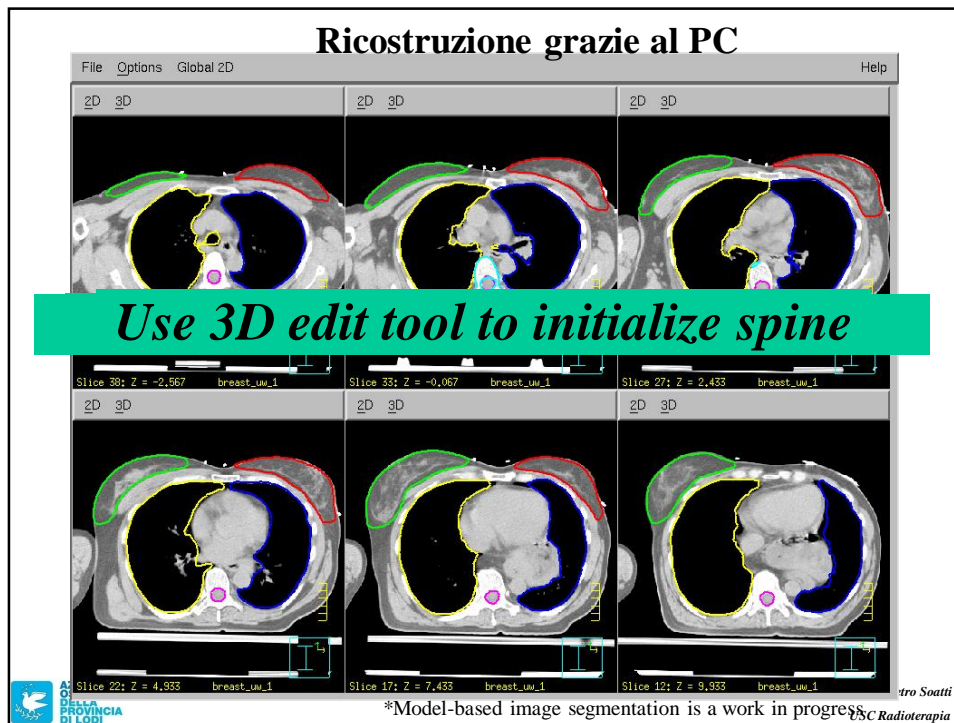
Biological Target Volume

The slide displays six diagrams illustrating different biological target volumes:

- **GTV** and **PTV** (Geometric Target Volume and Planning Target Volume)
- **PET F-miso Hypoxia**
- **MR/MRS choline/citrate Tumor Burden**
- **PET IUDR Tumor Growth**
- **Biological Eye View**
- **PTV** and **Biological Target Volume**

AZIENDA OSPEDALIERA DELLA PROVINCIA DI LODI

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USC Radioterapia*



Albert Einstein

I **computer** sono incredibilmente veloci, accurati e stupidi.

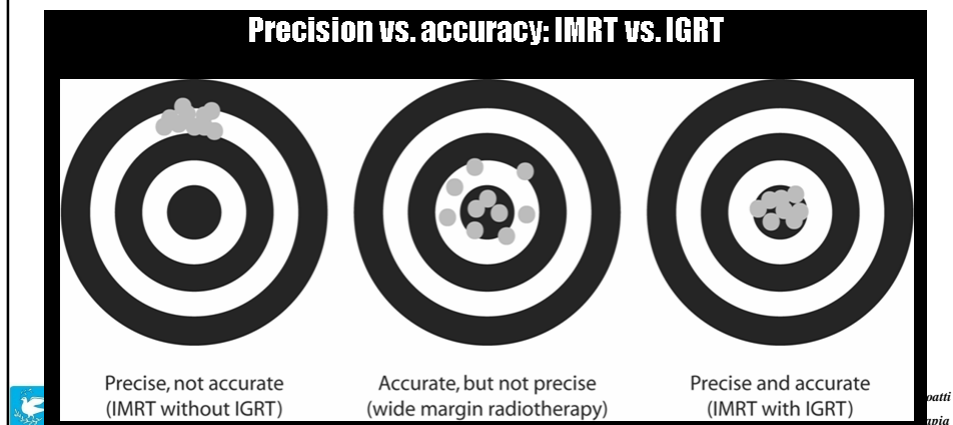
Gli **uomini** sono incredibilmente lenti, inaccurati e intelligenti.

L'insieme dei due costituisce una forza incalcolabile.

Ridurre i volumi?



- La combinazione di IGRT e IMRT consente di aumentare la precisione dell'erogazione dei trattamenti



IGRT anni '70 ..

Si seguiva il dito del
Professore:...

” fai la terapia ...qui!”

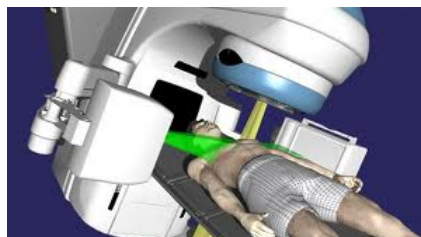


OSPEDALIERA
DELLA
PROVINCIA
DI LODI



Soatti
pia

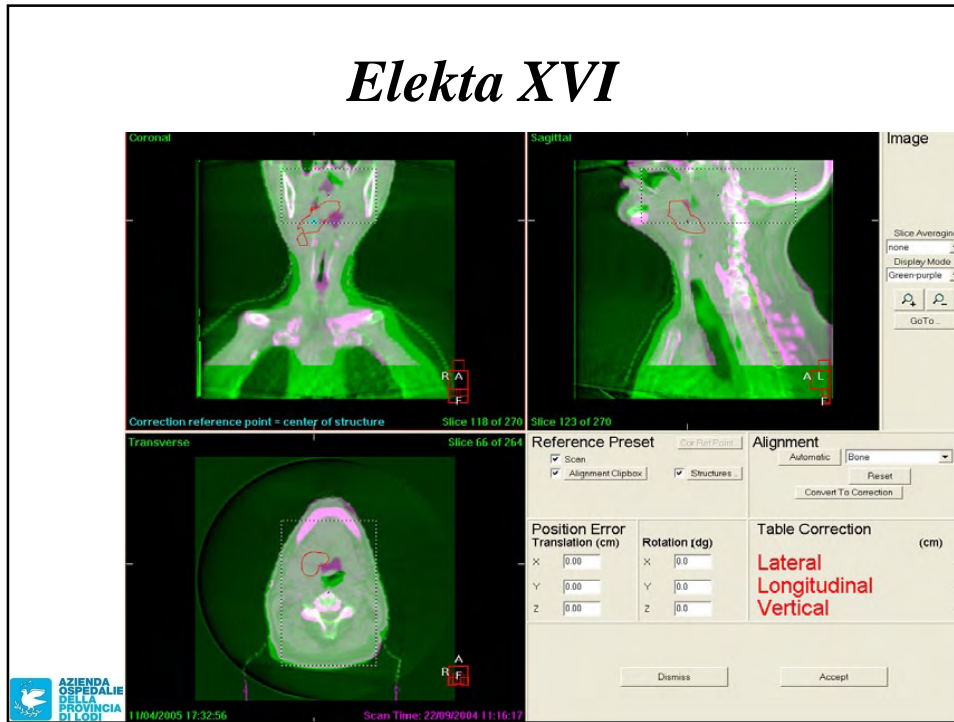
Cone Beam CT



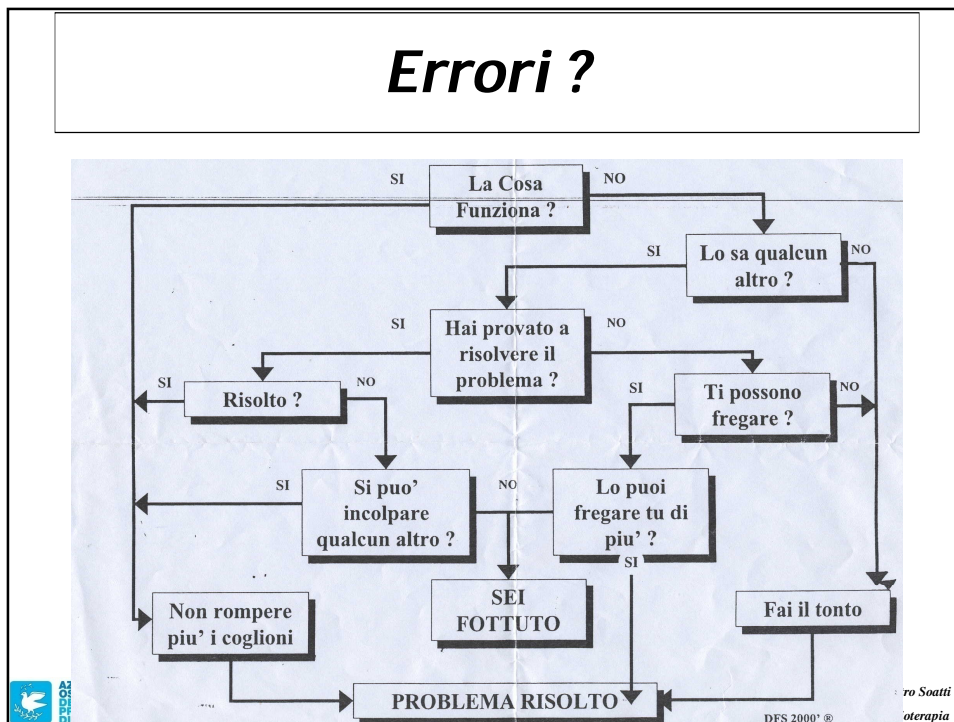
AZIENDA
OSPEDALIERA
DELLA
PROVINCIA
DI LODI

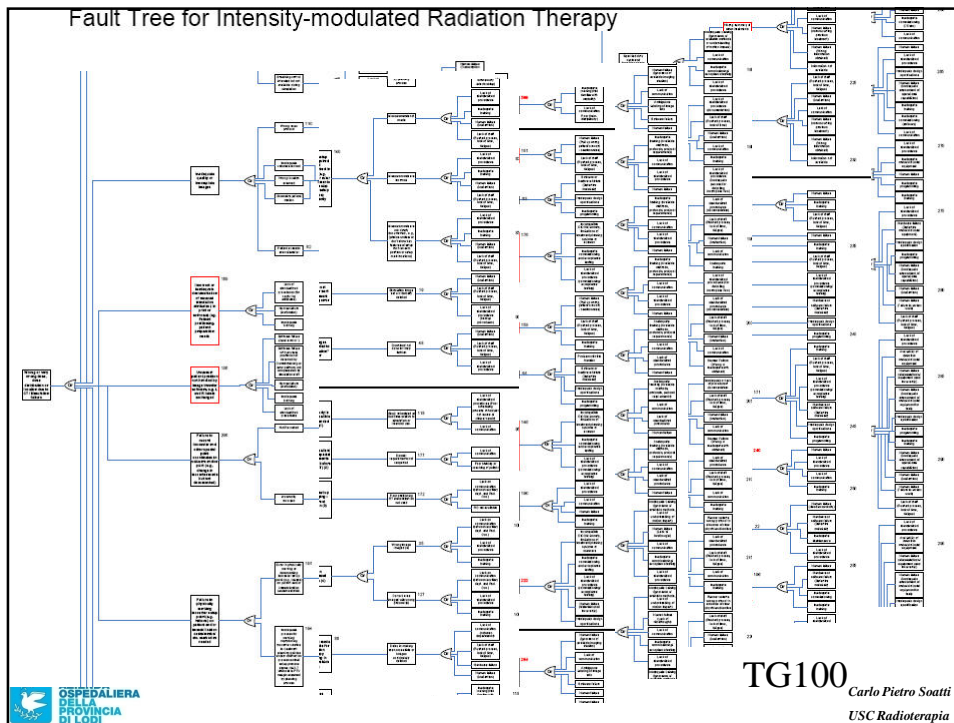
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Elekta XVI



Errori ?





*Roba da far rizzare i capelli....
ad averli...*



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Conclusioni?

Clinician Guide



Effective Health Care Program

Cancer
Head and Neck Cancer

Comparative Effectiveness and Safety of Radiotherapy Treatments for Head and Neck Cancer

Cosa dicono?



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Comparative Effectiveness Regarding Improved Tumor Control or Survival

Comparison	Evidence on Tumor Control or Survival
IMRT vs. 3DCRT	Insufficient
IMRT vs. 2DRT	Insufficient
2DRT vs. 3DCRT	Insufficient

IMRT = intensity-modulated radiation therapy; 2DRT = two-dimensional radiation therapy;
3DCRT = three-dimensional conformal radiation therapy

Samson DJ, et al. AHRQ Comparative Effectiveness Review No. 20.



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Qualità di vita e tossicità

Adverse Effects: IMRT is associated with a lower incidence of late xerostomia when compared to 3DCRT (●●○) or 2DRT (●●○). There is insufficient evidence to permit conclusions about the comparative effects of 2DRT, 3DCRT, or IMRT on adverse events other than late xerostomia.

Quality of Life: Patients who received IMRT had improved quality of life, with respect to late xerostomia, when compared with those who received 3DCRT (●●○) or 2DRT (●●○). There is insufficient evidence to determine the comparative effects of IMRT, 3DCRT, and 2DRT on other quality-of-life measures.

Confidence Scale

- High: ●●● There are consistent results from good-quality studies. Further research is very unlikely to change the conclusions.
- Moderate: ●●○ Findings are supported, but further research could change the conclusions.
- Low: ●○○ There are very few studies, or existing studies are flawed.



Conclusioni....

Experience of Treatment Team: The data is insufficient to determine whether the experience of the clinical team confers an advantage, because no comparative studies addressed this issue.

Siamo ancora al punto

Findings are supported, but further research could change the conclusions.

Ci vorrebbero data base comuni,
..rete...



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USC Radioterapia

Nuove tecnologie Troppo “giovani”...



Non sono ancora disponibili dati clinici esaustivi



Non facciamoci del male...



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USC Radioterapia

Grazie a tutti..

Spero di non aver disturbato
troppo il vostro sonno



Spengo Alla prossima...

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