Associazione Italiana Radioterapia e Oncologia clinica

Società Italiana di Radiobiologia

SIB IMRT, premesse e risultati

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DICHIARAZIONE

Relatore: Anna M

Come da nuova regolamentazione della Commissione Nazionale per [illegible] ntinua del Ministero della Salute, è richiesta la trasparenza delle fonti di finanziamento e dei rapporti con [illegible] interessi commerciali in campo sanitario.

- Posizione di dipendente in aziende con interess[illegible]po sanitario **(NIENTE DA DICHIARARE)**
- Consulenza ad aziende con interessi com[illegible]itario **(NIENTE DA DICHIARARE)**
- Fondi per la ricerca da aziende con inter[illegible]n campo sanitario **(NIENTE DA DICHIARARE)**
- Partecipazione ad Advisory Board **(N[illegible]ARARE)**
- Titolarità di brevetti in comparte[illegible]ende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Partecipazioni azionarie in azien[illegible]eressi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Altro

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Fatti: confronto seq-SIB

STORIA

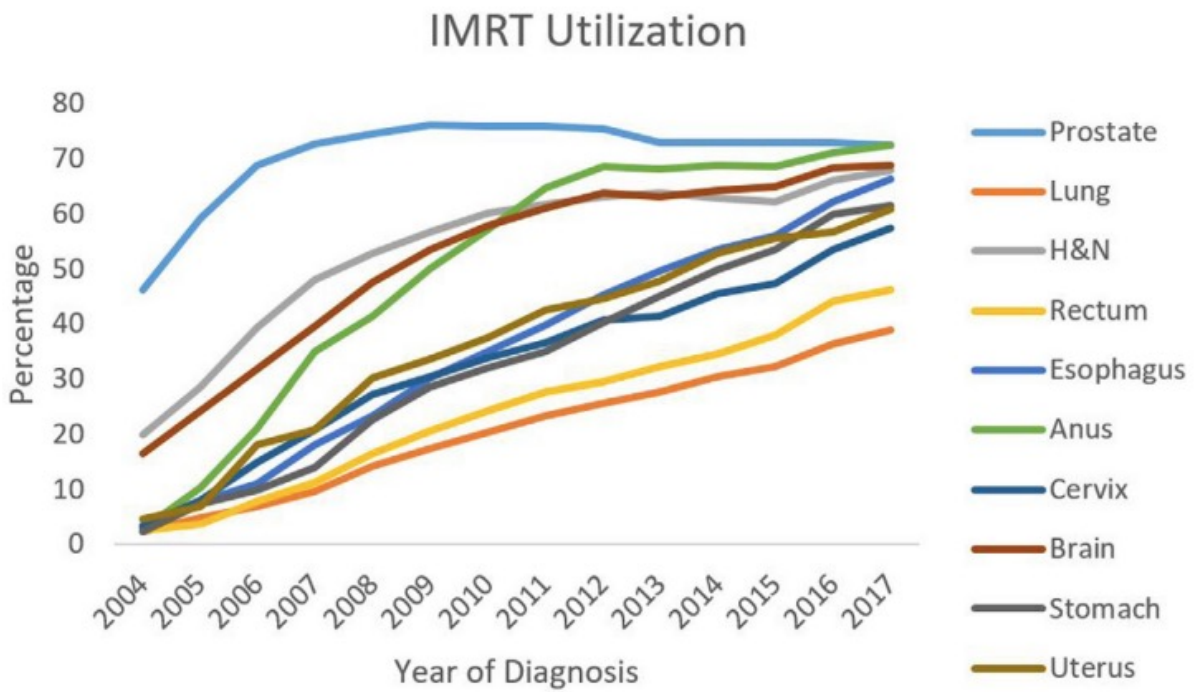
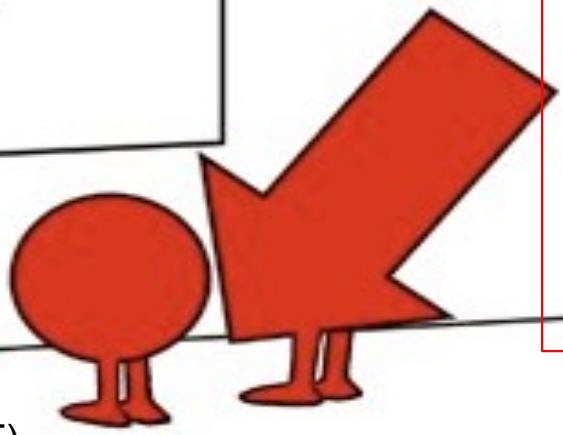


Fig. 2 Rates of IMRT utilization between 2004 and 2017. *Abbreviations*: H&N = head and neck; IMRT = intensity modulated radiation therapy.

RJ Hutten Adv Radiat Oncol. 2022 Jan 20;7(3):100887.



IPOFRAZIONAMENTI

RTOG 00-22 (2001-2005) (IMRT SIB)

RTOG 0225 (2003-2005) (IMRT SIB +/-CHT)

RTOG 00-22

- to investigate whether the early successes of IMRT reported by few institutions could be reproduced in a multi-institutional setting
- (T1–2, N0–1, M0) Oropharynx –**IMRT- no cht**
- Multiple fraction was initially desired for this study- **not feasable**

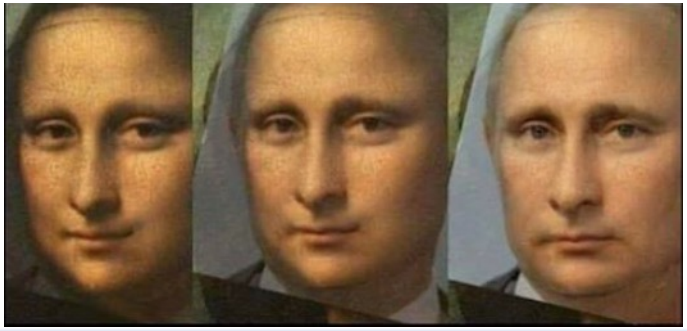
- Moderate **acceleration**

2.2 Gy	30 fx	66 Gy (PTVHD)
2 Gy	30 fx	60 Gy (PTV HR)
1.8 Gy	30 fx	54 Gy (PTV LR)

Eisbruch A. Int. J. Radiat Oncol Biol Phys, Vol. 76, No. 5, pp. 1333–1338, 2010

Ripopolamento cellulare H&N

- Inizia dopo 3-4 settimane per carcinomi squamosi
- Fino a 0.6 Gy vanno a “compensare” l’aumento di cellule tumorali dovuto al ripopolamento.
- Per ogni giorno di prolungamento del tempo totale di trattamento si perde 1% di controllo tumorale

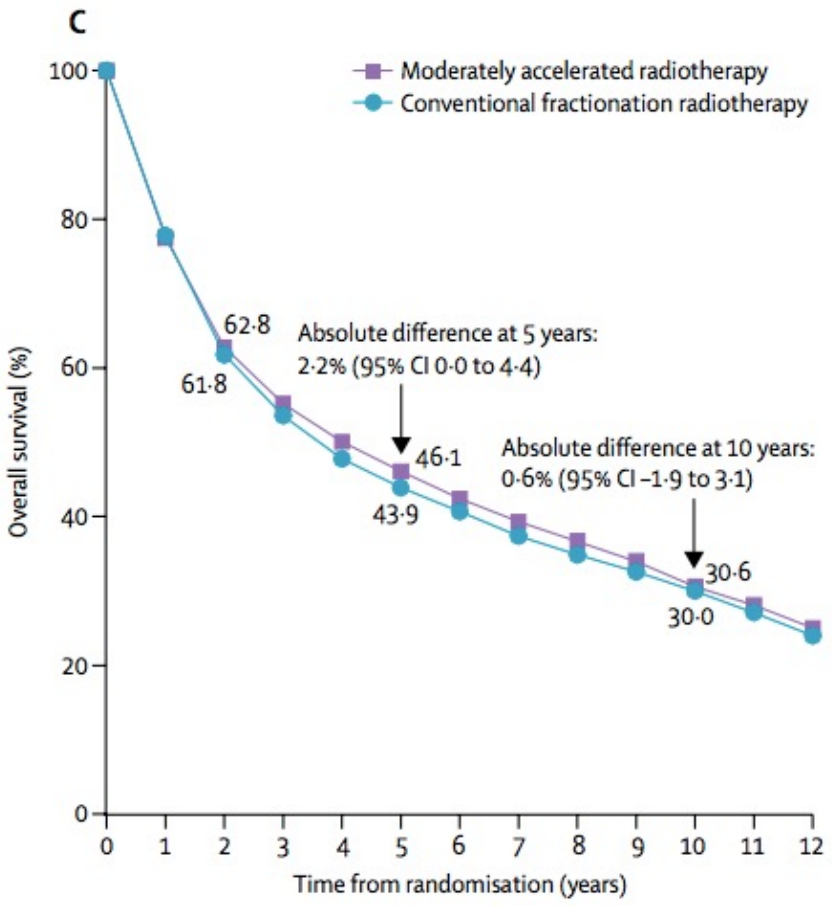


Withers HR et al. Acta Oncol 1988;27:131–46.

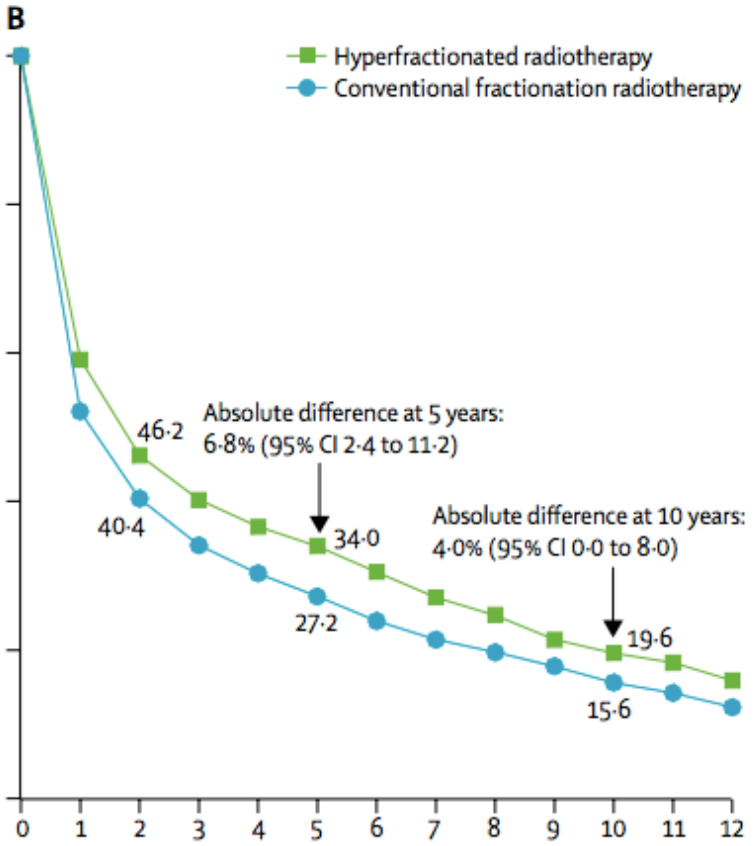
Nei pazienti H&N: MARCH

- 33 trials, 11 423 patients. Follow-up 7.9-10 y. Per lo più orofaringe e laringe; 5221 (74%) pazienti di stadio III-IV della malattia.
- significant benefit on overall survival for hyperfractionated group: absolute differences at 5 years of 8·1% (3·4 to 12·8) and at 10 years of 3·9% (–0·6 to 8·4).
- Altered fractionation radiotherapy absolute difference at 5 years of 3·1% (95% CI 1·3–4·9) and at 10 years of 1·2% (–0·8 to 3·2).
- Overall survival was significantly worse with altered fractionation radiotherapy compared with concomitant chemoradiotherapy: absolute differences at 5 years of –5·8% (–11·9 to 0·3) and at 10 years of –5·1% (–13·0 to 2·8).

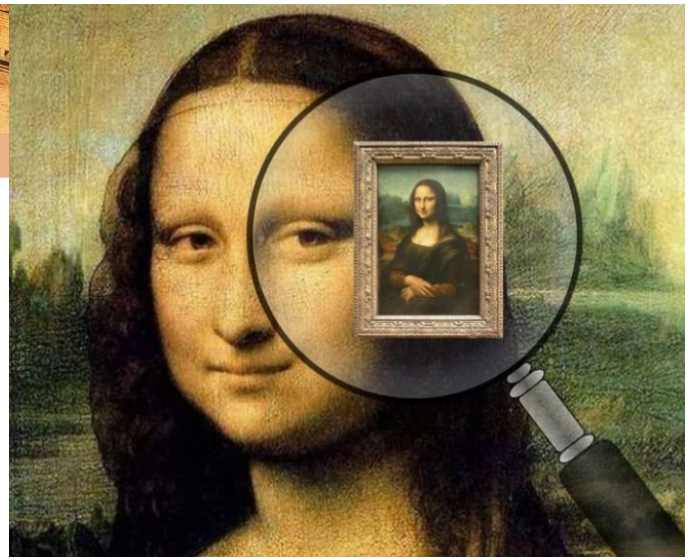
Lucas B. Et al. MARCH Collaborative Group (MARCH): an updated meta-analysis. Lancet Oncol. 2017 Sep;18(9):1221-1237



	Years 0–2	Years 2–5	Years 5–10	Years 10+
Moderately accelerated radiotherapy (deaths/person-years)	1497/6347	610/5816	343/4291	152/1412
Conventional fractionation radiotherapy (deaths/person-years)	1525/6292	650/5528	309/4005	153/1334



	Years 0–2	Years 2–5	Years 5–10	Years 10+
Hyperfractionated radiotherapy (deaths/person-years)	449/1122	106/985	94/861	46/366
Conventional fractionation radiotherapy (deaths/person-years)	507/980	106/773	71/628	34/272



Narrazione

«MA CI SONO ALTRI VANTAGGI»

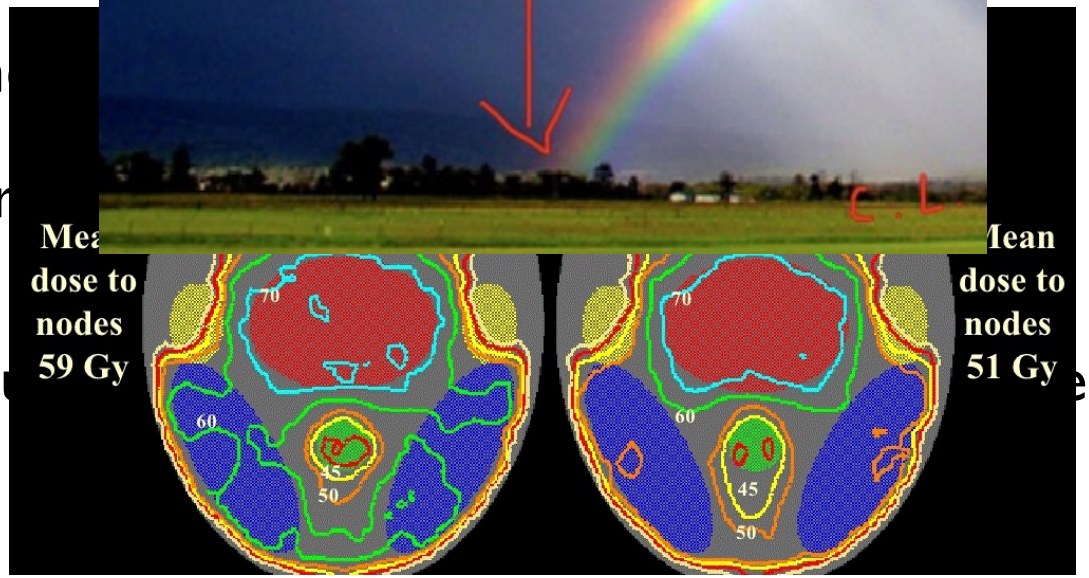
- Pianificazione ed esecuzione più semplice, efficiente
- Possibilità di associare cht
- Stesso piano dall'inizio alla fine del trattamento
- Vantaggio dosimetrico

Narrazione

- dose distribution … B- IMRT, yielding both better cove … et tissues sparing*
- single treatm …

1. fr …

2. "simu … erapy"



*Mohan R Int J Radiat Oncol Biol Phys 2000;46:619–30.

RADIATION THERAPY ONCOLOGY GROUP

RTOG 1005

A PHASE III TRIAL OF ACCELERATED WHOLE BREAST IRRADIATION WITH HYPOFRACTIONATION PLUS CONCURRENT BOOST VERSUS STANDARD WHOLE BREAST IRRADIATION PLUS SEQUENTIAL BOOST FOR EARLY-STAGE BREAST CANCER

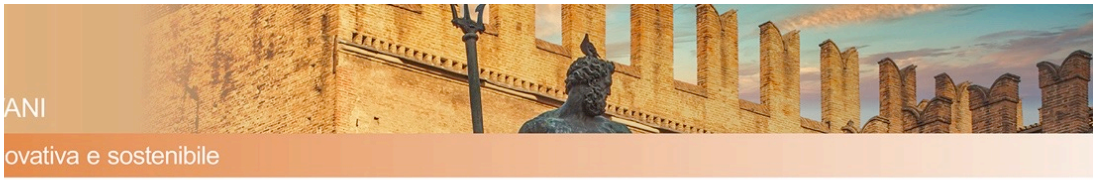
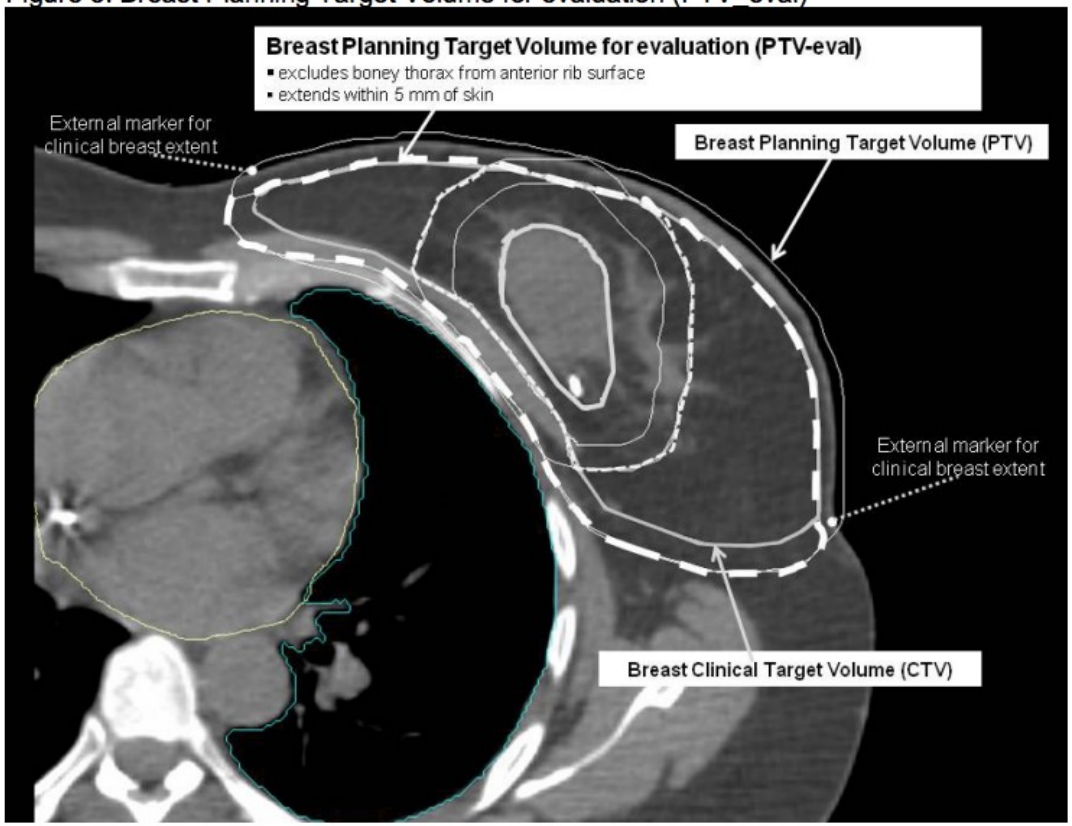


Figure 5. Breast Planning Target Volume for evaluation (PTV_eval)



APPENDIX VII

DOSE VOLUME HISTOGRAM CONSTRAINTS

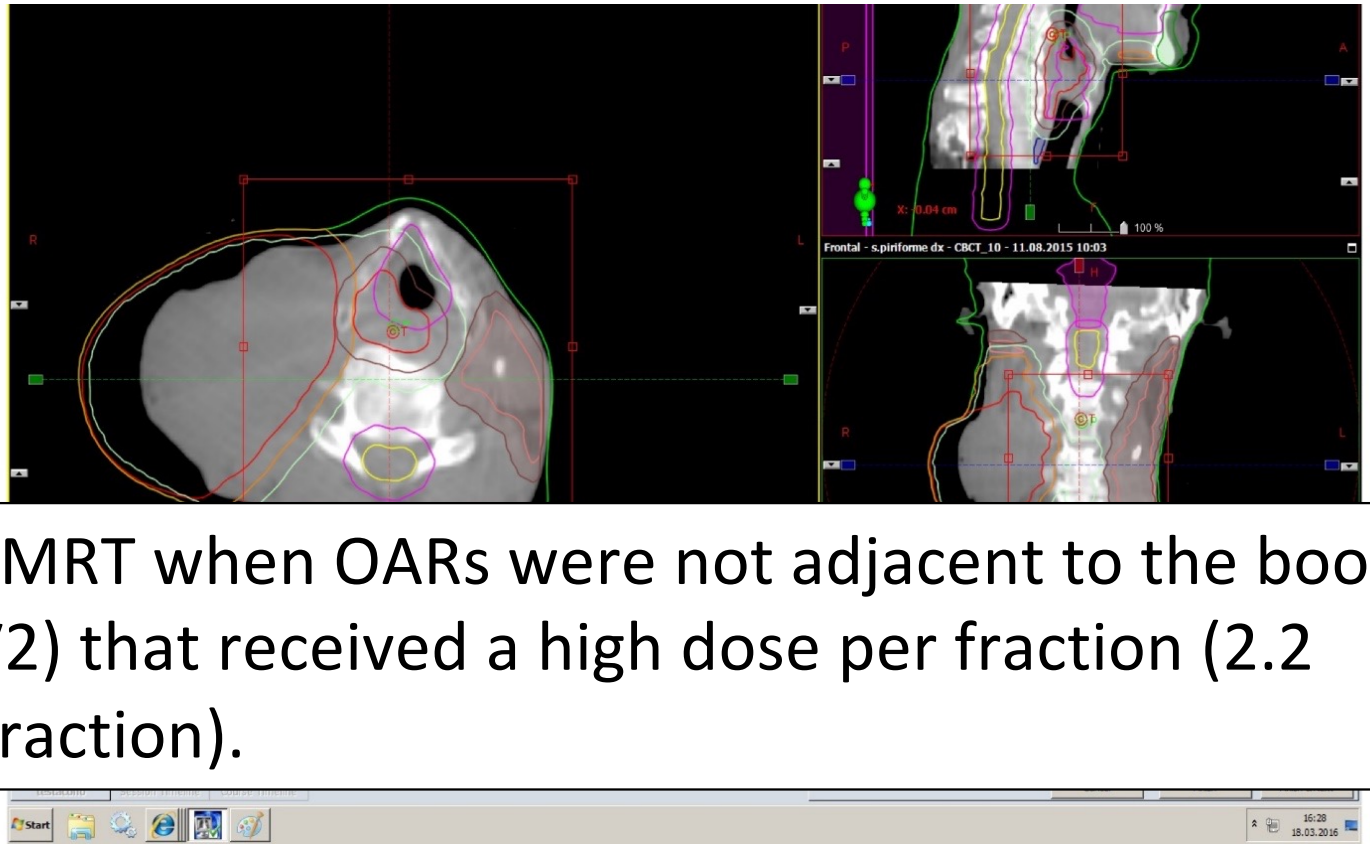
Breast PTV Eval

Breast PTV eval Description	Constraint			ARM I 50 Gy in 25 sequential 12-14 Gy boost total 62-64 Gy	ARM I 42.7 in 16 sequential 12-14 Gy boost total 54.7-56.7 Gy	ARM II 40 Gy in 15 concurrent boost to 48 Gy
	Goal	Volume	Dose			
Breast PTV Eval receiving whole-breast dose	Ideal	≥ 95% of the breast PTV Eval receives	≥ 95% of whole breast dose	≥ 47.5 Gy	≥ 40.6 Gy	≥ 38 Gy
	Acceptable	≥ 90% of the breast PTV Eval receives	≥ 90% of whole breast dose	≥ 45 Gy	≥ 38.4 Gy	≥ 36 Gy
Breast PTV Eval receiving boost dose	Ideal	≤ 30% of the breast PTV Eval receives	≥ 100% of boost dose	≥ 62-64 Gy	≥ 54.7-56.7 Gy	≥ 48 Gy
	Acceptable	≤ 35% of the breast PTV Eval receives	≥ 100% of boost dose	≥ 62-64 Gy	≥ 54.7-56.7 Gy	≥ 48 Gy
Breast PTV Eval receiving above the whole-breast dose	Ideal	≤ 50% of the breast PTV Eval receives	≥ 108% of whole breast dose	≥ 54 Gy	≥ 46.1 Gy	≥ 43.2 Gy
	Acceptable	≤ 50% of the breast PTV Eval receives	≥ 112% of whole breast dose	≥ 56 Gy	≥ 47.8 Gy	≥ 44.8 Gy

Table 5
Ideal dose-volume criteria for heart and corresponding achieved values (averages and standard deviations). Averages and standard deviations were calculated separately for left and right breasts for all plan options with data from applicable cases. $V_{16\ Gy}$ and $V_{8\ Gy}$ of heart for right breast, which were trivial for all plan options, are not listed

Plan options	Left			Right
	$V_{16\ Gy} \leq 5\%$	$V_{8\ Gy} \leq 30\%$	$D_{mean/40\ Gy} \leq 8\%$	$D_{mean/40\ Gy} \leq 8\%$
3D + 3D	2.0 ± 1.8	3.8 ± 2.5	4.9 ± 2.1	2.0 ± 1.5
3D + e	1.8 ± 1.8	3.5 ± 2.5	4.4 ± 2.1	2.3 ± 2.0
3D + IMRT	2.0 ± 1.8	3.9 ± 2.4	5.0 ± 2.1	1.8 ± 1.6
IMRT + 3D	1.9 ± 1.6	4.3 ± 3.5	4.6 ± 1.7	2.1 ± 1.8
IMRT + e	1.7 ± 1.7	4.0 ± 4.1	4.4 ± 1.7	1.9 ± 1.2
IMRT + IMRT	1.9 ± 1.6	4.3 ± 3.5	4.6 ± 1.7	1.6 ± 1.1
SIB	2.2 ± 1.6	4.9 ± 3.8	4.8 ± 1.8	1.5 ± 1.4

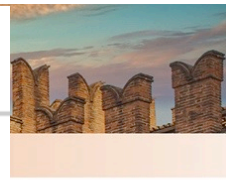
Quando è meglio Seq-IMRT o SIB



SIB-IMRT when OARs were not adjacent to the boost volume (PTV2) that received a high dose per fraction (2.2 Gy/fraction).

Radiation Oncology

BioMed Central



Radiation Oncology 2006, 1:7 doi:10.1186/1748-717X-1-7

Research

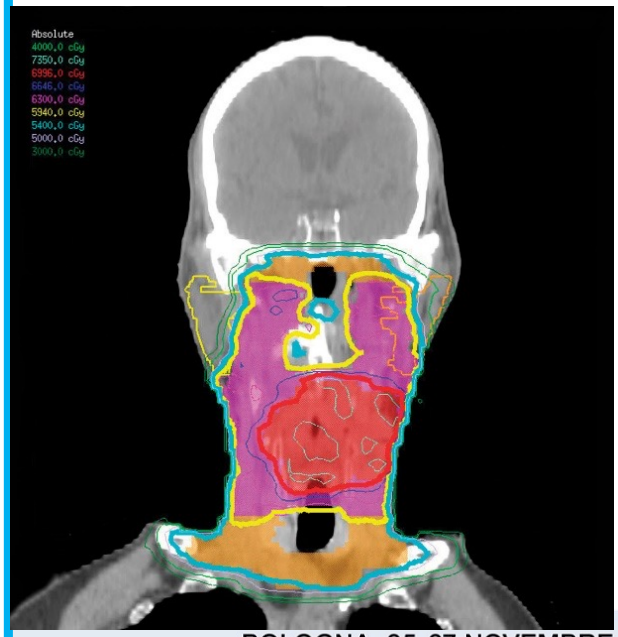
Open Access

IMRT using simultaneously integrated boost (SIB) in head and neck cancer patients

G Studer*[1], PU Huguenin[1], JB Davis[2], G Kunz[2], UM Lütolf[1] and C Glanzmann[1]

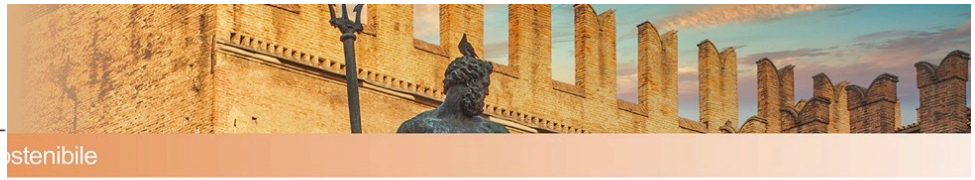
La dose/frazione che possiamo somministrare senza aumentare troppo le sequele è organo dipendente:

- dosi/frazione superiori a 2.2 Gy non sono raccomandate per la laringe



Original Research Article

TJ Tumori Journal



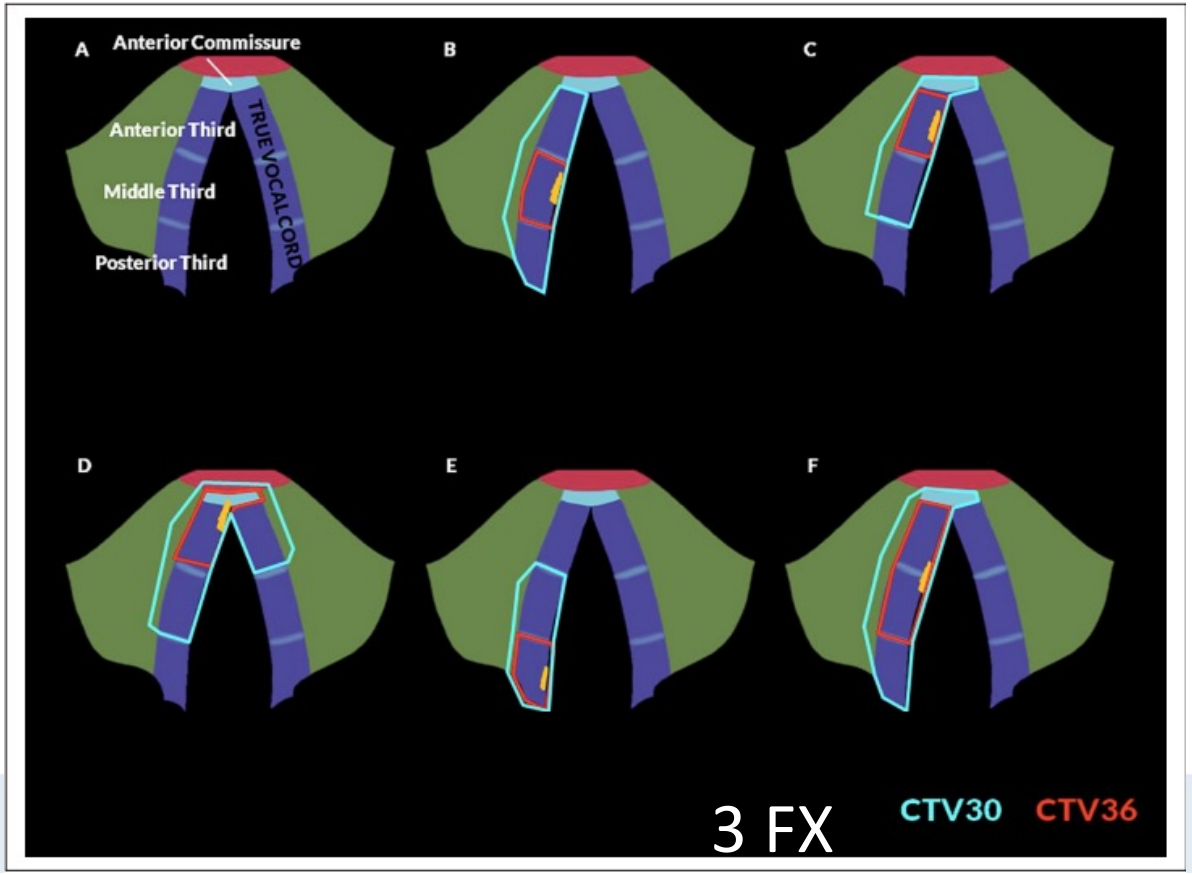
Stereotactic body radiotherapy for T1 glottic cancer: dosimetric data in 27 consecutive patients

Tumori Journal
1–11

DOI: 10.1177/0300891621100044O
journals.sagepub.com/home/tmj
SAGE

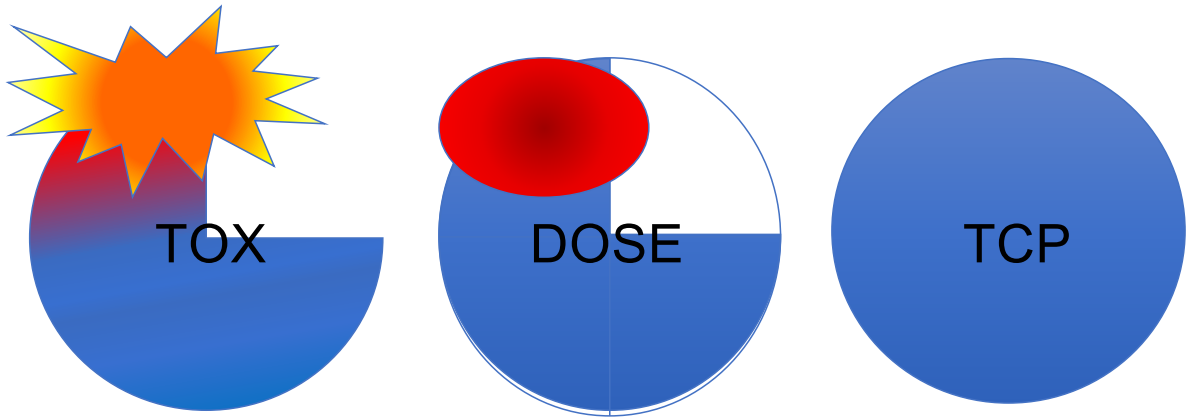
Giuseppe Sanguineti[1], Raul Pellini[2], Antonello Vidiri[3], Simona Marzi[4], Pasqualina D'Urso[1], Irene Terrenato[5], Alessia Farneti[1], Valentina Fuga[1], Sara Ungania[4] and Valeria Landoni[4]

- Piccoli volumi!
- Alta precisione!



LA RIVOLUZIONE COPERNICANA DEL RADIOTERAPISTA!

LA RIVOLUZIONE COPERNICANA DEL RADIOTERAPISTA!



"farmacocinetica" e "farmacodinamica" della Radioterapia

FARMACOCINETICA: assorbimento, distribuzione, (metabolismo, eliminazione)

- Numerosissimi studi di comparazione dosimetrica

FARMACODINAMICA: effetti sull'organismo e meccanismo d'azione.

- Pochissimi studi di analisi delle tossicità in relazione alle aree che hanno ricevuto dosi frazione > 2 Gy

Obiettivi per ottimizzazione del pdt

Per ridurre tox

- - no more than 20 % of any PTV will receive >110 % of it's prescribed dose.
- - no more than 1 % or 1 cc of the tissue outside the PTV will receive > 110 % of the dose prescribed to the primary PTV

Per mantenere TCP

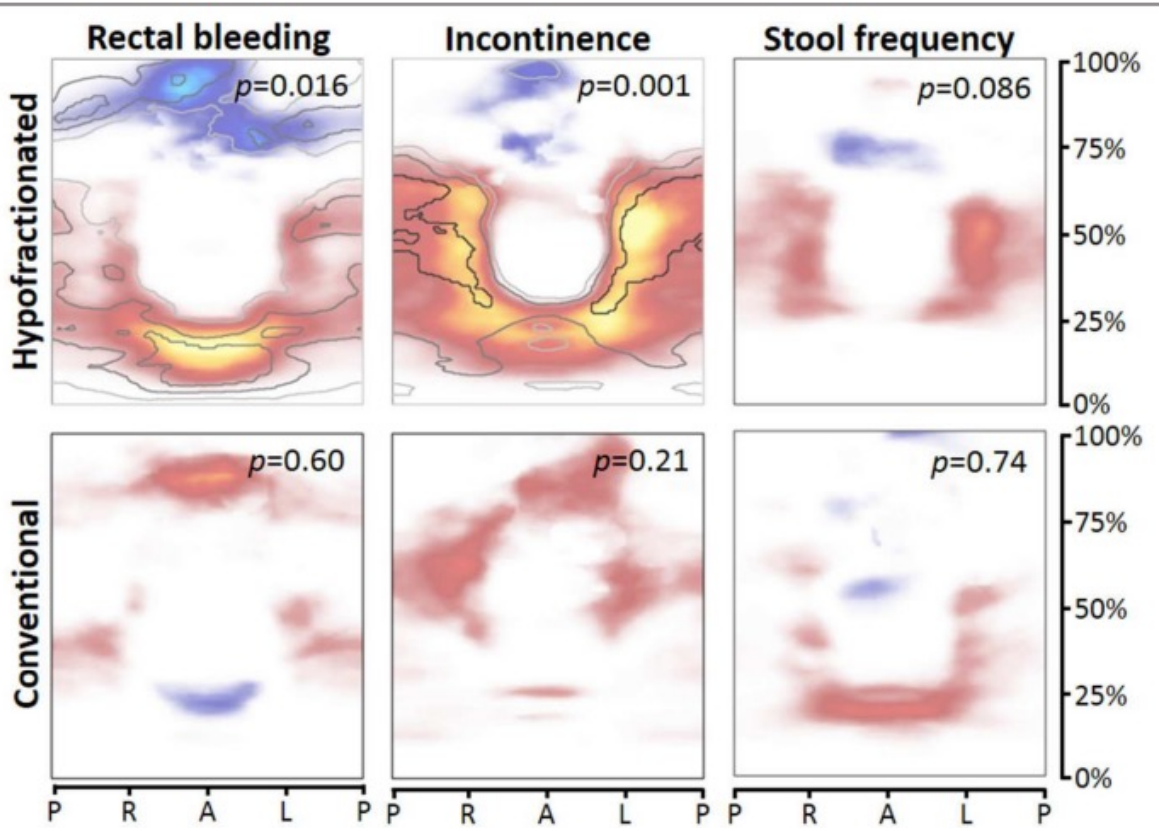
- - no more than 1 % of PTV1 will receive < 93 % of its prescribed dose
- - The prescription dose is the isodose which encompasses at least 95 % of the PTV

Handling hypofx doses to OARS: HYPRO trial

- HF (64.6 Gy in 19 fractions) or CF (78.0 Gy in 39 fractions). EQD2 was 90.4 Gy for HF versus 78.0 Gy for CF NEGATIVE STUDY
- function and radiosensitivity may vary within an organ, and that dose-shapes might be relevant.
- voxel-based dose mapping procedures have been introduced to take into account the spatial dose distribution by co-registering dose distributions to a region of interest. For hollow organs such as the rectum, a spatial 2D dose distribution of the rectal wall (i.e., virtual unfolding of the rectum to a 2D structure).
- just by calculating EQD2 for a HF schedule, this might not completely capture the biological effect of a HF treatment.

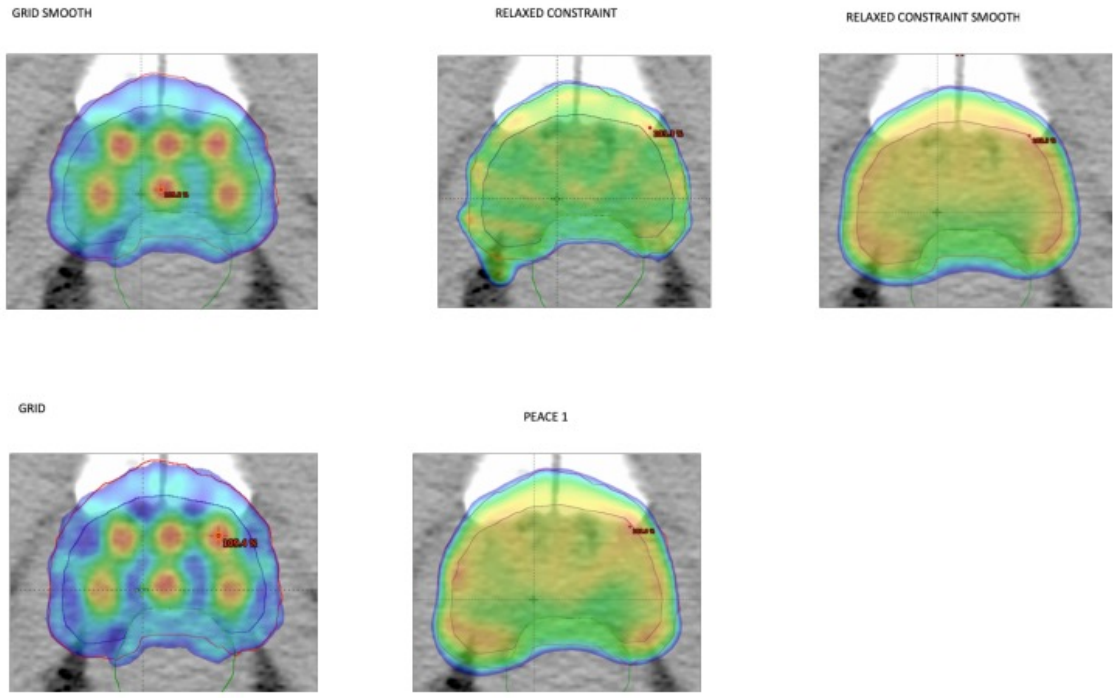
WD Heemsbergen et al. Front Oncol. 2020 Apr 3;10:469

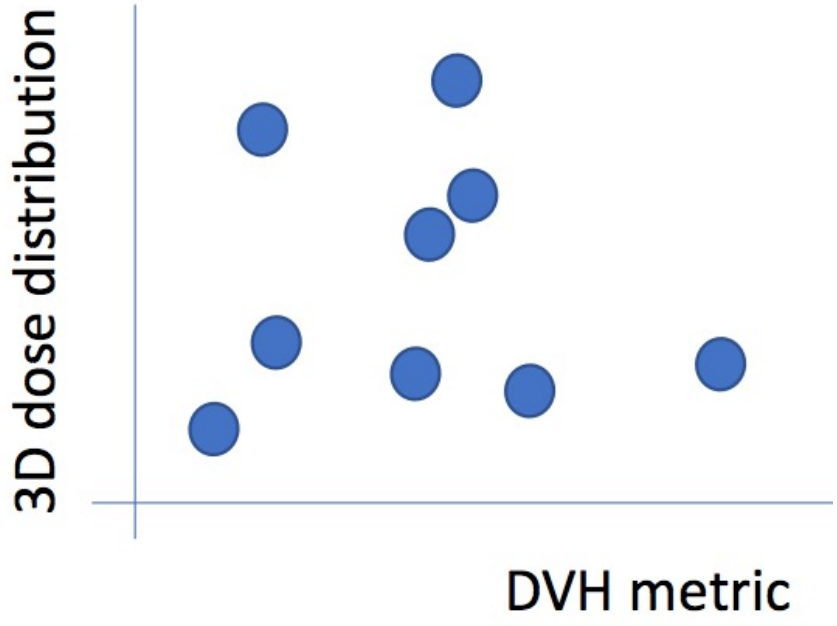
- for the endpoint fecal leakage (age and diabetes) and for the endpoints rectal bleeding and mucus (T stage) predictive clinical covariates were identified.



Dose difference maps (1EQD2) based on total rectum dose mapping, for the toxicity endpoints (moderate to severe), for the hypofractionated and conventional group separately.

- The same two histograms can hide completely 3D dose distributions





Courtesy Núria Jornet

cancers

Cancers 2021, 13, 3835

MDPI

Article

A Multicentre Evaluation of Dosiomics Features Reproducibility, Stability and Sensitivity

Lorenzo Placidi [1,*,†], Eliana Gioscio [2,†], Cristina Garibaldi [3], Tiziana Rancati [2], Annarita Fanizzi [4], Davide Maestri [5], Raffaella Massafra [4], Enrico Menghi [6], Alfredo Mirandola [5], Giacomo Reggiori [7], Roberto Sghedoni [8], Pasquale Tamborra [4], Stefania Comi [9], Jacopo Lenkowicz [1], Luca Boldrini [1] and Michele Avanzo [10]

- Patients' 3D dose distributions can be considered as an image with spatial and statistical distributions of dose levels that can be investigated using texture analysis
- Dosomics can be considered as an effective method to parameterize dose distribution in specific region of interest (ROIs) by intensity, textural and shape-based dose features, able to describe the dose distribution at a higher complexity level than those obtain using DVHs. The integration of these parameters with the DVH could potentially improve the predictive performance of NTCP models

COMPLEX CORRELATION!

STILL LIMITED LONG TERM OUTCOME DATA

AIR

Radiobiological basis and clinical results of the simultaneous integrated boost (SIB) in intensity modulated radiotherapy (IMRT) for head and neck cancer: A review

Ester Orlandi [a,*], Mauro Palazzi [a], Emanuele Pignoli [b], Carlo Fallai [a], Antonella Giostra [b], Patrizia Olmi [a]

Author	FS/NF/TD	Tumor		Acute responding tissues BED	Late reacting tissues BED
		BED	NTD2Gy		
Conventional	2/35/70	71.5	70	56.3	116.9
Butler et al.	2.4/25/60	68.2	66.8	56.4	108
Schwartz et al.	2.4/25/60	68.2	66.8	56.4	108
Studer et al.	2.11/33/69	72.5	71	58	119.6
	2.2/30/66	71.1	69.6	57.6	115.4

Critical Reviews in Oncology/Hematology 73 (2010) 111–125

Radiobiological basis and clinical results of the simultaneous integrated boost (SIB) in intensity modulated radiotherapy (IMRT) for head and neck cancer: A review

Ester Orlandi [a,*], Mauro Palazzi [a], Emanuele Pignoli [b], Carlo Fallai [a], Antonella Giostra [b], Patrizia Olmi [a]

	Worst acute tox %		Worst late tox %	
Butler	Mucosite G3	80%	-	-
	Faringite G3	50%	-	-
Shwartz	Mucosite G3	55%		
	Disfagia G3	20%	Disfagia G3	4
Studer	Mucosite G3	15%	Mucosite G3-4	10.4
	Disfagia G3	20%	Disfagia G3	1.7

Critical Reviews in Oncology/Hematology 73 (2010) 111–125

Tossicità accettabili ?

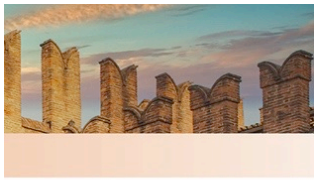
- 20 patients with primary head and neck carcinomas were treated with SMART boost technique.
- 2.4/2 Gy 5 weeks 60/50 Gy tot
- worsen the acute toxicity

Tox RTOG	
Mucosite G3	80%
Faringite G3	50%
Calo peso > 10%	15%
EN/FT	50%
Xerostomia G2	45% (< 6 mesi)

- Better tumor response (95% CR mean F-up 15.2 months)
- Acceptable toxicity

Butler EB Int J Radiat Oncol Biol Phys. 1999 Aug 1;45(1):21-32

Moderately accelerated intensity-modulated radiation therapy using simultaneous integrated boost: Practical reasons or evidence-based choice? A critical appraisal of literature

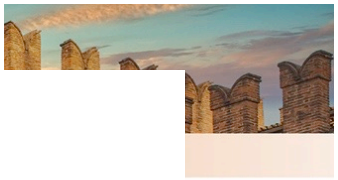


Head Neck. 2020 Nov;42(11):3405-3414

Francesca De Felice MD[1] | Pierluigi Bonomo MD[2] |
Giuseppe Sanguineti MD[3] | Ester Orlandi MD[4]

- moderately accelerated IMRT using SIB has been largely adopted in clinical practice, but no high- quality evidence is available on its safety and efficacy compared to recommended standard cisplatin-based CRT using CF. SIB-IMRT remains an exquisite technical solution mainly dictated by logistic issues, such as machine slots and patient convenience.

FAT



Study or Subgroup	SIB-IMRT Events	Total	SEQ-IMRT Events	Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
Spiotto MT 2014	30	134	44	120	20.8%	0.61 [0.41, 0.90]	2014
Songthong A. 2015	9	68	8	54	8.0%	0.89 [0.37, 2.16]	2015
Wang J 2015	7	22	8	24	8.8%	0.95 [0.41, 2.20]	2015
Tao H 2016	19	54	14	53	14.3%	1.33 [0.75, 2.37]	2016
Vlacich G 2017	60	73	44	63	29.7%	1.18 [0.97, 1.43]	2017
Lertbutsayanukul C 2018	27	107	28	102	18.4%	0.92 [0.58, 1.45]	2018
Total (95% CI)		**458**		**416**	**100.0%**	**0.96 [0.72, 1.28]**	
Total events	152		146				

Heterogeneity: Tau² = 0.06; Chi² = 11.08, df = 5 (P = 0.05); I² = 55%
Test for overall effect: Z = 0.29 (P = 0.77)

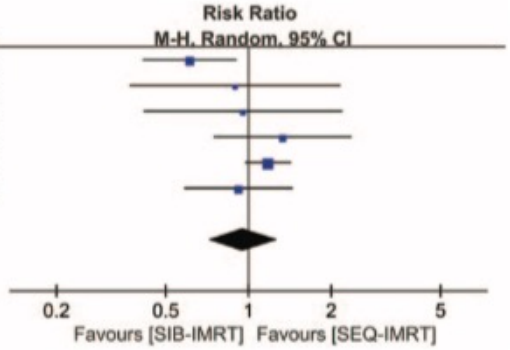


Figure 6. Forest plot of RR for grade ≥3 mucositis.

Systematic

dicine®

OPEN

Study or Subgroup	SIB-IMRT Events	Total	SEQ-IMRT Events	Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
Songthong A. 2015	5	68	5	54	27.0%	0.79 [0.24, 2.60]	2015
Vlacich G 2017	0	70	1	60	3.8%	0.29 [0.01, 6.90]	2017
Lertbutsayanukul C 2018	11	107	14	102	69.2%	0.75 [0.36, 1.57]	2018
Total (95% CI)		**245**		**216**	**100.0%**	**0.73 [0.40, 1.36]**	
Total events	16		20				

Heterogeneity: Tau² = 0.00; Chi² = 0.36, df = 2 (P = 0.84); I² = 0%
Test for overall effect: Z = 0.98 (P = 0.33)

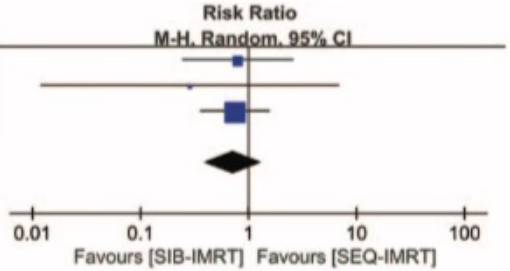


Figure 7. Forest plot of RR for grade ≥3 xerostomia.

A comp … en
simulta … s
sequen … d
radiatio … k cancer
A meta-an

Li Jiang, MD, Yo …
Rensheng Wang …

Study or Subgroup	SIB-IMRT Events	Total	SEQ-IMRT Events	Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
Songthong A. 2015	7	68	6	54	16.5%	0.93 [0.33, 2.60]	2015
Tao H 2016	19	107	29	102	26.3%	0.62 [0.37, 1.04]	2016
Vlacich G 2017	61	75	36	65	30.9%	1.47 [1.15, 1.87]	2017
Lertbutsayanukul C 2018	19	107	29	102	26.3%	0.62 [0.37, 1.04]	2018
Total (95% CI)		**357**		**323**	**100.0%**	**0.87 [0.48, 1.58]**	
Total events	106		100				

Heterogeneity: Tau² = 0.28; Chi² = 17.29, df = 3 (P = 0.0006); I² = 83%
Test for overall effect: Z = 0.46 (P = 0.64)

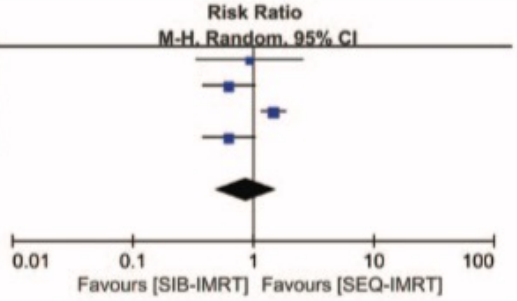


Figure 8. Forest plot of RR for grade ≥3 dysphagia.

Li Jiang Medi …

…NA, 25-27 NOVEMBRE
PALAZZO DEI CONGRESSI

FATTI: BREAST

3-year adverse effects in the IMPORT HIGH trial (CRUK/06/003) CE Coles et al.

- San Antonio Breast Cancer Symposium 2019
- 840 pts f-up 3Y
- Randomisation was 1:1:1 between 40Gy/15F to whole breast (WB) + 16Gy/8F sequential photon boost to tumour bed (40+16Gy), 36Gy/15F to WB, 40Gy to partial breast + 48Gy (48Gy) or + 53Gy (53Gy) in 15F SIB to tumour bed.
- rates of moderate/marked AEs were similar between SIB IMRT and WB + sequential boost IMRT delivered over 3 and 4.5 weeks respectively. Slightly increased risk for breast induration in 53Gy compared with control (borderline significance)

Long-term results of hypofractionation with concomitant boost in patients with early breast cancer: A prospective study Plos ONE October 7, 2021 K Saksornchai et al.

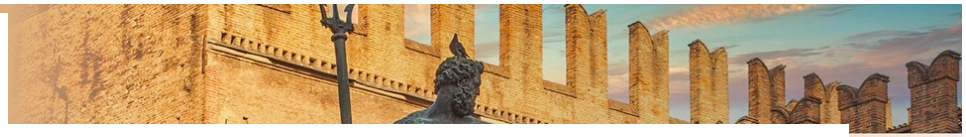
- 50 Gy in 25 fractions followed by a sequential 10–16 Gy boost to the tumor bed or 43.2 Gy in 16 fractions with a concurrent boost of 0.6 Gy for each fraction.
- 73 pts, f-up mediano 10 y
- DFS and OS were comparable
- no statistical difference in late toxicity between the 2 groups (p = 0.072).

Intensity Modulated Radiation Therapy (IMRT) With Simultaneously Integrated Boost Shortens Treatment Time and Is Noninferior to Conventional Radiation Therapy Followed by Sequential Boost in Adjuvant Breast Cancer Treatment: Results of a Large Randomized Phase III Trial (IMRT-MC2 Trial) J Hörner-Rieber et al. Int J Radiat Oncol Biol Phys. 2021 Apr 1;109(5):1311-1324

- 502 pts, median follow-up time of 5.1 years
- SIB IMRT:
  - whole-breast IMRT 50.4 Gy in 1.8-Gy d/fx
  - tumor bed SIB 64.4 Gy in 2.3 Gy d/f
- In the control arm, 3-D-CRT
  - whole breast 50.4 Gy in 1.8-Gy d/f
  - seqBoost 66.4 Gy 2 Gy d/f
- No differences 2yLC, cosmesis (primary end-points) and OS

FATTI: GE

2021



Article

A Pattern of Care Report on the Management of Patients with Squamous Cell Carcinoma of the Anus—A Study by the Italian Association of Radiotherapy and Clinical Oncology (AIRO) Gastrointestinal Tumors Study Group

Pierfrancesco Franco [1,2,*], Giuditta Chiloiro [3], Giampaolo Montesi [4], Sabrina Montrone [5], Alessandra Arcelli [6,7], Tiziana Comito [8], Francesca Arcadipane [9], Luciana Caravatta [10], Gabriella Macchia [11], Marco Lupattelli [12], Marina Rita Niespolo [13], Fernando Munoz [14], Elisa Palazzari [15], Marco Krengli [1,2], Francesca Valvo [16], Maria Antonietta Gambacorta [3], Domenico Genovesi [10,17] and Giovanna Mantello [18]

Franco *et al. Radiation Oncology* (2018) 13:172
https://doi.org/10.1186/s13014-018-1124-9

2018 Radiation Oncology

RESEARCH Open Access

Comparing simultaneous integrated boost vs sequential boost in anal cancer patients: results of a retrospective observational study

Pierfrancesco Franco[1*], Berardino De Bari[2], Francesca Arcadipane[1], Alexis Lepinoy[3], Manuela Ceccarelli[4], Gabriella Furfaro[1], Massimiliano Mistrangelo[5], Paola Cassoni[6], Martina Valgiusti[7], Alessandro Passardi[7], Andrea Casadei Gardini[7], Elisabetta Trino[1], Stefania Martini[1], Giuseppe Carlo Iorio[1], Andrea Evangelista[4], Umberto Ricardi[1] and Gilles Créhange[8]

- Most participants use volumetric intensity modulated radiotherapy (89.7%) and a simultaneous integrated boost (84.5%)

Median follow up was similar for the 2 groups (34 vs 31 months for SIB and SeqB).
Higher proportion of patients with high risk features in the SeqB group. No significant outcome differences were observed

AIRO2(cancers 2021 MDPI

Article

Radiotherapy with Intensity-Modulated (IMRT) Techniques in the Treatment of Anal Carcinoma (RAINSTORM): A Multicenter Study on Behalf of AIRO (Italian Association of Radiotherapy and Clinical Oncology) Gastrointestinal Study Group

Luciana Caravatta [1,*], Giovanna Mantello [2], Francesca Valvo [3], Pierfrancesco Franco [4], Lucrezia Gasparini [1], Consuelo Rosa [1], Najla Slim [5], Stefania Manfrida [6], Francesca De Felice [7], Marianna A. Gerardi [8],

987 patients, 3y f-up

Table 6. Univariate analysis treatment characteristics and clinical outcomes.

Variable	LC			CFS			OS			PFS			EFS		
	HR	95% CI	*p*-Value	HR	95% CI	*p*-Value	HR	95% CI	*p*-Value	HR	95% CI	*p*-Value	HR	95% CI	*p*-Value
OTT (Ref. <45) ≥45	1.13	(0.80–1.61)	0.478	1.22	(0.93–1.60)	0.140	1.23	(0.86–1.75)	0.243	1.33	(1.00–1.77)	**0.050**	1.31	(1.03–1.68)	**0.030**
Total dose 54 Gy (ref. >54 Gy														(0.76–1.26)	0.882
Total dose 55 Gy (ref. >55 Gy														(0.79–1.30)	0.904
Dose/Fraction HR P 1.8–2 Gy) >2 Gy)														(0.71–1.17)	0.452
Dose/Fraction LR P 1.8–2 Gy) <1.8 Gy	0.96	(0.67–1.39)	0.835	0.98	(0.74–1.31)	0.908	0.74	(0.52–1.06)	0.102	0.78	(0.58–1.04)	0.090	1.01	(0.67–1.51)	0.972
SIB (ref. No) Yes	0.92	(0.64–1.30)	0.639	0.92	(0.70–1.20)	0.527	0.94	(0.65–1.33)	0.713	0.93	(0.69–1.24)	0.616	0.89	(0.69–1.13)	0.334

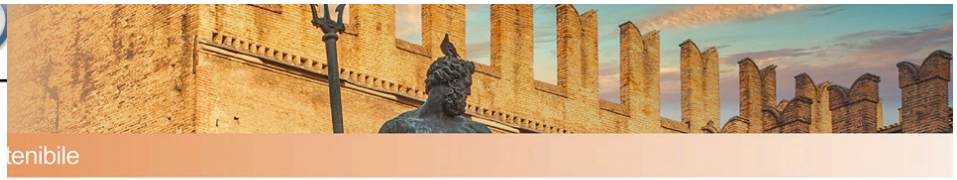
Legend: OTT = overall treatment time; SIB = simultaneous integrated boost; HR PTV = high-risk planning target volume; LR PTV = low-risk planning target volume. HR = hazard risk; 95% CI = 95% confidence interval. In bold, statistically significant values ($p < 0.05$).

No statistically significant association was found between total dose, dose/fraction and/or boost modality and clinical outcomes.

Radiol med (2018) 123:48–62
https://doi.org/10.1007/s11547-017-0806-y

RADIOTHERAPY

FATTI: GBL



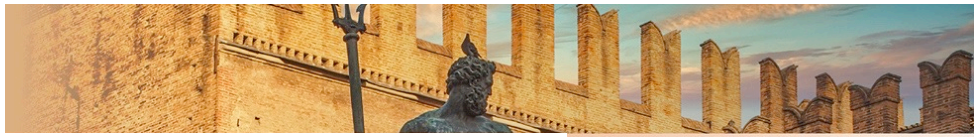
Hypofractionated radiotherapy with simultaneous integrated boost (SIB) plus temozolomide in good prognosis patients with glioblastoma: a multicenter phase II study by the Brain Study Group of the Italian Association of Radiation Oncology (AIRO)

Silvia Scoccianti[1] · Marco Krengli[2] · Livia Marrazzo[3] · Stefano Maria Magrini[4] · Beatrice Detti[1] · Vincenzo Fusco[5] · Luigi Pirtoli[6] · Daniela Doino[7] · Alba Fiorentino[8] · Laura Masini[2] · Daniela Greto[1] · Michela Buglione[4] · Giovanni Rubino[6] · Federico Lonardi[9] · Fernanda Migliaccio[10] · Salvino Marzano[11] · Riccardo Santoni[12] · Umberto Ricardi[13] · Lorenzo Livi[1]

Revisione letteratura:
Differenti frazionamenti
Differenti definizioni volumi
Differenti criteri di inclusione
Max 40 pts

- 24 pts RPA III-IV, GTV < 4 cm
- Tabella constraints!
- 52.5 Gy in 15 fractions of 3.5 Gy and 67.5 in 15 fractions of 4.5 Gy to the SIB volume. + TMZ
- Median OS 15.1 months, median PFS 8.6 months. Actuarial OS at 12 months 65.6% ± 0.09, actuarial PFS at 12 months 41.2% ± 0.10
- Radionecrosis 4.2%
- Vantaggio per QoL in shortened course

European Review for Medical and Pharmacological Sciences 2017; 21: 3563-3575



FATTI: PROSTATA

Rectal/urinary toxicity after hypofractionated *vs.* conventional radiotherapy in high risk prostate cancer: systematic review and meta analysis

R. DI FRANCO[1,2], V. BORZILLO[2], V. RAVO[2], G. AMETRANO[1,2], F. CAMMAROTA[2], S. ROSSETTI[1], F.J. ROMANO[1], C. D'ANIELLO[3], C. CAVALIERE[4], G. IOVANE[5], M.A. PORRICELLI[5], M. MUTO[6], M. BERRETTA[7], G. FACCHINI[1,5], P. MUTO[2]

- SIB in conventional fractionation treated patients showed a significant reduced risk of acute genitourinary toxicity (OR 0.42 p=0.0001) than standard CV, as well as HypoSIB treated-patients who suffered less from each toxicity than the Hypo counterparts.
- Comparing Hypo-SIB with CV-SIB, a reduction for acute gastrointestinal and late genitourinary toxicity for the Hypo-treated patients was observed.

Confronto conv seq vs hypofx sib pelvi HRPC

Study	n	F-up	> G2 tox acuta	> G2 tox tardiva
Karklelyte 2018	221	nd	Higher with hypo but not statistically significant	nd
Wang 2021	111	38 m	No differences	No differences
Niazi 2018	329	24 m	no significant differences in grade ≥3 GU toxicity or grades ≥2 or ≥3 GI toxicity	

conclusioni

- SIB IMRT= strumento, come ogni tecnica!
- Consapevolezza delle implicazioni favorevoli e non
- Occasione di studio con nuovi metodi e IA della radiobiologia tumorale e dei tessuti sani!