Workshop

PREVENZIONE E TERAPIA DELLE TOSSICITA'

P. Rovea

Radioterapia

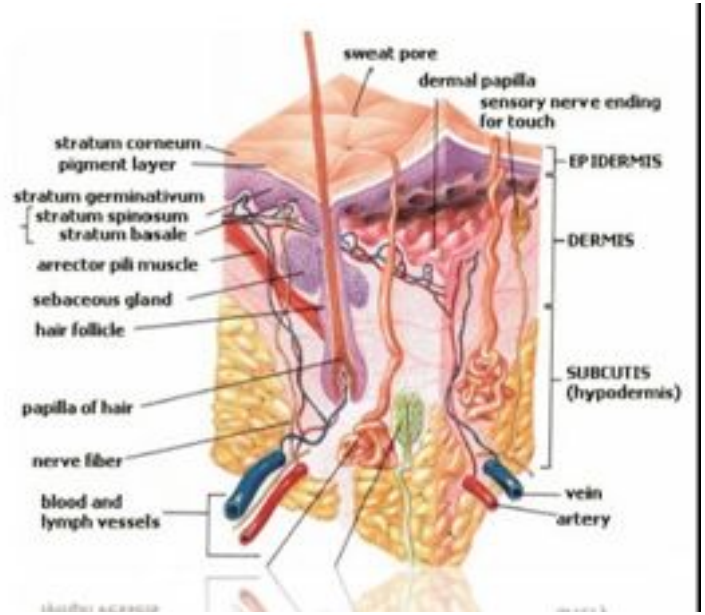
Osp. San Giovanni

Antica Sede

Torino

Azienda Ospedaliera Città della Salute e della Scienza di Torino

RADIOTERAPIA E REAZIONI CUTANEE



- Reazioni cutanee da RT: risultato di risposta infiammatoria + danno cellule proliferanti
- Alterazione capacità mitotiche cellule staminali strato basale / interruzione ripopolamento cellulare
- Perdita cellule basali dopo 20-25 Gy
- Deplezione max cellule basali: circa 50 Gy

JAPANESE DERMATOLOGICAL ASSOCIATION

THE JOURNAL OF DERMATOLOGY

doi: 10.1111/1346-8138.12669

Journal of Dermatology 2014; **41**: 1087–1094

ORIGINAL ARTICLE

Changes in biophysical properties of the skin following radiotherapy for breast cancer

Stephen Chu-Sung HU,[1,2] Ming-Feng HOU,[3,4] Kuei-Hau LUO,[5] Hung-Yi CHUANG,[4,5] Shu-Yi WEI,[6] Gwo-Shing CHEN,[1,2] Wenchang CHIANG,[7] Chih-Jen HUANG[8,9]

[1]Department of Dermatology, Kaohsiung Medical University Hospital, [2]Department of Dermatology, College of Medicine, Kaohsiung Medical University, [3]Department of General Surgery, Kaohsiung Medical University Hospital, [4]National Sun Yat-Sen University - Kaohsiung Medical University Joint Research Center, [5]Institute of Occupational Safety and Health, Department of Public Health, Kaohsiung Medical University, [6]Division of Nephrology, Department of Internal Medicine, Kaohsiung Municipal United Hospital, Kaohsiung, [7]Graduate Institute of Food Science and Technology, National Taiwan University, Taipei, [8]Faculty of Medicine, College of Medicine, Kaohsiung Medical University, and [9]Department of Radiation Oncology, Kaohsiung Medical University Hospital, Kaohsiung, Taiwan

La RT induce cambiamenti misurabili e significativi:
idratazione, ph, pigmentazione e vascolarizzazione

Di Franco *et al. Radiation Oncology* 2013, **8**:57
http://www.ro-journal.com/content/8/1/57

RADIATION ONCOLOGY

STUDY PROTOCOL Open Access

Preventing the acute skin side effects in patients treated with radiotherapy for breast cancer: the use of corneometry in order to evaluate the protective effect of moisturizing creams

Rossella Di Franco[1], Elena Sammarco[2], Maria Grazia Calvanese[1], Flora De Natale[2], Sara Falivene[1], Ada Di Lecce[1], Francesca Maria Giugliano[3], Paola Murino[4], Roberto Manzo[4], Salvatore Cappabianca[1], Paolo Muto[3] and Vincenzo Ravo[3*]

- Strumento per misurare il contenuto idrico della cute
- Misura indiretta della funzione di barriera

REAZIONI PRECOCI

timing	effetto	patogenesi	caratteristiche
• Tra la II e la IV settimana di terapia	**Secchezza**	Distruzione delle ghiandole sebacee	• Molto frequenti • Di scarsa rilevanza clinica in quanto rapidamente reversibili
	Epilazione	Danno dei follicoli piliferi	
	Iperpigmentazione	Stimolazione dei melanociti	
	Eritema/ Edema	Reazione infiammatoria citochino-mediata	
• Dopo la III settimana di terapia	**Epiteliolisi cutanea secca**	Depauperamento delle cellule staminali dello strato basale	
• Tra la IV e la V settimana di terapia	**Epiteliolisi cutanea umida**	Scomparsa completa delle cellule staminali dello strato basale	• Più rara • Associata a secrezione sierosa • Può esporre a complicazioni di natura infettiva

REAZIONI TARDIVE

timing	effetto	patogenesi	note cliniche	caratteristiche
• Dopo 90 gg dal termine del trattamento	**Atrofia di cute ed annessi**	Depauperamento fibroblasti dermici e riassorbimento fibre collagene		• Questi quattro fenomeni sono irreversibili !!
	Fibrosi	Proliferazione dei fibroblasti rimanenti per azione del TBF-beta con deposizione di tessuto fibroso denso	La fibrosi radio-indotta è caratterizzata da indurimento, edema ed aumento di spessore del derma	
	Discromie	Estremamente variabile: stimolazione/ deplezione dei melanociti		
• A partire da 6 mesi dal termine del trattamento	**Teleangectasie**	Alterazione dei piccoli vasi con perdita delle cellule endoteliali.	Aree di cute distrofica con vasi sottili e dilatati. Le alterazioni del microcircolo possono provocare ischemia e	

VALUTAZIONE

Scale di tossicità:

- *EORTC-RTOG toxicity system*
- *LENT-SOMA scale*
- *CTCAE 3.0 e 4.0*

CORRELAZIONE TOSSICITA'→ ESITI ESTETICI SUB-OTTIMALI

- *Edema (impatto su >volume)*
- *Secchezza, atrofia*
- *Fibrosi (impatto possibile su volume / retrazioni)*
- *Teleangectasia*
- *Iperpigmentazione / alterazioni cromatiche cute*
- *Liponecrosi*
- *Ulcerazione*

TOSSICITA' e RISULTATI COSMETICI
dati generali di letteratura

(su circa 30 lavori analizzati, dal 1995 al 2013)

- ***Tossicità G3:*** *3-5% (1-10%); fibrosi moderata/severa <5%*

In diminuzione negli anni

- ***Esiti estetici:***
  - *appena sufficienti/scadenti: 5-8% (3-30%)*
  - *giudizio buono/eccellente: dal 70% fino al 95%, soprattutto se valutato dalla paziente (solitamente più benevola di un 5-10% circa rispetto al giudizio medico; la soddisfazione soggettiva è comunque obbiettivo importante!)*

FATTORI DI RISCHIO

PAZIENTE-CORRELATI
Età
Alterazioni circolo linfatico
Volume irradiato
Infezioni della ferita chirurgica e del letto operatorio
Livello di igiene locale
Fototipo
Comorbidità (ipertensione, diabete, malattie del collagene)
Suscettibilità genetiche

TRATTAMENTO-CORRELATI
Dose Totale/ Frazionamento
Durata del trattamento
"Target Volume" (> sensibilità per volumi > 20 cm3) (> sensibilità a livello di pliche cutanee, ascelle ed inguini)
Tipologia di radiazione (elettroni/fotoni)
Bolus
Chemioterapia pregressa o concomitante (*Radiation Recall*)
Ormonoterapia

Quale prevenzione??

- A) Grandissima varietà di interventi possibili a livello topico
  - scarsità di indicazioni evidence-based

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  - scarsità di indicazioni evidence-based

- B) Importanza di una moderna e corretta condotta radioterapica
  - Dati di tox locale in netto miglioramento rispetto al passato, in relazione all'affinamento delle tecniche RT

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- B) Importanza di una moderna e corretta condotta radioterapica
  - Dati di tox locale in netto miglioramento rispetto al passato, in relazione all'affinamento delle tecniche RT
- C) Comorbidità e fattori di rischio di ogni paziente

International Journal of
Radiation Oncology
biology • physics

www.redjournal.org

EDITORIAL

Topical Agents for Radiation Dermatitis in Breast Cancer: 50 Shades of Red or Same Old, Same Old?

Gary M. Freedman, MD

Perelman Center for Advanced Medicine, Perelman School of Medicine of the University of Pennsylvania, Philadelphia, Pennsylvania

Received Jun 23, 2014, and in revised form Jun 23, 2014. Accepted for publication Jul 4, 2014.

- Alcuni recenti studi random mostrano un piccolo progresso nello sviluppo di topici migliori del placebo nella prevenzione/ trattamento della dermatite

(Pinnix, random ac ialuronico, Riv Rossa 2012; Sharp, random calendula, Eur J Onc Nurs 2013; Graham, random glicerina, TROG, Riv Rossa 2013)

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  - Studio random su emulsione con mistura allantoina, estratti di piante, vitamine, oli ed altro (Chan, Riv Rossa 2014): inesistenza di specifico meccanismo d'azione scientificam spiegabile. Rischio di evidenze «anedottiche», spinte commerciali…

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- Necessità di studi seri, che però possono avere conseguenze «a rischio»… (RTOG, Biafine vs BSC, Riv Rossa, 2000)

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- Inadeguatezza degli scoring sistems attuali
- Memo: i miglioramenti attuali delle tox sono correlati >all'affinamento della RT (tecnica, posizionamento paz, ecc.), spesso non citata negli studi

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- Per una mammella voluminosa, meglio un «prone board» ed una semplice crema idratante, piuttosto che trattarla supina ma con una crema cara…
- Spingere uso di prodotti topici semplici, più volte al giorno; se necessario per tox G2: lidocaina, steroidi; se G3-4: alluminio; argento-sulfadiazina; garze idonee
- Sarebbe sufficiente un'attenta cura della cute in corso di RT, con «a bit of old-fashioned country medicine»…

Chan et al. BMC Cancer 2014, 14:53
http://www.biomedcentral.com/1471-2407/14/53

BMC Cancer

RESEARCH ARTICLE Open Access

Prevention and treatment of acute radiation-induced skin reactions: a systematic review and meta-analysis of randomized controlled trials

Raymond Javan Chan[1,2,4*], Joan Webster[2,3,4], Bryan Chung[5], Louise Marquart[6], Muhtashimuddin Ahmed[7] and Stuart Garantziotis[4]

Results: Forty-seven studies were included in this review. These evaluated six types of interventions (oral systemic medications; skin care practices; steroidal topical therapies; non-steroidal topical therapies; dressings and other). Findings from two meta-analyses demonstrated significant benefits of oral Wobe-Mugos E for preventing RISR (OR 0.13 (95% CI 0.05 to 0.38)) and limiting the maximal level of RISR (MD −0.92 (95% CI −1.36 to −0.48)). Another meta-analysis reported that wearing deodorant does not influence the development of RISR (OR 0.80 (95% CI 0.47 to 1.37)).

Conclusions: Despite the high number of trials in this area, there is limited good, comparative research that provides definitive results suggesting the effectiveness of any single intervention for reducing RISR. More research is required to demonstrate the usefulness of a wide range of products that are being used for reducing RISR. Future efforts for reducing RISR severity should focus on promising interventions, such as Wobe-Mugos E and oral zinc.

Keywords: Radiation induced skin reactions, Radiation dermatitis, Systematic review, Meta-analysis, Randomized controlled trials

- Studi non omogenei, poco numerosi, risultati conflittuali.
- Studiate sia prevenzione che terapia delle tox cutanee

- Studi non omogenei, poco numerosi, risultati conflittuali.
- Studiate sia prevenzione che terapia delle tox cutanee
- Significatività statistica per:
  - associazione x os di enzimi (papaina, tripsina e chimotripsina) sia in prevenzione che terapia vs placebo;
  - supplementazione Zn x os in terapia vs placebo
  - lavaggi dolci (con o senza sapone) vs nulla
  - Betametasone topico vs placebo o nulla; steroidi topici + antibiotico vs nulla;
  - Creme con ac ialuronico opp trolamina vs placebo; trolamina vs calendula
  - Hidrogel dressing vs violetto genziana

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- Uso deodoranti (non contenenti metalli): indifferente
- Assoluta necessità di studi più ampi e di alta qualità

- Igiene personale
- Deodoranti
- Detersione
- Depilazione
- Nuoto
- Esposizione al sole
- Caldo e freddo
- Abbigliamento
- Lavaggio degli indumenti
- I pazienti dovrebbero essere incoraggiati ad utilizzare i prodotti consigliati dallo specialista.

PREVENZIONE
Mantenere una buona igiene della cute. Lavarsi con acqua e asciugarsi tamponando. E' preferibile usare detergenti a pH neutro
Idratare la cute con creme emollienti
Immediatamente prima della seduta della radioterapia, la cute deve essere pulita e non devono essere applicate creme idratanti, gel, emulsioni o medicazioni
Usare indumenti di seta, lino o cotone. Evitare indumenti stretti ed in fibre sintetiche che riducono la dispersione del calore
Evitare la depilazione o l'uso di lamette da barba. Radersi con rasoio elettrico
Evitare soluzioni alcooliche (deodoranti, profumi, dopobarba ecc) e l'uso del borotalco
Non esporre la parte irradiata ai raggi diretti del sole o a lampade UV (dopo la RT per almeno 6-12 mesi)
Non sottoporre la pelle irradiata a temperature molto fredde o molto calde (ex. Impacchi di ghiaccio, borse acqua calda)
Evitare di fare il bagno nelle piscine contenenti disinfettanti a base di cloro che possono aumentare la secchezza della cute

Grosso M, Gestione della radiodermite acuta, Lo Spazio Scientifico, 2009

Cancer Management and Research

Dovepress

open access to scientific and medical research

Open Access Full Text Article

EXPERT OPINION

Daily baseline skin care in the prevention, treatment, and supportive care of skin toxicity in oncology patients: recommendations from a multinational expert panel

This article was published in the following Dove Press journal:
Cancer Management and Research
6 December 2013
Number of times this article has been viewed

René-Jean Bensadoun[1]
Phillipe Humbert[2]
Jean Krutman[3]
Thomas Luger[4]
Raoul Triller[5]
André Rougier[6]
Sophie Seite[6]
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[1]Department of Radiation Oncology, CHU Poitiers, Poitiers Cedex, [2]Department of Dermatology, University Hospital of Besançon, Besançon, France; [3]IUF-Leibniz Research Institute for Environmental Medicine, Heinrich-Heine University,

Abstract: Skin reactions due to radiotherapy and chemotherapy are a significant problem for an important number of cancer patients. While effective for treating cancer, they disturb cutaneous barrier function, causing a reaction soon after initiation of treatment that impacts patient quality of life. Managing these symptoms with cosmetics and nonpharmaceutical skin care products for camouflage or personal hygiene may be important for increasing patient self-esteem. However, inappropriate product choice or use could worsen side effects. Although recommendations exist for the pharmaceutical treatment of skin reactions, there are no recommendations for the choice or use of dermatologic skin care products for oncology patients. The present guidelines were developed by a board of European experts in dermatology and oncology to provide cancer care professionals with guidance for the appropriate use of non-pharmaceutical, dermocosmetic skin care management of cutaneous toxicities associated with radiotherapy and systemic chemotherapy, including epidermal growth factor inhibitors and monoclonal antibodies. The experts hope that these recommendations will improve the management of cutaneous side effects and hence quality of life for oncology patients.

Cancer Management and Research

Dovepress

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Daily baseline skin care in the prevention, treatment, and supportive care of skin toxicity in oncology patients: recommendations from a multinational expert panel

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- Argomento molto controverso
- Carenza di studi evidence-based

- Buona igiene continua durante tutto il trattamento
- Detergenti ph 5.5, delicati, non irritanti
- Creme idratanti non profumate
- Fotoprotezione
- Consulenza dermatologica se tox G 2 (?) 3 o 4

DETERSIONE

Cosa significa «detergente delicato»??

- Cancer Research UK – BC Cancer Agency:
  - Senza profumi
  - PH compreso tra 5 e 6
  - Senza lanolina
  - Senza surfactanti irritanti

European Journal of Cancer Care

Original article

Mild soaps and radiotherapy: a survey of the UK public to identify brands of soap considered mild and analysis of these to ascertain suitability for recommendation in radiotherapy departments

K. ROBERTSON, BSC, *The Beacon Centre, Taunton & Somerset NHSFT, Musgrove Park Hospital, Taunton,* &
P. BROWN, PHD, *Radiography Department, School of Healthcare Studies, Cardiff University, Cardiff, UK*

- Per il paziente la definizione «delicato» è vaga!
- Il paziente non adeguatamente informato tende ad acquistare prodotti che non rispondono ai criteri richiesti

Radiotherapy and Oncology 105 (2012) 378–379

Contents lists available at SciVerse ScienceDirect

Radiotherapy and Oncology

journal homepage: www.thegreenjournal.com

Letter to the Editor

Deodorant use and the risk of skin toxicity in patients undergoing radiation therapy for breast cancer: A meta-analysis

No increase in skin toxicity associated with the topical application of deodorant in pts undergoing RT for BC

Journal of Radiation Research, 2014, 55, 553–558
doi: 10.1093/jrr/rrt141 Advance Access Publication 1 January 2014

Comparison of acute skin reaction following morning versus late afternoon radiotherapy in patients with breast cancer who have undergone curative surgical resection

Jae Myoung NOH[1], Doo Ho CHOI*,[1], Hyojung PARK[1], Seung Jae HUH[1], Won PARK[1], Seung Won SEOL[1], Bae Kwon JEONG[2], Seok Jin NAM[3], Jeong Eon LEE[3] and Won-Ho KIL[3]

[1]Department of Radiation Oncology, Samsung Medical Center, Sungkyunkwan University School of Medicine, #50 Irwon-dong, Gangnam-gu, Seoul 135-710, Republic of Korea
[2]Department of Radiation Oncology, Gyeongsang National University Hospital, Chiram-dong, Jinju, Gyeongsangnam-do 660-702, Republic of Korea
[3]Department of Surgery, Samsung Medical Center, Sungkyunkwan University School of Medicine, #50 Irwon-dong, Gangnam-gu, Seoul 135-710, Republic of Korea

- 395 paz
- Tox ≥G2 più frequente nel gruppo trattato dopo h 15 rispetto alle paz trattate prima delle h 10 (p 0.0088)

- L'orario della RT può influenzare il grado di tox cutanea

Esempi di topici utilizzati

- Polinucleotidi (Leni Radio R)
- Betaglucano, ac ialuronico, alginati (neoViderm R)
- Vitis Vinifera (Ixoderm R)
- Vitamina E (Vea R)
- Olio di calendula (Biafine R)
- Ac. Ialuronico + aminoacidi collagene (Radioderm R)
- Secrezione Cryptomphalus Aspersa (Radiocare R)
- Omega 3,6,9 (Quinovit R)

Esempi di topici utilizzati

- Ac. Ialuronico, Aloe, collagene, vit (VerbaDerm R)
- Genisteina, Vit C-E, Tè verde (Eudensine R)
- Derivati ac. 18 glicirretico (Floderm Fte R)
- Alga Atlantica, e.b.m.guaiacolo, manganese (Radioskin R)
- Trigliceridi, fitisteroli (Xderit R)
- ….

- Aloe, olio di mandorle, camomilla, violetto di genziana, vitamina A, E, F, C…

Importanza dei fattori individuali, intrinseci ad ogni paziente:

- *Età / stato pre-postmenopausale*
- *Sovrappeso / obesità (BMI)*
- *Volume mammario*
- *Abitudini voluttuarie (fumo, eccesso di alcol)*
- *Comorbidità vascolari (ipertensione, vasculopatie)*
- *Dislipidemie*

The Breast 22 (2013) 634–638

Contents lists available at ScienceDirect

The Breast

journal homepage: www.elsevier.com/brst

Original article

Smoking as an independent risk factor for severe skin reactions due to adjuvant radiotherapy for breast cancer

Lena Sharp[a,b,*], Hemming Johansson[a,c], Thomas Hatschek[a,c], Mia Bergenmar[a,c]

[a] Department of Oncology, Karolinska University Hospital, 171 76 Stockholm, Sweden
[b] Department of Learning, Informatics, Management and Education, Karolinska Institutet, 171 77 Stockholm, Sweden
[c] Department of Oncology-Pathology, Karolinska Institutet, 171 77 Stockholm, Sweden

- (390 pz) **RT> 50 Gy**, **alto BMI** e ***fumo*** risultano fortemente correlati con severa tox cutanea acuta

Factors related to severe acute radiation skin reactions.

Factor	Events (%)/patients	Unadjusted		Adjusted[a]		Stepwise[b]		Bootstrap[c]
		OR (95% CI)	*P*-value	OR (95% CI)	*P*-value	OR (95% CI)	*P*-value	Inclusion %
Age								
<50 years	16 (18)/90	1	0.56[d]	1	0.044[d]			43
50–64 years	37 (23)/161	1.4 (0.7–2.7)		2.2 (1.0–4.8)				
≥65 years	30 (22)/139	1.3 (0.7–2.5)		2.7 (1.2–6.0)				
BMI								
Normal	26 (15)/175	1	<0.001[d]	1	<0.001[d]	1	<0.001[d]	96
Overweight	28 (19)/147	1.4 (0.8–2.4)		1.1 (0.6–2.1)		1.4 (0.7–2.5)		
Obese	29 (43)/68	4.3 (2.3–8.1)		4.2 (2.1–8.3)		4.2 (2.2–8.3)		
Smoking: CO-test detected								
No	70 (20)/352	1	0.059	1	0.031	1	0.027	55
Yes	11 (38)/32	2.1 (1.0–4.6)		2.5 (1.1–5.7)		2.5 (1.1–5.7)		
Surgery								
Partial mastectomy	54 (18)/296	1	0.010	1	0.23			30
Mod rad mastectomy	29 (31)/94	2.0 (1.2–3.4)		1.5 (0.8–3.0)				
Seroma after surgery								
No	63 (20)/311	1	0.30	1	0.54			6
Yes	20 (26)/78	1.4 (0.8–2.4)		0.8 (0.4–1.7)				
Dose								
<50 Gy	18 (15)/121	1	0.053	1	0.050	1	0.040	48
≥50 Gy	62 (24)/263	1.8 (1.0–3.1)		1.9 (1.0–3.8)		1.9 (1.0–3.5)		
Earlier chemotherapy								
No	41 (17)/243	1	0.007	1	0.054			45
Yes	42 (28)/147	2.0 (1.2–3.2)		1.8 (1.0–3.3)				
Ongoing endocrine therapy								
No	37 (21)/176	1	0.91	1	0.52			9
Yes	46 (22)/214	1.0 (0.6–1.7)		1.2 (0.7–2.1)				

Abbreviations: OR, odds-ratio; CI, confidence interval.

[a] Adjusted for all listed variables.

[b] Stepwise model with backward selection search. All variables are forced to be included in the model at the first step and only variables with significance levels<0.05 remains in the final model. Estimation is based on observations with non-missing values for all specified variables.

[c] To assess the replication stability of the Stepwise model a bootstrap resampling procedure proposed by Sauerbrei et al. was used. This technique generates a number of samples (1000) each of the same size as the original data, by random sampling with replacement from the original data set. The frequency of inclusion is indicative for the prognostic importance of the variables.

[d] Test for trend.

The Breast

Original article

Smoking as an independent risk factor for severe skin reactions due to adjuvant radiotherapy for breast cancer

Lena Sharp, Hemming Johansson, Thomas Hatschek, Mia Bergenmar

- Il fumo costituisce un fattore di rischio indipendente per tox cutanea severa in corso di RT

- *Smettere di fumare durante il trattamento radiante* è un'ottima decisione per ridurre il rischio di importante tox alla cute

IMPORTANZA dei FATTORI CORRELATI al TRATTAMENTO RADIANTE

- ***Dose per frazione e dose totale (concomitant boost; ipofrazionamento; APBI)*** Freedman, Rad and Onc 2013. START Trialist Group, Lancet Onc 2013, Mukesh, Rad and Oncol 2013; Shah, Clin Breast Cancer 2013

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- ***Uso del boost*** Collette, EJC 2008, Antonini Rad and Oncol 2009

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- ***Volume irradiato*** (Murphy, Int J Rad Onc Biol Phys 2011)
- ***Uso del boost*** Collette, EJC 2008, Antonini Rad and Oncol 2009
- ***Uso dei bolus***

Quali terapie??

Treatment			
Topical	Maintain hygiene and gently clean and dry skin in the radiation field, even when ulcerated	Hyaluronic acid cream	IV
Topical	Moisturizers/antibacterial moisturizers	Anti-inflammatory emulsion (trolamine)	IV[a]/V[b]
Topical	Drying gels Antiseptics (chlorhexidine)		IV[b]
Topical	Hydrophilic dressings		V[b]
Topical	Antibiotics when infection is suspected		IV[a]
Systemic	Antibiotics: doxycycline		II[c]
Others	Blood cultures should be carried out if fever and/or signs of sepsis		I[b]

Lacouture ME et al. *Clinical practice guidelines for prevention and treatment of EGFR inhibitor-associated dermatologic toxicities.* Support care cancer. 2011:19; 1079-1095

Gestione della tox cutanea acuta G1

- Buona igiene cutanea
- Idratazione
- Se prurito (senza cute lesa/infetta): possibile uso creme steroidee
- Se infezione: antimicrobici topici/sistemici

Grosso M, Lo Spazio Scientifico Ed, 2009

Gestione della tox cutanea acuta G2

- Buona igiene cutanea
- Detergere con soluz fisiol ed asciugare delicatamente
- Idratazione evitando parti umide/edematose
- Corretta gestione essudato: idrocolloide/cellulosa biosintetica; antimicrobici (es: sulfadiazina)
- No medicazioni adesive o troppo aderenti (per evitare lacerazioni al cambio medicazione)

Grosso M, Lo Spazio Scientifico Ed, 2009

Gestione della tox cutanea acuta G3

- Buona igiene cutanea
- Detergere con soluz fisiol ed asciugare delicatamente
- Idratazione evitando parti umide/edematose
- Corretta gestione essudato: schiume poliuretano / silicone; se più grave: alginato di CA e idrofibra
- Se infezioni: antibiotici topici a base Ag / antibiotici sistemici

Grosso M, Lo Spazio Scientifico Ed, 2009

Gestione della tox cutanea acuta G4

- Buona igiene cutanea
- Detergere con soluz fisiol ed asciugare delicatamente
- Corretta gestione essudato: alginato di CA e idrofibra
- Se infezioni: antimicrobici topici a base Ag / antibiotici sistemici
- Se emorragia: alginato di CA e lieve compressione
- Se necrosi: debridement autolitico, enzimatico o chirurgico

Grosso M, Lo Spazio Scientifico Ed, 2009

LA MEDICINA BIOLOGICA · GENNAIO - MARZO 2011

A. Laffranchi

Dr. Alberto Laffranchi
– Fondazione IRCCS ISTITUTO NAZIONALE dei TUMORI di Milano.
Via Venezian, 1
I - 20133 Milano

ATTI DEL XXV CONGRESSO DI MEDICINA BIOLOGICA
– NUOVI ORIZZONTI IN MEDICINA – Milano, 14 e 15 Maggio 2010 - SESSIONE POSTER

TRATTAMENTO DELLE LESIONI CUTANEE ACUTE DA RADIOTERAPIA

- Tox cutanea G3-4: lavaggi quotidiani soluz acquosa ac citrico monoidrato+sodio bicarbonato+saccarosio 6% (15%). Pomate alla camomilla o calendula. Magnetoterapia 1 seduta/ die per 5-20 volte.

Gestione della tox cutanea tardiva

- Prevenzione infezioni
- Miglioramento struttura/elasticità cutanea: topici idratanti-emollienti; evitare esposizione al sole; FKT per migliorare elasticità cutanea e ridurre la fibrosi
- Ridurre rischio traumi

Grosso M, Lo Spazio Scientifico Ed, 2009

- Farmaci CHT
- Trastuzumab

CORRELAZIONE TOSSICITA'→ COSMESI ED ESITI ESTETICI

Impatto della cosmesi sulla qualità di vita:

(Hau et al, Breast Cancer Res Treat 2013)

- *Studio SGW su 688 paz, con risultati cosmetici a 10 aa*
- *Fair/poor cosmesis in 9% dei paz*
- *Analisi uni- multivariata: la cosmesi è associata in modo statisticamente significativo alla qualità di vita (EORTC QLQ-30)*

IMPORTANZA DELLA VALUTAZIONE ESITI ESTETICI

- *Gli effetti di cosmesi good/excellent vs fair/poor sulla QOL si mantengono significativi anche a 10 aa*
- ***Conferme da altri AA:***
  - *Esito estetico: indicatore di QOL (Heil, Eur J Surg Onc 2011)*

→ Un risultato cosmetico scadente predice una bassa QOL e la influenza per lungo tempo

L'obiettivo di questa collana di opuscoli è quello di darti alcuni consigli sulla corretta cura della pelle prima, durante e dopo la chemioterapia e la radioterapia, al fine di migliorare la qualità della tua vita.

Rivolgiti al personale medico, infermieristico e tecnico di tuo riferimento per qualunque dubbio o domanda.

LA PELLE DEL PAZIENTE ONCOLOGICO
COME PRENDERSENE CURA

1. Considerazioni generali
2. Detersione e idratazione
3. Esposizione solare e fotoprotezione
4. Alterazioni dei capelli
5. Alterazioni delle unghie
6. Alterazioni delle mucose
7. Approfondimenti in radioterapia
8. Suggerimenti cosmetologici
9. Linfedemi
10. Stile di vita
    (alimentazione, integratori, attività fisica, ...)

Tossicità cardiovascolare

- Pericardite, fibrosi pericardio, fibrosi miocardio, problemi sistema di conduzione (aritmie e blocchi), disfunzioni sistema nervoso autonomo (aritmie), malattie valvolari

- Malattia coronarica (con le moderne tecniche: frequenza ed entità non ancora ben definite)

- Oggi la manifestazione clinica predominante è la *malattia coronarica*. La sua frequenza non è ancora ben nota (l'interesse si è sviluppato più lentamente)
- Entità rischio con moderne tecniche: non ben noto

Darby S (2010, 2013)

International Journal of Radiation Oncology biology • physics
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EDITORIAL

Coronary Artery Disease and Breast Radiation Therapy

Richard D. Pezner, MD

Radiation Oncology Department, City of Hope Medical Center, Duarte, California

Received Mar 27, 2013, and in revised form Apr 18, 2013. Accepted for publication Apr 20, 2013

EDITORIAL

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Richard D. Pezner, MD

Radiation Oncology Department, City of Hope Medical Center, Duarte, California

Received Mar 27, 2013, and in revised form Apr 08, 2013. Accepted for publication Apr 26, 2013

- In passato si pensava fossero sufficienti **dosi al cuore** < 30Gy per abbattere rischio effetti tardivi, ma:

EVIDENZE DI AUMENTATO RISCHIO ANCHE PER BASSE DOSI!! (Cutter DJ, 2010)

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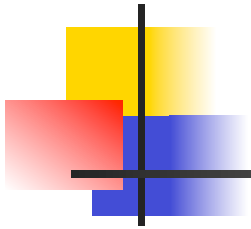
  EVIDENZE DI AUMENTATO RISCHIO ANCHE PER BASSE DOSI!! (Cutter DJ, 2010)

- Oggi per RT mamm sn tale dose può variare in media tra 1.45-7Gy (2 e 10 Gy se RT mamm int). Circa 1.5 Gy se RT mamm ds. (Schubert 2011; Jacobson GM 2013; Darby NEJM 2010, 2013)

- Invece: ampia variabilità di dose alla coronaria



International Journal of Radiation Oncology biology • physics

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Radiation Oncology Department, City of Hope Medical Center, Duarte, California

Received Mar 27, 2013, and in revised form Apr 16, 2013. Accepted for publication Apr 20, 2013

- Storicamente: valutazione DVH, cuore visto come organo "intero" (Gagliardi G, QUANTEC 2010). "Parallel subunit" organ toxicity.
-
- Coronarie: organo "series subunit" (danno ad una porzione=potenziale grave tox anche in assenza di RT sul resto dell'arteria)

- Quindi: DVH "whole heart" poco utili per stimare rischio di malattia coronarica

- Costraints! (Rischio mortalità a 15aa <1%)

- $V20_{Gy}$=10% (DBCCC Acta Oncol 2013)
- V25<10% (Gagliardi G, Br J Rad 1996)
- V30<20(30)cc (Gagliardi G, Br J Rad 1996)
- V40<10cc (Gagliardi G, Br J Rad 1996) 5% (DBCCC Acta Oncol 2013)
- V50<2cc (Pili G, Riv rossa 2011)

- **LADCA**: $V20_{Gy}$=0% (frazion. convenz.) (DBCCC Acta Oncol 2013)

Cancer and the Heart

Risks of Heart Disease after Radiotherapy

David J. Cutter, MB, BChir
Sarah C. Darby, PhD
Syed W. Yusuf, MD

Non è nota con precisione la relazione dose-volume cardiaco (es: più vantaggiosa alta dose a piccolo volume cardiaco o viceversa?)

International Journal of Radiation Oncology biology • physics

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Clinical Investigation: Breast Cancer

Long-term Cardiac Mortality After Hypofractionated Radiation Therapy in Breast Cancer

Kristin Holm Tjessem, MD,* Safora Johansen, PhD,† Eirik Malinen, PhD,‡ Kristin V. Reinertsen, MD, PhD,* Turi Danielsen, PhD,‡ Sophie D. Fossa, MD, PhD,* and Alexander Fossa, MD, PhD*

*Department of Oncology, Oslo University Hospital, National Resource Centre for Late Effects after Cancer Treatment; †Department of Oncology, Oslo University Hospital-Radium Hospital, and Division of Radiotherapy/Radiography, College of Oslo and Akershus, Faculty of Health; and ‡Department of Medical Physics, Oslo University Hospital, Oslo, Norway

Received Nov 26, 2012, and in revised form May 12, 2013. Accepted for publication May 21, 2013

- 1565 pazienti
  - I gruppo: 4.3 Gy x2/settim x 10 sedute, 43 Gy
  - II gruppo: 2.5 Gyx5/settim x 20 sedute, 50 Gy
  - Uso di campi anche parasternali, scella e sovraclaveari
- Paz con ipofrazionam più spinto e con RT (fotoni) parasternale: aumento rischio morte per malattia cardiaca
- La differenza emerge 12-15 aa dopo RT

ARTICLE IN PRESS

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Radiotherapy and Oncology

journal homepage: www.thegreenjournal.com

Original article

Long-term mortality from cardiac causes after adjuvant hypofractionated vs. conventional radiotherapy for localized left-sided breast cancer

Elisa K. Chan[a], Ryan Woods[b], Sean Virani[c], Caroline Speers[d], Elaine S. Wai[e], Alan Nichol[f], Mary L. McBride[b], Scott Tyldesley[f,*]

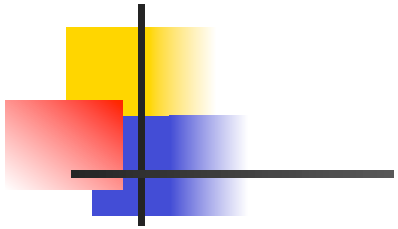
[a] Department of Oncology, Saint John Regional Hospital; [b] BC Cancer Agency, Cancer Control Research Department, Vancouver; [c] Division of Cardiology, University of British Columbia, Vancouver; [d] BC Cancer Agency, Breast Cancer Outcomes Unit, Vancouver; [e] BC Cancer Agency, Radiation Therapy Program, Victoria; and [f] BC Cancer Agency, Radiation Therapy Program, Vancouver, Canada

- 5334 donne, comparazione tra un regime RT mamm sn convenzionale ed uno **ipofrazionato** (16 sedute)
- No differenza a 15 aa in mortalità per causa cardiaca (4.8% vs 4.2% RT convenz)
- No differenze per mortalità da cancro o da altre cause
- Confermati i dati di Whelan e degli studi START

Int. J. Radiation Oncology Biol. Phys., Vol. 79, No. 1, pp. 1–9, 2011

0360-3016/$ - see front matter

doi:10.1016/j.ijrobp.2010.08.035



CRITICAL REVIEW

HYPOFRACTIONATED WHOLE-BREAST RADIOTHERAPY FOR WOMEN WITH EARLY BREAST CANCER: MYTHS AND REALITIES

JOHN YARNOLD, F.R.C.R.,* SØREN M. BENTZEN, D.Sc.,† CHARLOTTE COLES, PH.D.,‡ AND JOANNE HAVILAND, M.Sc.¶

Where the heart is concerned, the priority is to protect this organ from exposure regardless of radiation schedule, since there appears to be no safe lower dose limit, however fractionated

- 2168 donne sottoposte a RT dal 1958 al 2001
- Dose media al cuore tutte le paz: 4.9 Gy (0.03→27.72); 6.6Gy x mamm sn

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MARCH 14, 2013 VOL. 368 NO. 11

Risk of Ischemic Heart Disease in Women after Radiotherapy for Breast Cancer

Sarah C. Darby, Ph.D., Marianne Ewertz, D.M.Sc., Paul McGale, Ph.D., Anna M. Bennet, Ph.D., Ulla Blom-Goldman, M.D., Dorthe Brønnum, R.N., Candace Correa, M.D., David Cutter, F.R.C.R., Giovanna Gagliardi, Ph.D., Bruna Gigante, Ph.D., Maj-Britt Jensen, M.Sc., Andrew Nisbet, Ph.D., Richard Peto, F.R.S., Kazem Rahimi, D.M., Carolyn Taylor, D.Phil., and Per Hall, Ph.D.

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- Dose media al cuore tutte le paz: 4.9 Gy (0.03→27.72); 6.6Gy x mamm sn
- Eventi coronarici > se RT mammella sn rispetto alla ds
- Con dosi medie-cuore <2Gy; 2-4Gy; 5-9Gy; 10 o>10Gy vs 0: increm. mal. coronarica 10%, 30%, 40%, 116%

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- Con dosi medie-cuore <2Gy; 2-4Gy; 5-9Gy; 10 o>10Gy vs 0: increm. mal. coronarica 10%, 30%, 40%, 116%
- Tassi eventi coronarici maggiori si incrementano linearmente con la dose media al cuore, **di 7.4% per Gy** (p<0.001) **senza soglia**

- Tali eventi iniziano entro i primi 5 aa dalla RT e continua fino alla III decade (x 20 aa)
- L'incremento proporzionale del tasso di eventi coronarici per Gy è simile nelle donne con/senza fattori di rischio cardiaci al tempo RT

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- Overall rate ratio x eventi coronarici in paz con anamnesi+ vs- per cardiopatia ischemica: **6.67**

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- Overall ratio x eventi coronarici in paz con diabete, malattie circolatorie, BPCO, fumo, alto BMI, uso regol. analgesici / senza cardiopatia: **1.96** (2.60 nei primi 10 aa)

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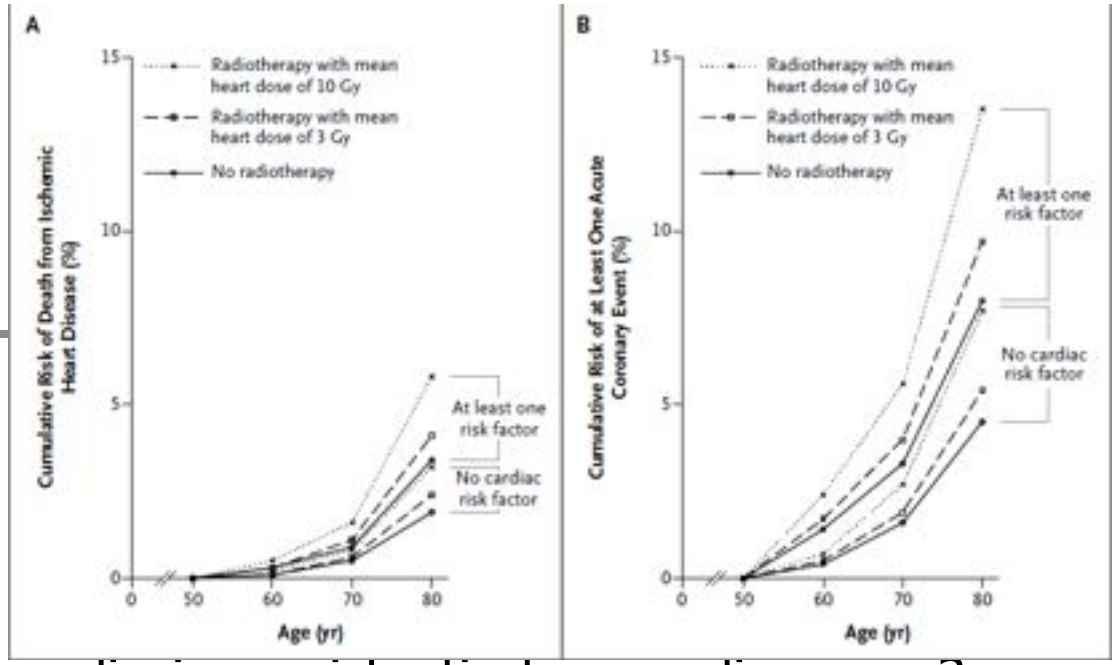
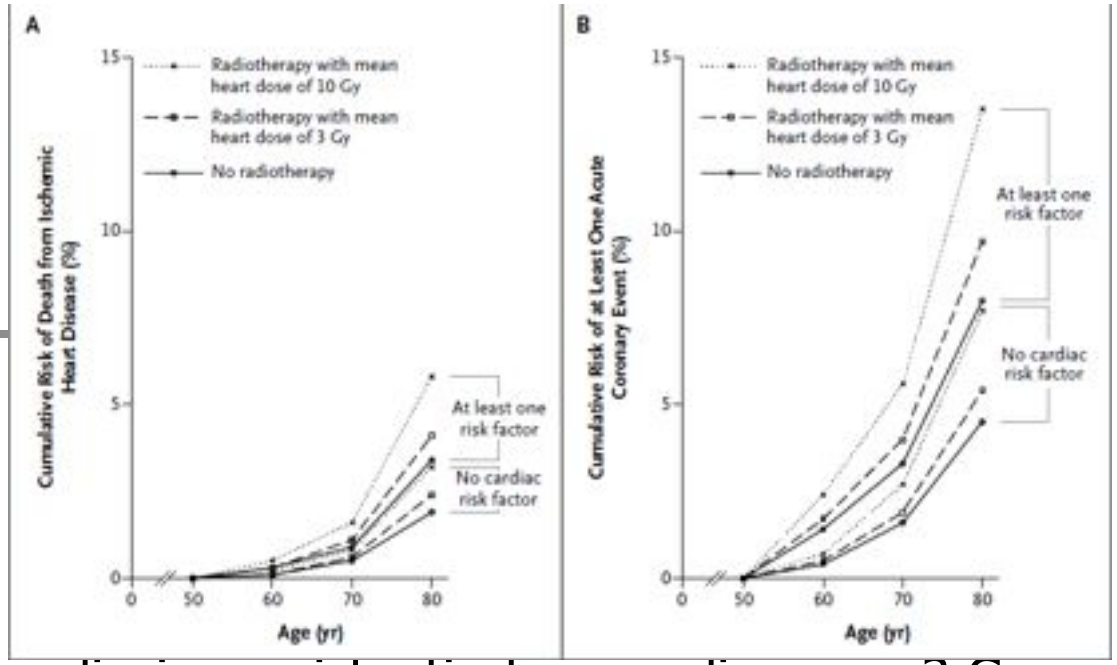
- La dose media al cuore (più di quella alla coronaria) è il miglior predittore del rischio eventi coronarici



- Esempio:
- paz 50 aa, no fattori rischio cardiaci preesistenti, dose media cuore 3 Gy: rischio evento coronarico acuto prima 80 aa→**4.5-5.4%** (=incremento assoluto 0.9); rischio morte **1.9-2.4%** (=incremento assoluto +0.5)



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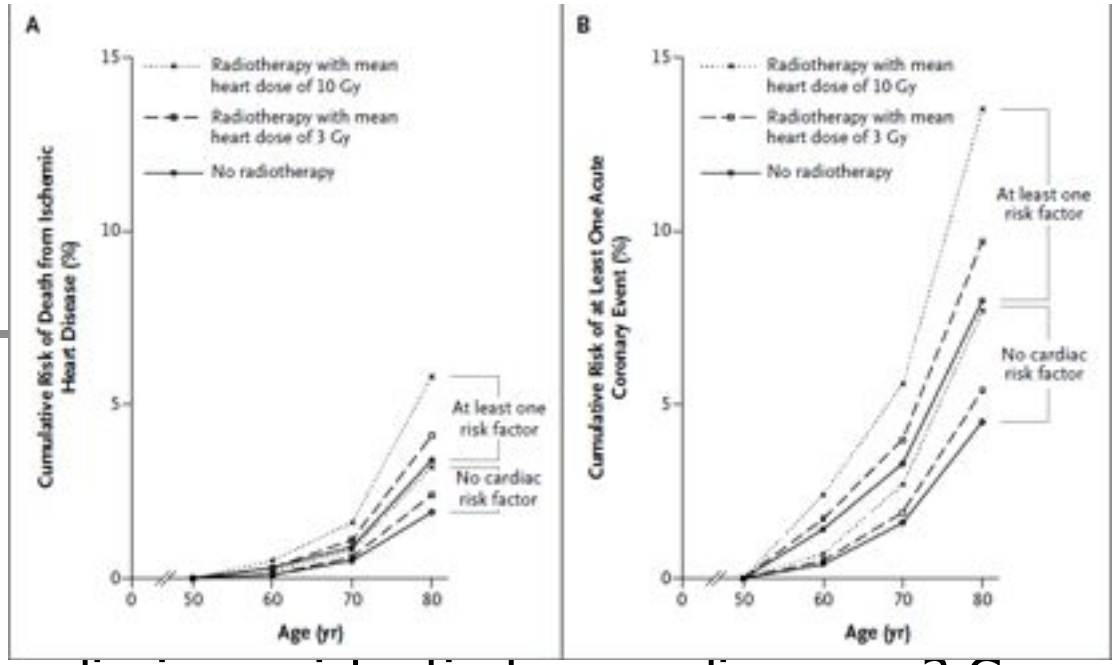
- paz 50 aa, <u>no fattori rischio cardiaci preesistenti</u>, dose <u>media cuore 10</u> Gy: rischio evento coronarico acuto prima 80 aa→**4.5-7.7%** (+3.2); rischio morte **1.9-3.4%** (+1.5)



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- <u>Se presenti fattori rischio cardiaci, dose media cuore 3 Gy</u>: rischio evento coronarico acuto: **7.1%** (+1.7) rischio morte **4.1%** (+0.7)

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CONCLUSIONS

Exposure of the heart to ionizing radiation during radiotherapy for breast cancer increases the subsequent rate of ischemic heart disease. The increase is proportional to the mean dose to the heart, begins within a few years after exposure, and continues for at least 20 years. Women with preexisting cardiac risk factors have greater absolute increases in risk from radiotherapy than other women. (Funded by Cancer Research UK and others.)

Commenti…

- Il beneficio della RT supera i rischi della tox cardiaca nella maggioranza delle donne con indicazione a RT. Importanza delle moderne tecniche RT
- Il periodo di analisi non godeva di tali tecniche!
- Pur con un modico incremento del rischio cardiaco, con indicazioni appropriate della RT c'è un guadagno su O.S. e mortalità
- Con le moderne tecnologie la dose e il rischio cardiaco stanno diminuendo rispetto al passato

CLINICAL INVESTIGATION Breast

CARDIAC DOSE FROM TANGENTIAL BREAST CANCER RADIOTHERAPY IN THE YEAR 2006

Carolyn W. Taylor, F.R.C.R.,* Julie M. Povall, M.Sc.,† Paul McGale, Ph.D.,* Andrew Nisbet, Ph.D.,† David Dodwell, M.D.,† Jonathan T. Smith, F.R.C.R.,† and Sarah C. Darby, Ph.D.*

International Journal of Radiation Oncology biology • physics
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Clinical Investigation

Breast Cancer Laterality Does Not Influence Survival in a Large Modern Cohort: Implications for Radiation-Related Cardiac Mortality

Charles E. Rutter, MD,* Anees B. Chagpar, MD,† and Suzanne B. Evans, MD*,†

*Departments of *Therapeutic Radiology and †Surgery, and ‡Cancer Outcomes, Public Policy and Effectiveness Research Center, Yale School of Medicine, New Haven, Connecticut*

Received May 4, 2014, and in revised form Jun 5, 2014. Accepted for publication Jun 7, 2014.

- 344.831 casi ('98-'06)
- (Nat Cancer Database)
- No differenze in OS per RT (breast +/-LFN, tecniche "moderne") su mammella sn vs mammella ds.
- No incremento rischio morte cardiaco per RT mammella sn vs ds

Conclusions

Radiation therapy to the left breast delivered in a modern fashion does not appear to be deleterious to patient survival relative to right breast radiation therapy at 10 years. This suggests that breast radiation therapy is not associated with significantly heightened risks of cardiac mortality with modern techniques.

DOI:10.1093/jnci/dju156
First published online August 15, 2014

ARTICLE

Cardiovascular Morbidity and Mortality After Treatment for Ductal Carcinoma In Situ of the Breast

Naomi B. Boekel, Michael Schaapveld, Jourik A. Gietema, Emiel J. T. Rutgers, Michel I. M. Versteegh, Otto Visser, Berthe M. P. Aleman, Flora E. van Leeuwen

Manuscript received January 2, 2014; revised April 21, 2014; accepted Mar 8, 2014.

JNCI J Natl Cancer Inst (2014) 106(8): dju156 doi:10.1093/jnci/dju156

1989-2004; 10478 pazienti

After a median follow-up of 10 years, we did not find an increased risk for cardiovascular morbidity or mortality after radiotherapy for DCIS when comparing surgery and radiotherapy vs surgery only, nor when comparing radiotherapy for left-sided vs right-sided DCIS. Compared with the general population, DCIS patients have a decreased risk of cardiovascular death, independent of treatment.

Quale prevenzione possibile??

- Simulazione TC
- Accuratezza contouring / Uso di atlanti

ELSEVIER

Int. J. Radiation Oncology Biol. Phys., Vol. 79, No. 1, pp. 10–18, 2011

0360-3016/$ – see front matter

doi:10.1016/j.ijrobp.2009.10.058

CLINICAL INVESTIGATION **Breast**

DEVELOPMENT AND VALIDATION OF A HEART ATLAS TO STUDY CARDIAC EXPOSURE TO RADIATION FOLLOWING TREATMENT FOR BREAST CANCER

Mary Feng, M.D.,* Jean M. Moran, Ph.D.,* Todd Koelling, M.D.,† Aamer Chughtai, M.D.,‡ June L. Chan, M.D.,* Laura Freedman, M.D.,* James A. Hayman, M.D.,* Reshma Jagsi, M.D., D. Phil.,* Shruti Jolly, M.D.,* Janice Larouere, M.D.,* Julie Soriano, M.D.,* Robin Marsh, C.M.D.,* and Lori J. Pierce, M.D.*

International Journal of Radiation Oncology • Biology • Physics

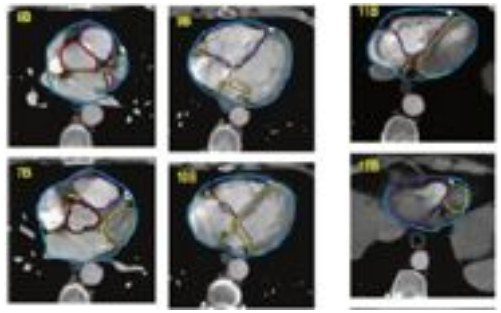
EDITORIAL

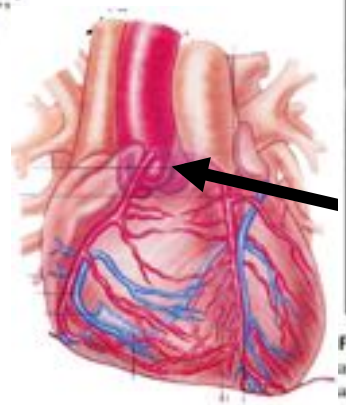
Coronary Artery Disease and Breast Radiation Therapy

Richard D. Pezner, MD

Radiation Oncology Department, City of Hope Medical Center, Duarte, California

Received Mar 27, 2013, and in revised form Apr 18, 2013. Accepted for publication Apr 20, 2013





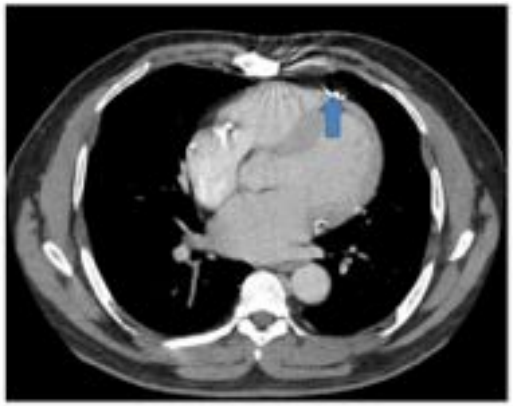


Fig. 1. An 80-year-old man with breast cancer. Coronary arteries are visible because of calcifications. Arrow shows left anterior descending coronary artery.

- Identificazione della coronaria!
- (in particolare: origine da aorta della coronaria ds e sn)

- Dose al cuore comunque più bassa possibile (eventi coronarici: incremento lineare dose media al cuore, di 7.4% per Gy (p<0.001), senza soglia)

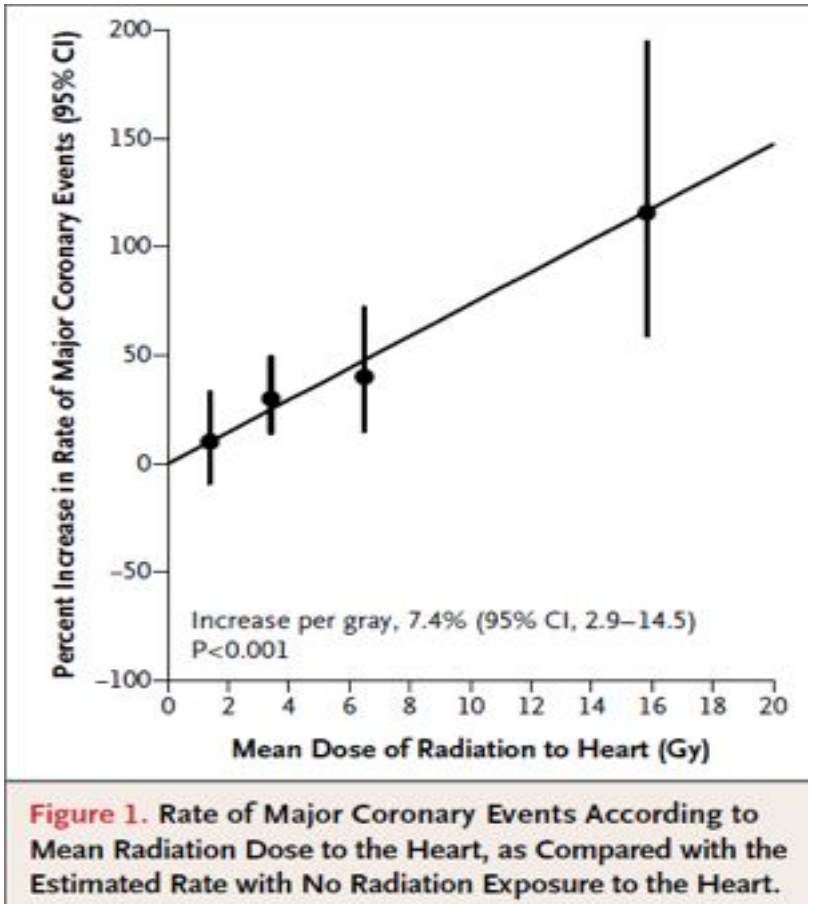


Figure 1. Rate of Major Coronary Events According to Mean Radiation Dose to the Heart, as Compared with the Estimated Rate with No Radiation Exposure to the Heart.

Acta Oncologica, 2013; 52: 703–710

Delineation of target volumes and organs at risk in adjuvant radiotherapy of early breast cancer: National guidelines and contouring atlas by the Danish Breast Cancer Cooperative Group

- High priority: to spare OAR as much as possible from RT
- Priorities:
  - **CTV boost > LADCA** > heart > lung > CTV breast/chest wall > CTV periclavicularis > CTV IMN > contralateral breast

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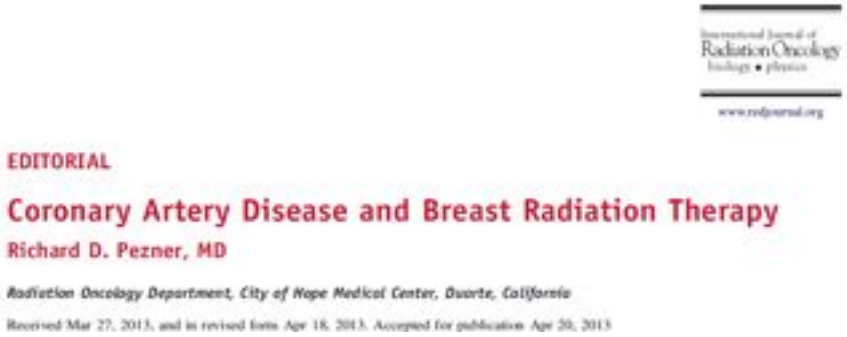

- Abbiamo ancora insufficienti informazioni sulla dose max tollerabile coronarica!

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- Uso selettivo di RT su IMN
- Respiratory gating? Necessità di ulteriori studi per confermare utilità nel ridurre dosi RT coronarica

Original Article

Radiat Oncol J 2013;31(4):239-246
http://dx.doi.org/10.3857/roj.2013.31.4.239
pISSN 2234-1900 · eISSN 2234-3156

ROJ Radiation Oncology Journal

The deep inspiration breath hold technique using Abches reduces cardiac dose in patients undergoing left-sided breast irradiation

Ha Yoon Lee, MD, Jee Suk Chang, MD, Ik Jae Lee, MD, PhD, Kwangwoo Park, PhD, Yong Bae Kim, MD, PhD, Chang Ok Suh, MD, PhD, Jun Won Kim, MD, Ki Chang Keum, MD, PhD

Department of Radiation Oncology, Yonsei University College of Medicine, Seoul, Korea

Results: All patients were successfully treated with the DIBH technique using Abches. Significant differences were found between the DIBH and FB plans for mean heart dose (2.52 vs. 4.53 Gy), heart V30 (16.48 vs. 45.13 cm^3), V20 (21.35 vs. 54.55 cm^3), mean left anterior descending coronary artery (LAD) dose (16.01 vs. 26.26 Gy, all $p < 0.001$), and maximal dose to 0.2 cm^3 of the LAD (41.65 vs. 47.27 Gy, $p = 0.017$). The mean left lung dose (7.53 vs. 8.03 Gy, $p = 0.073$) and lung V20 (14.63% vs. 15.72%, $p = 0.060$) of DIBH using Abches were not different significantly compared with FB.

Conclusion: We report that the use of a DIBH technique using Abches in breathing adapted radiotherapy for left-sided breast cancer is easily feasible in daily practice and significantly reduces the radiation doses to the heart and LAD, therefore potentially reducing cardiac risk.

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- RT in posizione prona? Potrebbe garantire >protezione cardiaca in alta % di casi (85%?) soprattutto se mammella voluminosa

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- PBI (se i campi non sono in stretta vicinanza del cuore)

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- PBI (se i campi non sono in stretta vicinanza del cuore)

- IMRT: (ma abbiamo ancora poche informazioni sulla dose max tollerabile da coronarie!)

Radiotherapy and Oncology 112 (2014) 9–16

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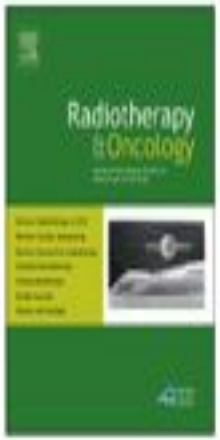

Review

Cardiac dose sparing and avoidance techniques in breast cancer radiotherapy

Chirag Shah [a], Shahed Badiyan [b], Sameer Berry [a], Atif J. Khan [c], Sharad Goyal [c], Kevin Schulte [a], Anish Nanavati [d], Melanie Lynch [a], Frank A. Vicini [e,*]

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Table 2
Summary of studies on cardiac protection.

Technique	Key findings	Cardiac dose reductions
Breath hold	(1) Imaging studies confirm deep inspiration optimal point for cardiac protection (2) Feasibility demonstrated in clinical setting with treatment times less than 20 min (3) Dosimetric studies demonstrate reduction in low dose and high dose cardiac dosimetries (4) Studied with breast conserving therapy with or without regional therapy and in the post-mastectomy setting (5) Can be combined with Intensity Modulated Radiation Therapy	(1) Decreased cardiac volume in field [9–11,18,20–23,30] (2) Reduced mean, maximum, V_{5Gy}, V_{10Gy}, V_{15Gy}, V_{20Gy}, V_{25Gy}, V_{30Gy}, V_{40Gy}, V_{50Gy} [12,16,17,21,22,24–30] (3) Reduced left anterior descending dose [17,25,27,29–30] (4) Reduced cardiac mortality probability (4.8% vs. 0.1%) [14]
Prone	(1) Dosimetric studies demonstrate a reduction in cardiac dose in >50% cases but in some cases worse cardiac dose (2) Large breast volumes were associated with reduction in cardiac dose with technique, less consistent in small breast volume (3) Prospective data demonstrate acceptable toxicity and clinical outcomes (4) Studied with breast conserving therapy with or without regional therapy (5) Can be combined with intensity modulated radiation therapy or accelerated partial breast irradiation	(1) 75–85% of left sided cases reduced cardiac volume in field [33–35] (2) Non-significant decrease in mean heart, V_{40Gy}, V_{5Gy} [36,39]; decreased cardiac V_{35Gy} [38] (3) Decreased mean cardiac dose (4.6 Gy vs. 3.0 Gy) [40]
Intensity modulated radiation therapy	(1) Dosimetric studies demonstrate reduction in low dose and high dose cardiac dose parameters as well as dose to the left ventricle and coronary arteries (2) Feasibility demonstrated in clinical setting (3) Multiple techniques available with cardiac sparing preserved (4) Studied with breast conserving therapy with or without regional therapy and in the post-mastectomy setting (5) Can be combined with breath hold, prone technique, or accelerated partial breast irradiation	(1) Reduction in cardiac NTCP compared with 3D-CRT [57,71,72] (2) Decreased mean dose, V_{5Gy}, V_{15Gy}, V_{20Gy}, V_{30Gy}(10–50%), maximum dose [54,58–61,64–66,68,71,73,74,76] (3) Reduced dose to left anterior descending, left ventricle [62,63,80]
Proton beam irradiation	(1) Dosimetric studies demonstrate reduction in low dose and maximum cardiac dose (2) Feasibility demonstrated in small prospective studies (3) Studied with breast conserving therapy with or without regional therapy and in the post-mastectomy setting (4) Can be combined with accelerated partial breast irradiation	(1) Reduction in cardiac $V_{22.5Gy}$, V_{20Gy}, V_{5Gy} [89,90,93] (2) Reduction in maximum cardiac dose compared with 3D-CRT/IMRT (19 Gy vs. 23–25 Gy) [86] (3) Mean dose – one study with no difference [78], two studies with reduction [88,90] (4) Reduction in cardiac NTCP (2.1% vs. 0.5%) [87]
Accelerated partial breast irradiation	(1) Dosimetric studies demonstrate reduction in low dose and high dose cardiac dosimetries with each technique (2) Limited to early stage patients meeting certain criteria (3) Can be combined with prone technique or intensity modulated radiation therapy	(1) Reduced mean dose to 1.2 Gy [112] (2) Reduction in V_{5Gy}, V_{10Gy}, V_{20Gy}, $V_{50\%}$, $V_{90\%}$, $V_{100\%}$; decreased volume receiving low and high dose compared with whole breast [104,106,107,109,113] (3) Reduction in left anterior descending dose [115]
Intraoperative radiotherapy	(1) Dosimetric studies demonstrate reduction in low dose and maximum cardiac dose (2) Limited to early stage patients meeting certain criteria (3) Limited clinical data supporting technique available	(1) Maximum heart dose 1 Gy [127] (2) Average dose to left chest wall 0.6 Gy [128]

Abbreviations: V_x = volume receiving a particular dose or less, NTCP = normal tissue complication probability, 3D-CRT = 3-dimensional conformal radiotherapy, IMRT = intensity modulated radiation therapy.

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- Conclusioni:
  - L'incremento di tox cardiaca da RT è spesso correlato a <u>trattamenti non recenti</u>

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- Conclusioni:
  - L'incremento di tox cardiaca da RT è spesso correlato a trattamenti non recenti
  - Con applicazione delle moderne tecniche "cardiac sparing": favorevoli dati dosimetrici; significative riduzioni dose cardiaca; ancora limitati risultati clinici di tossicità nel tempo

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  - Si consiglia di applicare almeno alcune tali tecniche se RT mamm sn
  - Per ora non c'è una tecnica migliore di altre (alcune sono applicabili anche in concomitanza)
  - Possibile utilizzo di "surrogati" di eventi cardiaci tardivi, a breve termine (perfusione SPECT, biomarkers)

- Porre particolare attenzione alle pazienti già affette da cardiopatia ischemica!

(Overall rate ratio x eventi coronarici in paz con anamnesi+ vs- per cardiopatia ischemica: 6.67)

Cancer/Radiothérapie 18 (2014) 119–124

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Original article

Potential impact of cardiac dose–volume on acute cardiac toxicity following concurrent trastuzumab and radiotherapy☆

Impact des histogrammes dose–volume sur la toxicité aiguë cardiaque après un traitement concomitant par irradiation et trastuzumab

L. Cao[a,b], W.G. Hu[a,b], Y.M. Kirova[c], Z.Z. Yang[a,b], G. Cai[a,b], X.L. Yu[a,b], J.L. Ma[a,b], X.M. Guo[a,b], Z.M. Shao[d], J.Y. Chen[a,*,b]

review

Cardiotoxicity of concomitant radiotherapy and trastuzumab for early breast cancer

Tanja Marinko[1], Jure Dolenc[2], Cvetka Bilban-Jakopin[3]

[1] Department of Radiotherapy, Institute of Oncology Ljubljana, Ljubljana, Slovenia
[2] Department of Cardiology, University Medical Centre Ljubljana, Ljubljana, Slovenia
[3] Institute of Oncology Ljubljana, Ljubljana, Slovenia

Radiol Oncol 2014; 48(2): 105-112.

No incremento tox cardiaca dimostrabile

The NEW ENGLAND JOURNAL of MEDICINE

MARCH 14, 2013

Risk of Ischemic Heart Disease in Women after Radiotherapy for Breast Cancer

Sarah C. Darby, Ph.D., Marianne Ewertz, D.M.Sc., Paul McGale, Ph.D., Anna M. Bennet, Ph.D., Ulla Blom-Goldman, M.D., Dorthe Brønnum, R.N., Candace Correa, M.D., David Cutter, F.R.C.R., Giovanna Gagliardi, Ph.D., Bruna Gigante, Ph.D., Maj-Britt Jensen, M.Sc., Andrew Nisbet, Ph.D., Richard Peto, F.R.S., Kazem Rahimi, D.M., Carolyn Taylor, D.Phil., and Per Hall, Ph.D.

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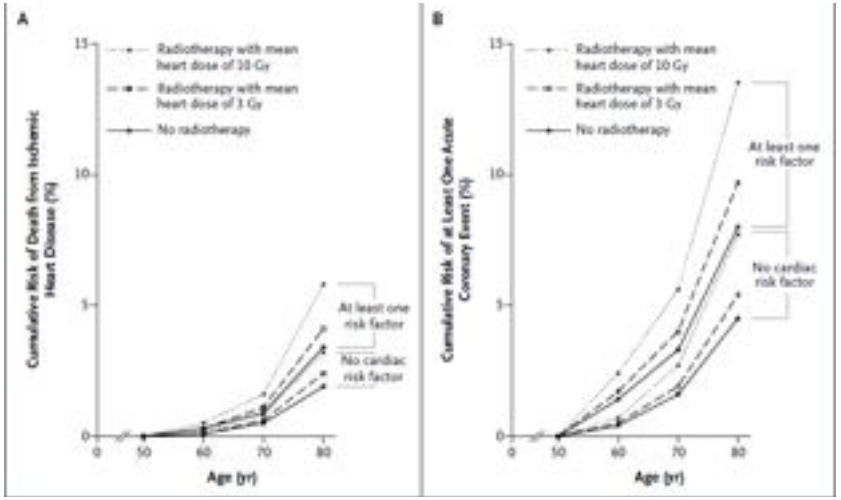
  - Malattie circolatorie
  - Diabete
  - BPCO



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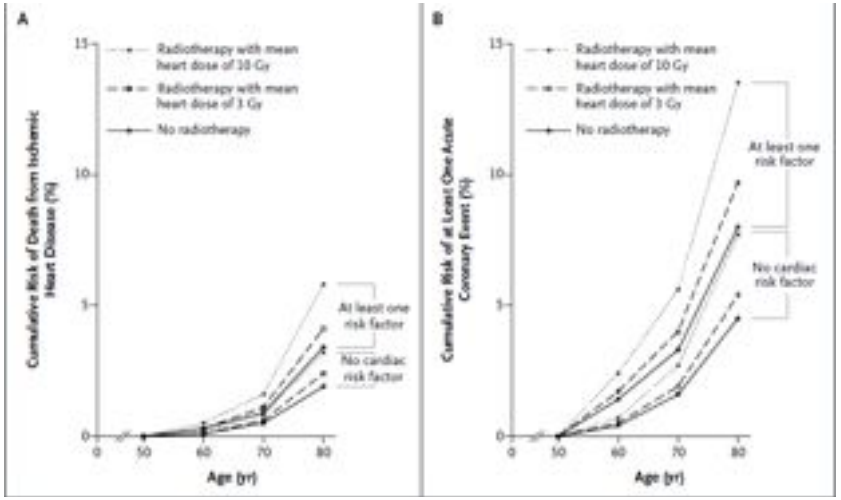
- Terapia adeguata di patologie già presenti:
  - Malattie circolatorie
  - Diabete
  - BPCO
- Eliminazione/controllo:
  - Fumo
  - Uso regolare analgesici
  - BMI (18-25 kg/mq)



(Overall ratio x eventi coronarici in paz con uno o più tra: diabete, malattie circolatorie, BPCO, fumo, alto BMI, uso regol. analgesici / senza cardiopatia: ***1.96*** *e 2.60 nei primi 10 aa. Il rischio si incrementa se già presenti fattori di rischio)*

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Coronary Artery Disease and Breast Radiation Therapy

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- Importanza del controllo di altri fattori di rischio quali:
  - Ipercolesterolemia, ipertrigliceridemia
  - Ipertensione

- Stimolo ad idoneo stile di vita (alimentazione corretta ed attività fisica regolare): impatto statisticam. significativo sulla prevenzione cardiovascolare e delle recidive/II neoplasie mammarie

Grazie per l'attenzione!