Associazione Italiana Radioterapia e Oncologia clinica

Società Italiana di Radiobiologia

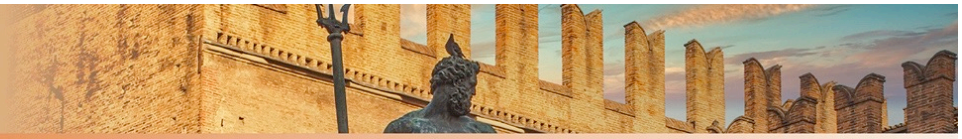
Overall Treatment Time:

Radiobiological Assumptions And Clinical Implications

Practical Methods for the Management of Unplanned Radiation Therapy Treatment Interruptions

Prof. Francesco Marampon

Associazione Italiana Radioterapia e Oncologia clinica
Società Italiana di Radiobiologia

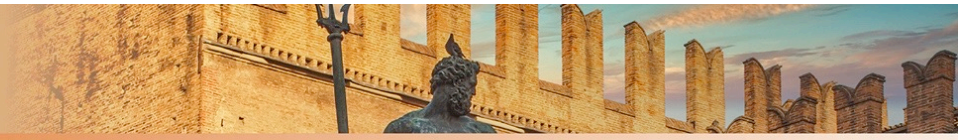


DICHIARAZIONE

Relatore: Francesco Marampon

Come da nuova regolamentazione della Commissione Nazionale per la Formazione Continua del Ministero della Salute, è richiesta la trasparenza delle fonti di finanziamento e dei rapporti con soggetti portatori di interessi commerciali in campo sanitario.

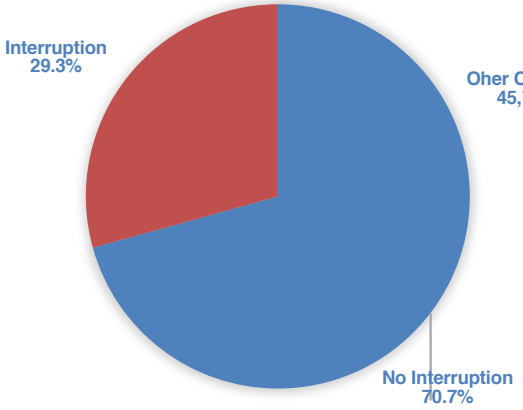
- Posizione di dipendente in aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Consulenza ad aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Fondi per la ricerca da aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Partecipazione ad Advisory Board **(NIENTE DA DICHIARARE)**
- Titolarità di brevetti in compartecipazione ad aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Partecipazioni azionarie in aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Altro



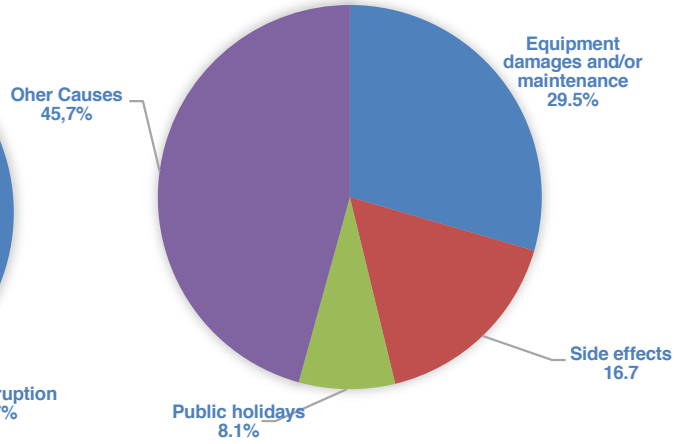
AGENDA

- **INTRODUCING OVERALL TREATMENT TIME**
- **THE RADIOBIOLOGY OF OVERALL TREATMENT TIME**
- **CLINICAL EVIDENCE**
- **PRATICAL PRACTICE**

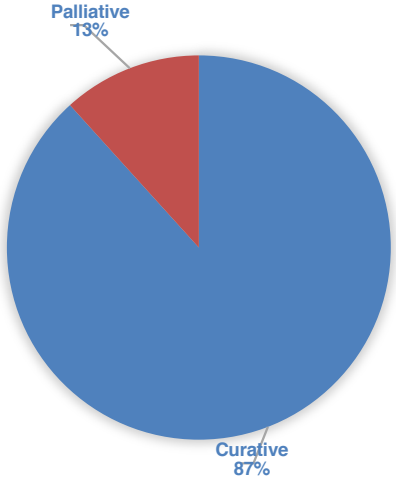
RADIOTHERAPY INTERRUPTION



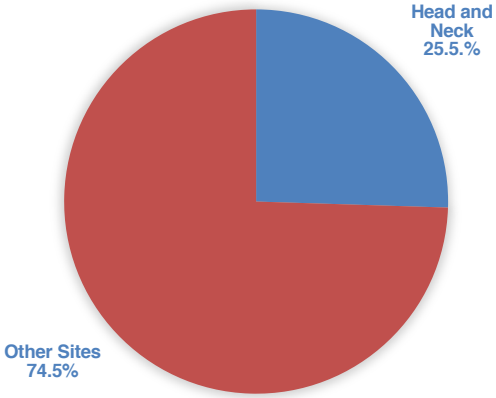
CAUSES



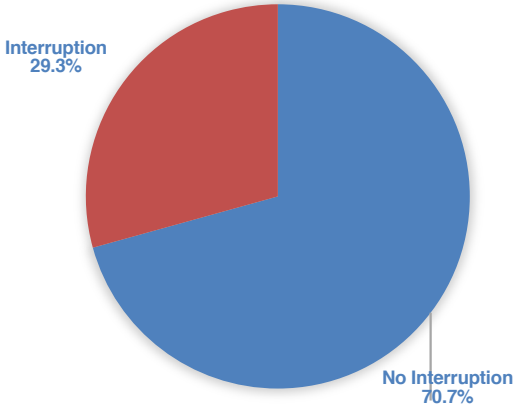
INTENT OF TREATMENT



SITE



RADIOTHERAPY INTERRUPTION



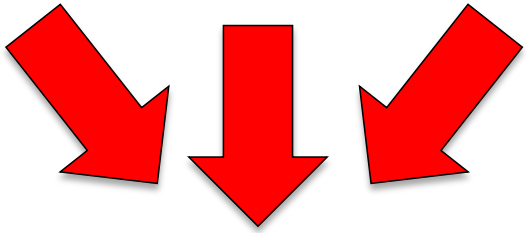
CLINICAL INVESTIGATION

Defining Radiation Treatment Interruption Rates During the COVID-19 Pandemic: Findings From an Academic Center in an Underserved Urban Setting

Elizabeth Gaudio, BS,[*] Nariman Ammar, PhD,[†,‡] Fatma Gunturkun, PhD,[†,‡] Cem Akkus, PhD, MPH,[†,‡] Whitney Brakefield, MS,[†,§] Daniel V. Wakefield, MD, MPH,[*,‖] Maria Pisu, PhD,[¶] Robert Davis, MD, MPH,[†,‡] Arash Shaban-Nejad, PhD, MPH,[†,‡] and David L. Schwartz, MD, FACR[*,#]

AGENDA

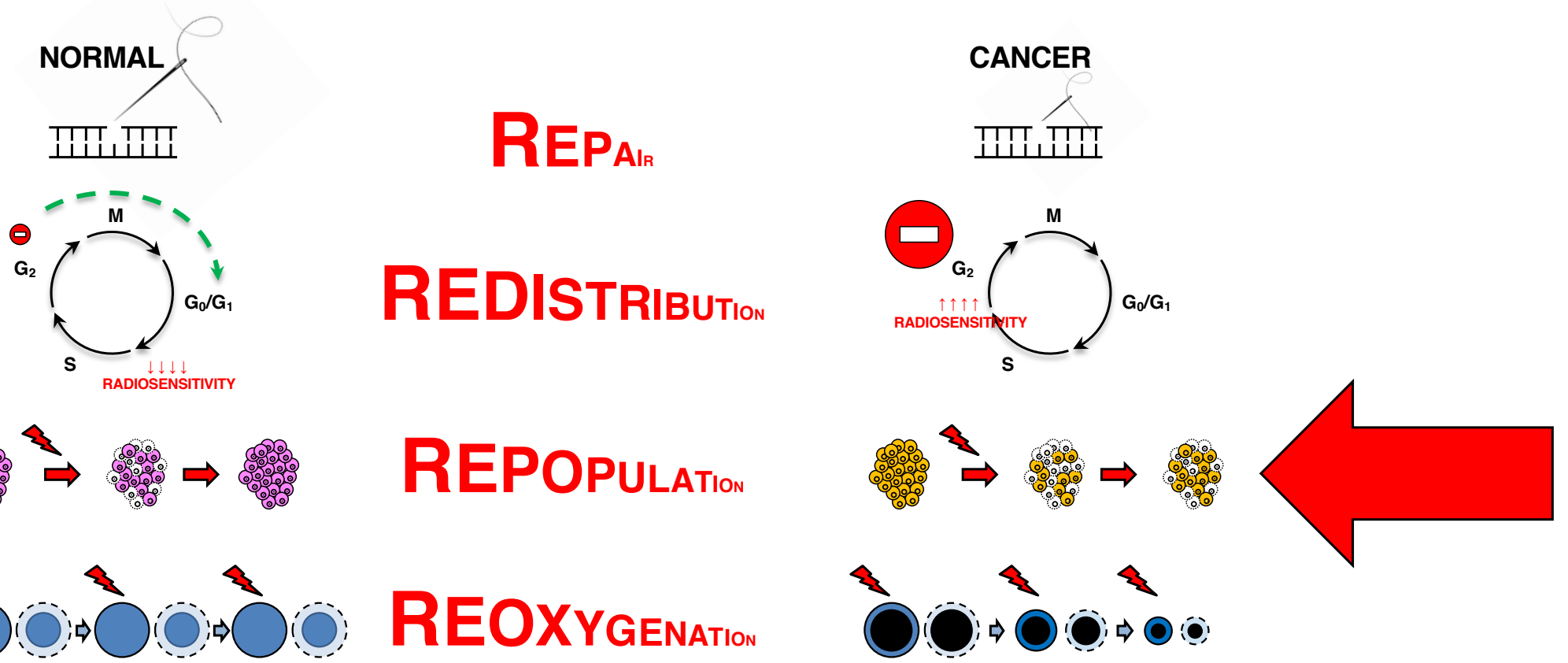
- INTRODUCING OVERALL TREATMENT TIME
- THE RADIOBIOLOGY OF OVERALL TREATMENT TIME
- CLINICAL EVIDENCE
- PRATICAL PRATICE



WHAT IS THE
"MINIMUM DURATION OF AN INTERRUPTION"
SIGNIFICANTLY AFFECTING LOCAL TUMOR CONTROL?

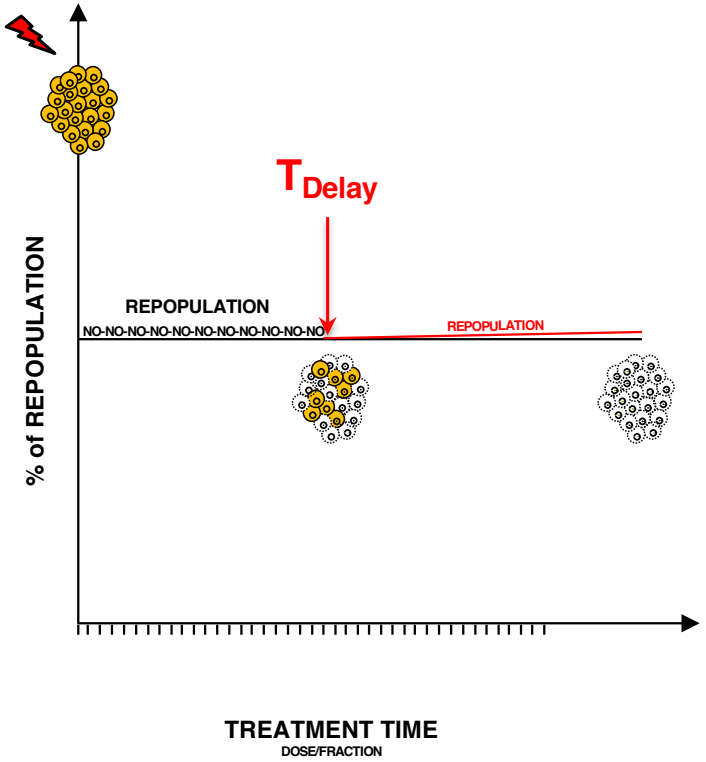
ARE WE SURE IT'S JUST A QUESTION OF
THE AMOUNT OF CANCER CELLS AND NOT THE "TYPE"?

THE RADIATION BIOLOGY OF FRACTIONATION



THE BIOLOGY OF INTERRUPTIONS AND UNCOMPENSATED TREATMENT BREAKS

NEOPLASTIC REPOPULATION



T_{delay}
TIME ELAPSED FROM THE BEGINNING OF TREATMENT BEFORE THE ONSET OF REPOPULATION

K
BED REQUIRED EACH DAY TO OFFSET REPOPULATION

70 Gy, 2 Gy x 35 fr α/β=10

$$Tumor\ BED = 35x2\left[1+\frac{2}{10}\right] = \mathbf{84\ Gy}$$

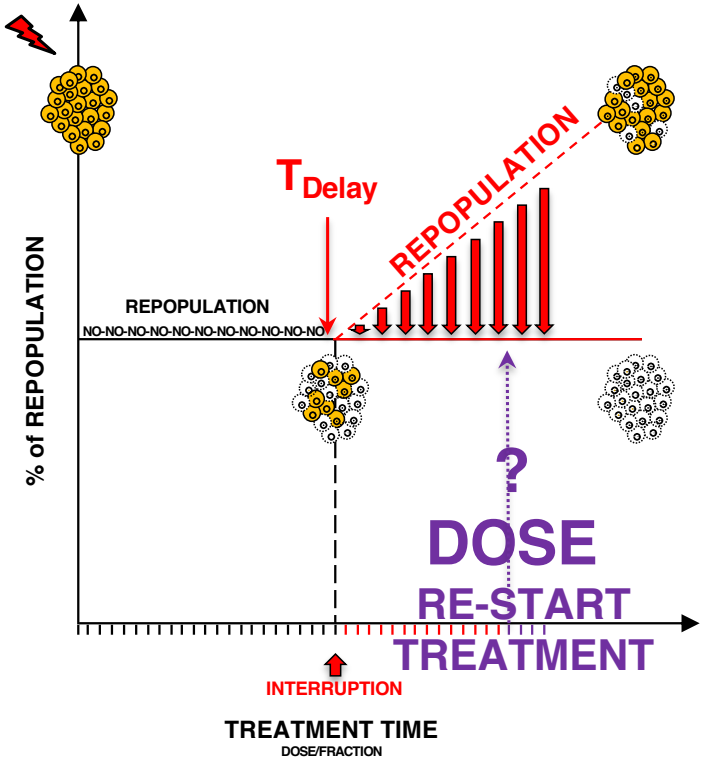
BED — REPOPULATION FACTOR

$$\text{«}Normalized\text{»}\ Tumor\ BED = Nd\left[1+\frac{d}{\frac{\alpha}{\beta}}\right] - K\ (T - T_{delay})$$

$$\text{«}Normalized\text{»}Tumor\ BED = 35\ x\ 2\left[1+\frac{2}{10}\right] - 0.9\ x\ (46-28) = \mathbf{67.8\ Gy}$$

THE BIOLOGY OF INTERRUPTIONS AND UNCOMPENSATED TREATMENT BREAKS

NEOPLASTIC REPOPULATION



TUMOR CONTROL RATE DECREASES DRAMATICALLY WHEN OVERALL TREATMENT TIME IS PROLONGED

T_{delay}
TIME ELAPSED FROM THE BEGINNING OF TREATMENT BEFORE THE ONSET OF REPOPULATION

K
BED REQUIRED EACH DAY TO OFFSET REPOPULATION

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THE BIOLOGY OF INTERRUPTIONS AND UNCOMPENSATED TREATMENT BREAKS

Seminars in Cancer Biology 31 (2015) 28–35

Contents lists available at ScienceDirect

Seminars in Cancer Biology

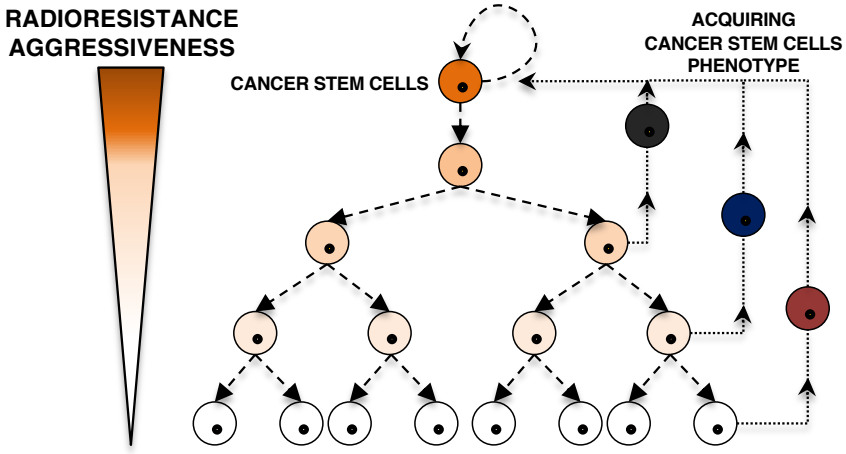
journal homepage: www.elsevier.com/locate/semcancer

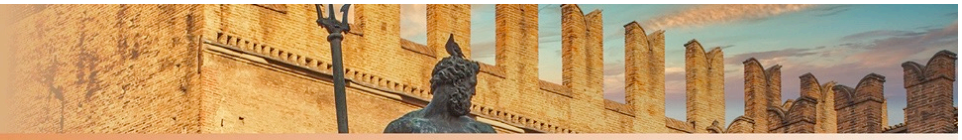
Review

Cancer stem cells, cancer cell plasticity and radiation therapy☆

Erina Vlashi[a,b], Frank Pajonk[a,b,*]

...TO CANCER STEM CELLS and TUMOR PLASTICITY





AGENDA

- INTRODUCING OVERALL TREATMENT TIME
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- CLINICAL EVIDENCE
- PRATICAL PRACTICE

WHAT IS THE MINIMUM DURATION OF AN INTERRUPTION SIGNIFICANTLY AFFECTING LOCAL TUMOR CONTROL?

Comparison of Conventional and Split-Course Radiotherapy as Primary Treatment in Carcinoma of the Larynx

J. Overgaard, M. Hjelm-Hansen, L. Vendelbo Johansen & A. P. Andersen

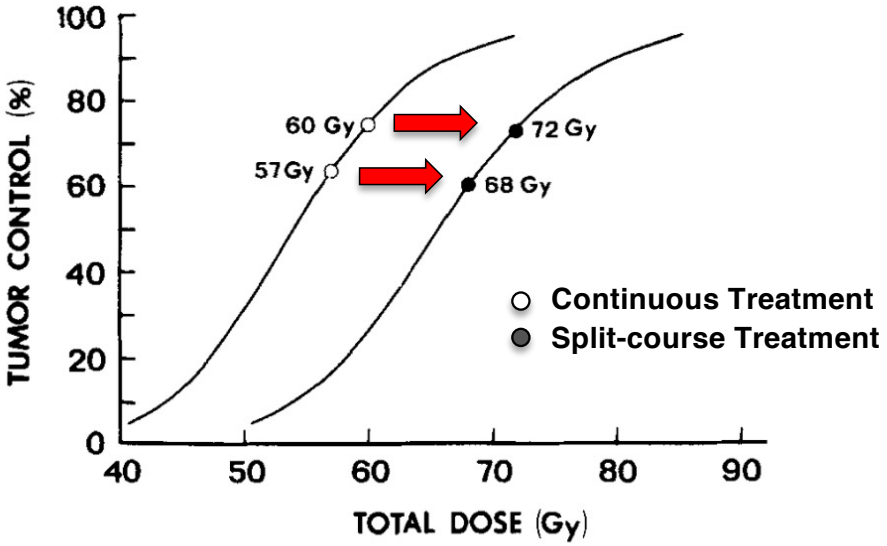
Stage II-IV carcinoma of the larynx
Stage I-IV carcinoma of the pharynx

57 Gy/30 fr./6 wk
60 Gy/30 fr./6 wk

vs.

40 Gy/20 fr./4 wk-3 wk-32 Gy/16 fr/3.5 wk
40 Gy/20 fr.14 wk-3 wk-28 Gy/14 fr./3 wk

DANISH SPLIT-COURSE TRIAL



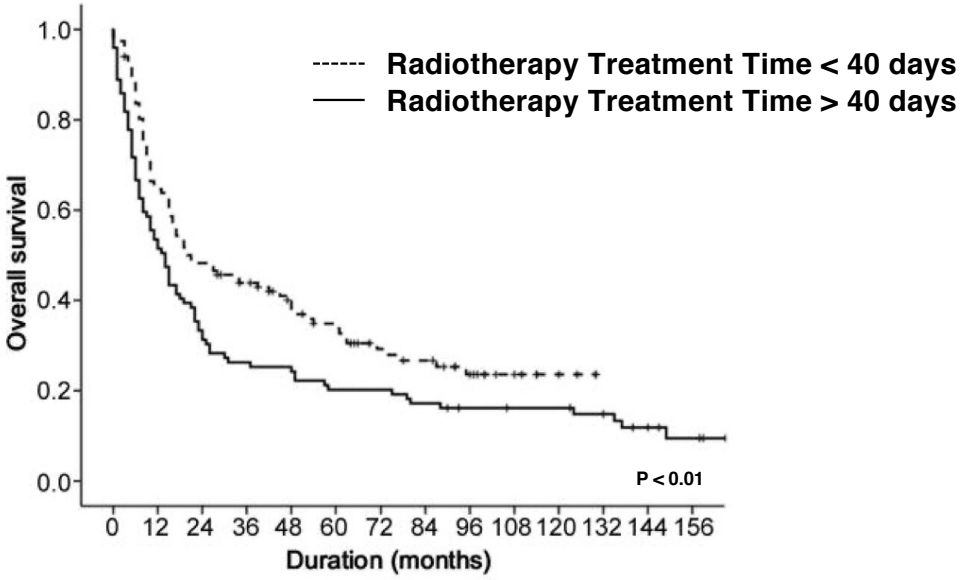
14-16 DAY INTERRUPTIONS DEFINITELY AFFECT TREATMENT OUTCOME

EVIDENCE FROM CLINICAL STUDIES: HEAD & NECK CANCER

in vivo *31*: 949-955 (2017)
doi:10.21873/invivo.11152

Impact of Time Factors on Outcome in Patients with Head and Neck Cancer Treated with Definitive Radio(Chemo)Therapy

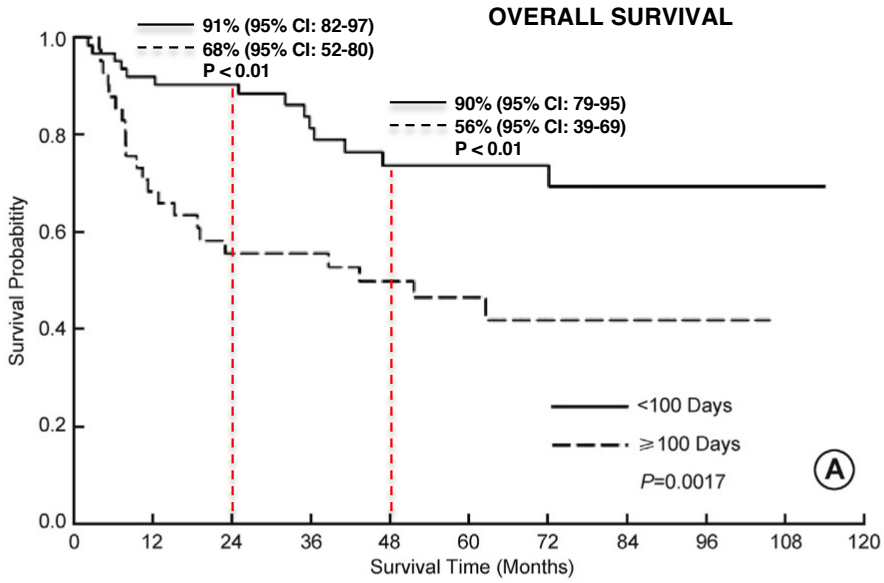
SÖREN DAHLKE[1], DIANA STEINMANN[1], HANS CHRISTIANSEN[1], MARTIN DURISIN[2], ANDRE ECKARDT[3], GERD WEGENER[4], MICHAEL BREMER[1] and ANDREAS MEYER[1]



Research Paper

The effect of treatment package time in head and neck cancer patients treated with adjuvant radiotherapy and concurrent systemic therapy

Ahmed I. Ghanem [a,e,*], Matthew Schymick [a], Souheyla Bachiri [a], Aniruddh Mannari [a], Jawad Sheqwara [b], Charlotte Burmeister [c], Steven Chang [d], Tamer Ghanem [d], Farzan Siddiqui [a]



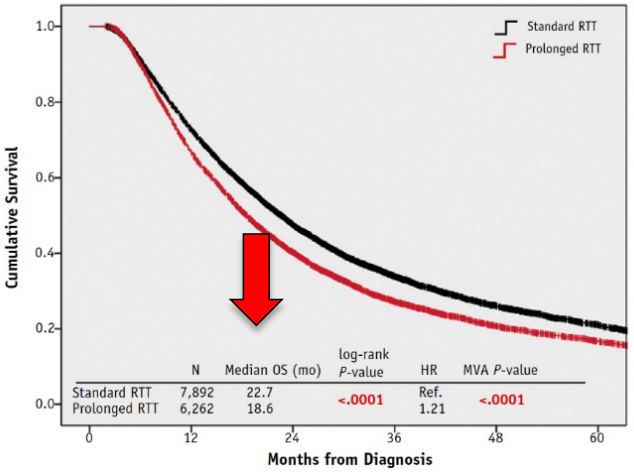
EVIDENCE FROM CLINICAL STUDIES: NSCLC and ESOPHAGUS CANCER

Clinical Investigation

Radiation Treatment Time and Overall Survival in Locally Advanced Non-small Cell Lung Cancer

Matthew T. McMillan, BA,* Eric Ojerholm, MD,* Vivek Verma, MD,† Kristin A. Higgins, MD,‡ Sunil Singhal, MD,§ Jarrod D. Predina, MD,§ Abigail T. Berman, MD, MSCE,* Surbhi Grover, MD, MPH,* Cliff G. Robinson, MD,‖ and Charles B. Simone, II, MD¶

- **14.154 PZ. III NSCLC → CHT+RT (59.4-70.0 Gy)**
- **INTERRUPTION IN 6.262 (44.2%).**



Pergamon
Int. J. Radiation Oncology Biol. Phys., Vol. 32, No. 4, pp. 1017–1023, 1995

0360-3016/95 $9.50 + .00
0360-3016(94)00447-1

● *Clinical Original Contribution*

EFFECT OF OVERALL TREATMENT TIME ON LOCAL CONTROL IN RADICAL RADIOTHERAPY FOR SQUAMOUS CELL CARCINOMA OF ESOPHAGUS

MIKAEL KAJANTI, M.D.,* REMIGIUSZ KALETA, M.D.,† LEENA KANKAANRANTA, M.D.,* TIMO MUHONEN, M.D.* AND LARS HOLSTI, M.D.*

Table 1. Distribution of 109 patients with tumor control at 1 year by overall treatment time and T-stage

Overall treatment time (days)	T-stage T1	%	T2	%	All	%	T1/T2 (%)
35–41*	10/19	53	4/33	12	14/52	27	71/29
42–48*	12/24	50	4/20	20	16/44	37	75/25
49–55*	18/29	62	6/39	15	24/68	35	75/25
56–62†	17/41	42	4/47	11	22/88	25	77/23
63–70†	27/50	54	6/51	12	33/101	33	82/18
Total	84/163	52	25/190	13	109/353	31	77/23

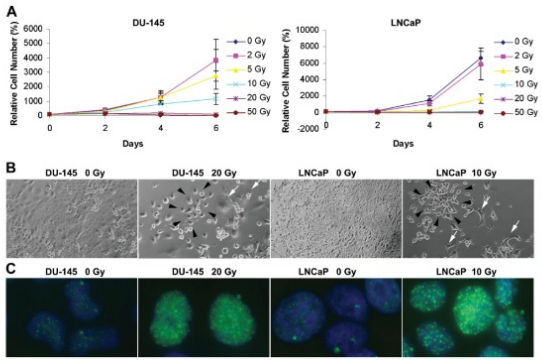
* Continuous therapy.
† Split-course therapy.

EVIDENCE FROM CLINICAL STUDIES: PROSTATE CANCER

The Prostate 72:1746–1756 (2012)

Long-Term Recovery of Irradiated Prostate Cancer Increases Cancer Stem Cells

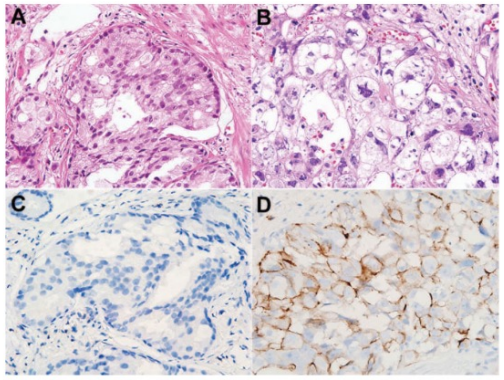
Yong Mee Cho,[1,2] Young Seok Kim,[3] Mun Jung Kang,[2] William L. Farrar,[1] and Elaine M. Hurt[1]*



↑↑↑

CD44⁺ CELLS

«IRRADIATED PROSTATE CANCER»



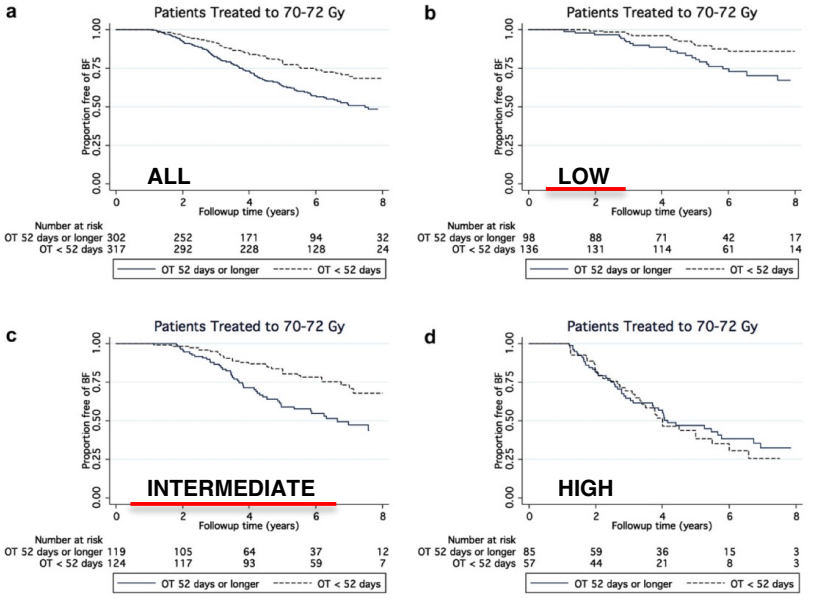
Contents lists available at ScienceDirect
Radiotherapy and Oncology
journal homepage: www.thegreenjournal.com
ELSEVIER

Prostate radiotherapy

The role of overall treatment time in the outcome of radiotherapy of prostate cancer: An analysis of biochemical failure in 4839 men treated between 1987 and 1995

Howard D. Thames [a,*], Deborah Kuban [b], Larry B. Levy [b], Eric M. Horwitz [c], Patrick Kupelian [d], Alvaro Martinez [e], Jeffrey Michalski [f], Thomas Pisansky [g], Howard Sandler [h], William Shipley [i], Michael Zelefsky [j], Anthony Zietman [i]

$$\frac{\alpha}{\beta} = 1.5Gy$$

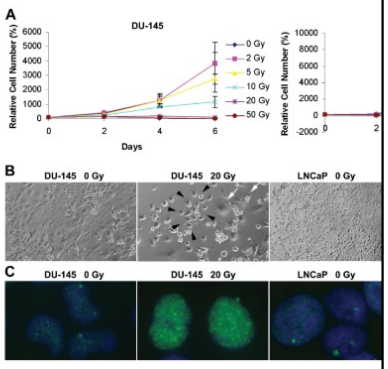


EVIDENCE FROM CLINICAL STUDIES: PROSTATE CANCER

The Prostate 72:1746–1756 (2012)

Long-Term Recovery of Irradiated Prostate Cancer

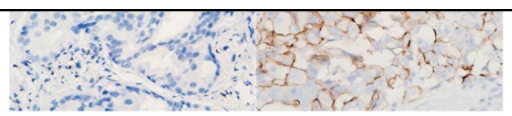
Yong Mee Cho,[1,2]



↑↑↑

CD44⁺ CELLS

«IRRADIATED PROSTATE CANCER»



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The role of overall treatment time in the outcome of radiotherapy of prostate
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B. Levy[b], Eric M. Horwitz[c], Patrick Kupelian[d],
Pisansky[g], Howard Sandler[h], William Shipley[i].

$$\frac{\alpha}{\beta} = 1.5Gy$$

International Journal of Radiation Oncology biology • physics

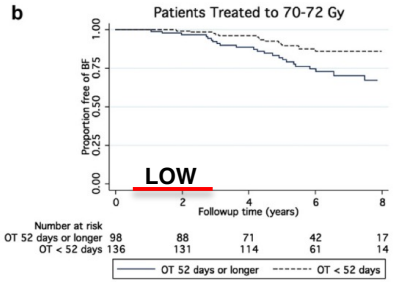
www.redjournal.org

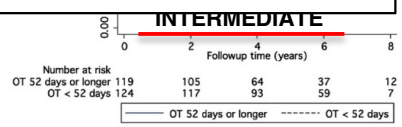
COMMENTARY

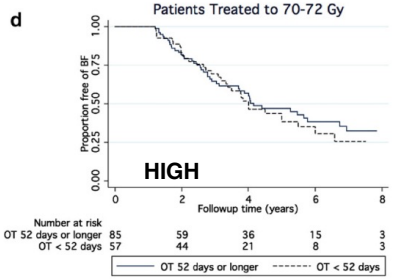
Role of Overall Treatment Time in the Management of Prostate Cancer Patients: How to Manage Unscheduled Treatment Interruptions

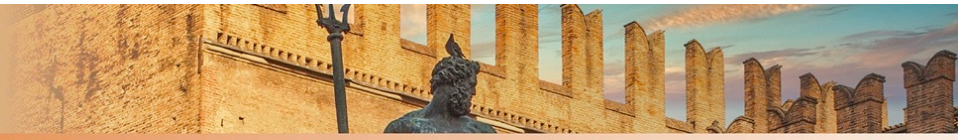
Howard M. Sandler, MD, MS, FASTRO, FASCO

Cedars-Sinai Medical Center, Los Angeles, California









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- CLINICAL EVIDENCE
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MANAGEMENT OF UNPLANNED RADIATION THERAPY TREATMENT INTERRUPTIONS

www.rcr.ac.uk

Clinical Oncology
The Royal College of Radiologists

The timely delivery of radical radiotherapy: guidelines for the management of unscheduled treatment interruptions
Fourth edition

SSK

Strahlenschutzkommission

Geschäftsstelle der
Strahlenschutzkommission
Postfach 12 06 29
D-53048 Bonn

http://www.ssk.de

Management of unplanned treatment interruptions in medical radiation therapy

Recommendation by the German Commission on Radiological Protection

WHERE POSSIBLE
TREATMENT SHOULD NOT BE PROLONGED
FOR MORE THAN 2 DAYS

RETAIN
OVERALL TIME TREATMENT

RESEARCH

OPEN ACCESS
Check for updates
FAST TRACK

Mortality due to cancer treatment delay: systematic review and meta-analysis

Timothy P Hanna,[1,2,3] Will D King,[3] Stephane Thibodeau,[2] Matthew Jalink,[1,2] Gregory A Paulin,[2] Elizabeth Harvey-Jones,[4] Dylan E O'Sullivan,[3] Christopher M Booth,[1,2,3,5] Richard Sullivan,[6] Ajay Aggarwal[4,6,7]

MANAGEMENT OF UNPLANNED RADIATION THERAPY TREATMENT INTERRUPTIONS

- [x] **PRIORITISATION OF PATIENTS**
- [ ] **COMPENSATORY MEASURES**

Category 1

- SHORT DOUBLING TIME
- CURATIVE INTENT
- PROLONGED OTT AFFECTS OUTCOME:
  - SCC of H&N (EBRT)
  - SCC of CERVIX (EBRT or BRT+EBRT)
  - SCC of OESOPHAGUS (EBRT)
  - SCC of SKIN, VAGINA or VULVA (EBRT)
  - SCC of ANUS (EBRT or BRT+EBRT)
  - SCC of TONGUE (BRT+EBRT)
  - NSCLC (EBRT)
  - SCLC (EBRT)
  - ADK of OESOPHAGUS (EBRT)

Category 2

- MEDIUM/HIGH DOUBLING TIME
- CURATIVE INTENT
- OTT MORE THAN 5 DAYS AFFECTS OUTCOME:
  - BREST CANCER
  - TRANSITIONAL CC OF THE BLADDER
  - PROSTATE CANCER

Category 2

- PALLIATIVE INTENT
- OTT MORE THAN 7 DAYS AFFECTS EFFECTIVENESS

MANAGEMENT OF UNPLANNED RADIATION THERAPY TREATMENT INTERRUPTIONS

PRIORITISATION OF PATIENTS

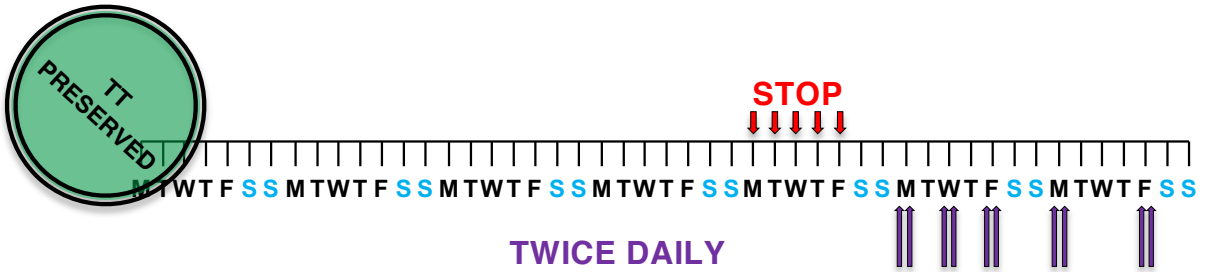
☑ **COMPENSATORY MEASURES**

➡ **TRANSFER TO A SECONDARY LINAC**

MANAGEMENT OF UNPLANNED RADIATION THERAPY TREATMENT INTERRUPTIONS

- PRIORITISATION OF PATIENTS
- ☑ COMPENSATORY MEASURES
  - ⇨ TRANSFER TO A SECONDARY LINAC
  - ➡ ACCELERATED SCHEDULING

70 Gy, 2 Gy x 35 fr
(H&N CANCER $\frac{\alpha}{\beta} = 10\ Gy$ B.E.D= 84 Gy)



6 hrs between fractions - ≤ 2.2 Gy/fr.

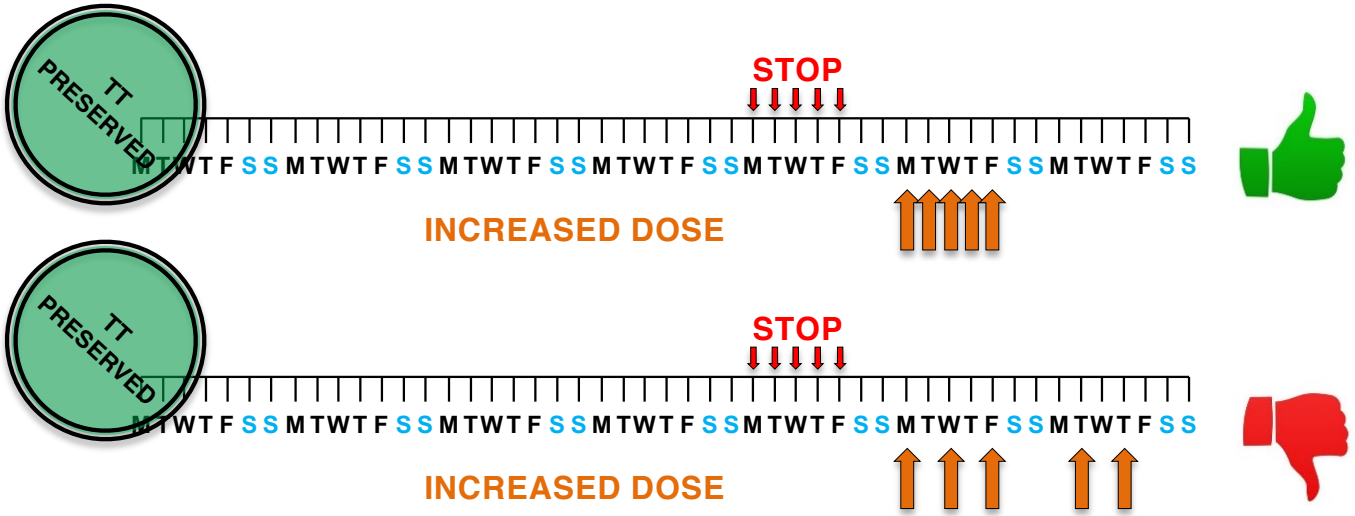
MANAGEMENT OF UNPLANNED RADIATION THERAPY TREATMENT INTERRUPTIONS

PRIORITISATION OF PATIENTS

☑ **COMPENSATORY MEASURES**

- TRANSFER TO A SECONDARY LINAC
- ACCELERATED SCHEDULING
- **INCREASING FRACTION**

70 Gy, 2 Gy x 35 fr
(H&N CANCER $\frac{\alpha}{\beta} = 10\ Gy$ B.E.D= 84 Gy)



$$EQD2^{30\,fr.} = D\left(\frac{d + \frac{\alpha}{\beta}}{2 + \frac{\alpha}{\beta}}\right)$$

$D^{30fr.} = 70.72\ Gy$

$d = 2.3\ Gy$

MANAGEMENT OF UNPLANNED RADIATION THERAPY TREATMENT INTERRUPTIONS

OTT

PRIORITISATION OF PATIENTS

☑ **COMPENSATORY MEASURES**

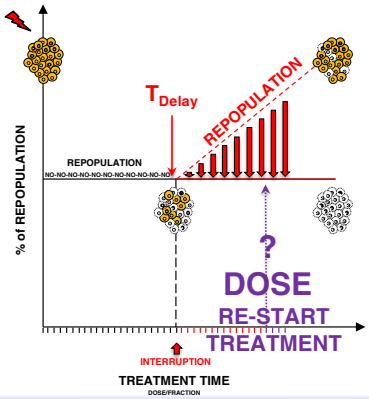
- TRANSFER TO A SECONDARY LINAC
- ACCELERATED SCHEDULING
- INCREASING FRACTION
- **BIOLOGICAL COMPENSATION**

70 Gy, 2 Gy x 35 fr
(H&N CANCER $\frac{\alpha}{\beta} = 10\ Gy$ B.E.D= 84 Gy)

STOP

M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F

NEOPLASTIC REPOPULATION



MANAGEMENT OF UNPLANNED RADIATION THERAPY TREATMENT INTERRUPTIONS

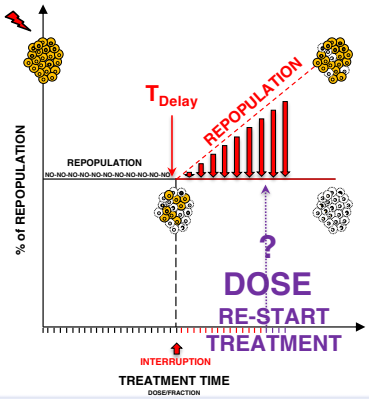
OTT

PRIORITISATION OF PATIENTS

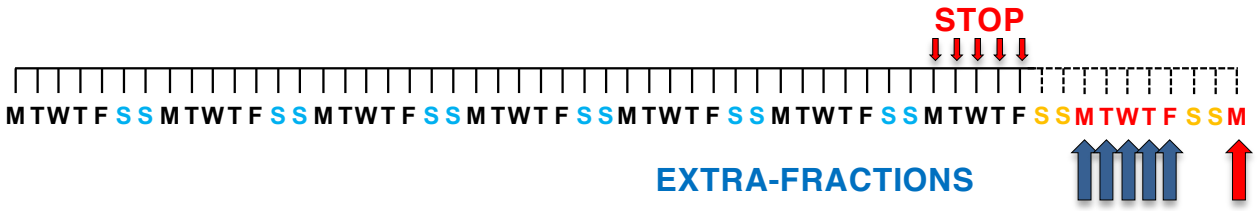
☑ **COMPENSATORY MEASURES**

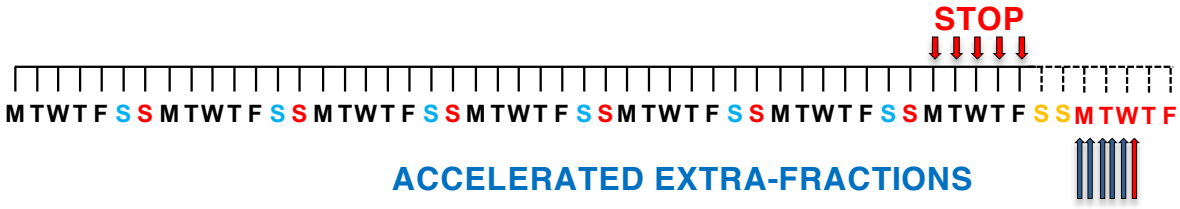
- TRANSFER TO A SECONDARY LINAC
- ACCELERATED SCHEDULING
- INCREASING FRACTION
- **BIOLOGICAL COMPENSATION**

NEOPLASTIC REPOPULATION



70 Gy, 2 Gy x 35 fr
(H&N CANCER $\frac{\alpha}{\beta} = 10\ Gy$ B.E.D= 84 Gy)





TUMOR CONTROL PROBABILITY

MANAGEMENT OF UNPLANNED RADIATION THERAPY TREATMENT INTERRUPTIONS

OTT

PRIORITISATION OF PATIENTS

☑ **COMPENSATORY MEASURES**

- TRANSFER TO A SECONDARY LINAC
- ACCELERATED SCHEDULING
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- **BIOLOGICAL COMPENSATION**

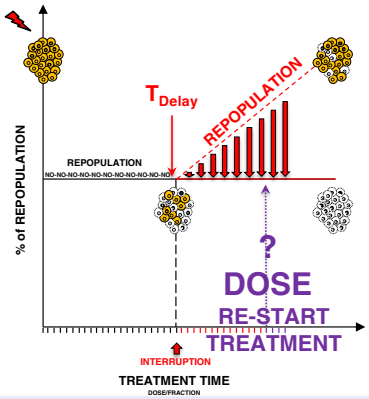
70 Gy, 2 Gy x 35 fr
(H&N CANCER $\frac{\alpha}{\beta} = 10\ Gy$ B.E.D= 84 Gy)

STOP

M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F

5 Days Longer

NEOPLASTIC REPOPULATION



BED | REPOPULATION FACTOR

$$«Normalized» \ Tumor\ BED = Nd\left[1 + \frac{d}{\frac{\alpha}{\beta}}\right] - K\ (T - T_{delay})$$

$$«Normalized» Tumor\ BED = 35{\times}2\left[1 + \frac{2}{10}\right] - 0.9\ (46 - 28) = \mathbf{67.8\ Gy}$$

BED pre-GAP | BED post-GAP

$$\mathbf{67.8\ Gy} = 30x2\left[1 + \frac{2}{10}\right] + 5\left[1 + \frac{d}{10}\right] - 0.9\ (51 - 28)$$

$$\boldsymbol{d = 2,62\ Gy}$$

MANAGEMENT OF UNPLANNED RADIATION THERAPY TREATMENT INTERRUPTIONS

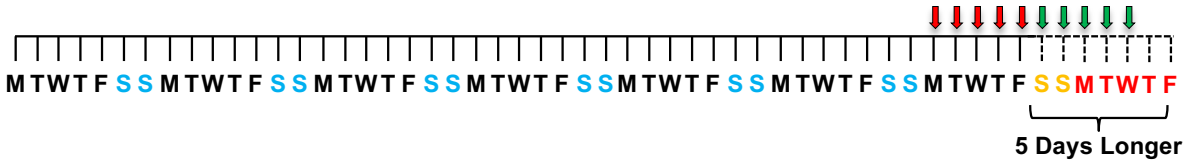
OTT

PRIORITISATION OF PATIENTS

☑ **COMPENSATORY MEASURES**

- TRANSFER TO A SECONDARY LINAC
- ACCELERATED SCHEDULING
- INCREASING FRACTION
- **BIOLOGICAL COMPENSATION**

70 Gy, 2 Gy x 35 fr
(H&N CANCER $\frac{\alpha}{\beta} = 10\ Gy$ B.E.D= 84 Gy)



NO MORE THAN 10%

$$Normal\ Tissue\ BED = 35{\times}2\left[1+\frac{2}{3}\right] = 116.67\ Gy \qquad EQD2 = 70\ Gy$$

$$Normalized\ Normal\ Tissue\ BED = 30{\times}2\left[1+\frac{2}{3}\right] + 5{\times}2.6\left[1+\frac{2}{3}\right] = 124.5\ Gy \qquad EQD2 = 74.5\ Gy$$

$$= 30{\times}2\left[1+\frac{2}{3}\right] + 5{\times}2.5\left[1+\frac{2}{3}\right] = 122.9\ Gy \qquad EQD2 = 73.7\ Gy$$

$$= 30{\times}2\left[1+\frac{2}{3}\right] + 5{\times}2.4\left[1+\frac{2}{3}\right] = 121.6\ Gy \qquad EQD2 = 72.9\ Gy$$

IS IT OK FOR NORMAL TISSUE?

$d = 2,62\ Gy$

MANAGEMENT OF UNPLANNED RADIATION THERAPY TREATMENT INTERRUPTIONS

OTT

70 Gy, 2 Gy x 35 fr
.E.D= 84 Gy)

PRIORITIS

COMPEN

TRANSFE

ACCELER

INCREAS

BIOLOGIC

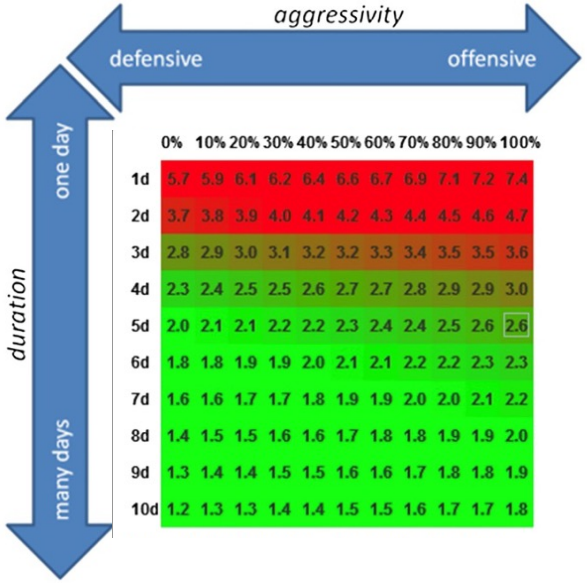
Norr

Normalized Norr

S S M T W T F S S M T W T F S S M T W T F
5 Days Longer

METHODOLOGY Open Access

Compensability index for compensation radiotherapy after treatment interruptions



$$BED_{ratio} = \frac{BED_{new}}{BED_{original}}$$

IS IT OK FOR NORMAL TISSUE?

$d = 2,62\ Gy$

A RADIOTHERAPY TREATMENT COMPENSATION CALCULATOR

Testa Collo 35 frazioni, 2 Gy. Perdita 5 giorni consecutivi alla 7th Settimana. Recupero in 5 giorni consecutivi alla interruzione, mono- o bi-frazione giornaliera

NB: inserire solamente i dati in ROSSO

TRATTAMENTO PREVISTO		
Data Inizio	[dd/mm/yyyy]	02/03/20
Data Fine prevista	[dd/mm/yyyy]	17/04/20
Durata prevista	[Day]	47,00
Frazioni Previste	[Day]	35
Dose/frazione	[Gy]	2
Sedute eseguite	[Day]	25
INFO TRATTAMENTO PREVISTO		
Dose Totale	[Gy]	70
BED al tumore prevista	[Gy]	66,9
BED al tessuto sano sprevista	[Gy]	116,667
T delay (Specifico per tipologia di cancro)	[Gy]	28
Alpha Beta Tumore	[Gy]	10
Alpha Beta Tessuto Sano	[Gy]	3

MODIFICHE TRATTAMENTO		
Data Fine modificata	[dd/mm/yyyy]	01/05/20
Durata Modificata	[Day]	57,00
Numero giorni di recupero	[Day]	10,00
Numero frazioni di recupero al giorno	n°	1,00
Frazioni totali di recupero	n°	10,00
INFO TRATTAMENTO MODIFICATO		
BED al tumore prevista	[Gy]	66,9
BED persa per interruzione	[Gy]	9
BED raggiunta a causa interruzione	[Gy]	57,9
Dose/Frazione per recuperare BED persa	[Gy]	2,62
BED al tumore con recupero	[Gy]	66,9
% di BED (-) o (+) al tumore vs. senza interruzione	[%]	0,00
BED al tessuto sano prevista	[Gy]	116,7
BED al tessuto sano dopo recupero	[Gy]	132,3
% di BED (-) o (+) al tessuto sano vs. senza interruzione	[Gy]	13,4
EQD2	[Gy]	79,4
Numero Frazioni da 2 Gy (EQD2)	[N°Frazioni]	39,7
INFO TRATTAMENTO SE MODIFICATA DOSE CONSIGLIATA		
Dose Corretta	[Gy]	2,4
BED al tumore prevista senza interruzioni	[Gy]	66,9
BED al tumore con recupero dose corretta	[Gy]	63,7
BED al tessuto sano prevista senza interruzioni	[Gy]	116,7
BED al tessuto sano dopo recupero con "dose corretta"	[Gy]	126,5
% di BED (-) o (+) al tessuto sano vs. senza interruzione	[Gy]	8,46
EQD2 con "dose corretta"	[Gy]	70,3
Numero Frazioni da 2 Gy (EQD2)	[N°Frazioni]	35,1
k		0,9

< > April 2020

Wk	Mo	Tu	We	Th	Fr	Sa	Su
14	30	31	1	2	3	4	5
15	6	7	8	9	10	11	12
16	13	14	15	16	17	18	19
17	20	21	22	23	24	25	26
18	27	28	29	30	1	2	3
19	4	5	6	7			

1th	2th	3th	4th	5th	6th	7th	8th	9th
Lun	Lun	Lun	Lun	Lun	Lun	Lun	Lun	Lun
Mar	Mar	Mar	Mar	Mar	Mar	Mar	Mar	Mar
Mer	Mer	Mer	Mer	Mer	Mer	Mer	Mer	Mer
Giov	Giov	Giov	Giov	Giov	Giov	Giov	Giov	Giov
Ven	Ven	Ven	Ven	Ven	Ven	Ven	Ven	Ven
Sab	Sab	Sab	Sab	Sab	Sab	Sab	Sab	Sab
Dom	Dom	Dom	Dom	Dom	Dom	Dom	Dom	Dom

Fatte | Fermo | Recupero

A RADIOTHERAPY TREATMENT COMPENSATION CALCULATOR

Prostata 39 frazioni, 2 Gy, boost . Perdita ultimo giorno 7th e tutta 8th Settimana.
Recupero in 5 giorni 9th settimana, mono-frazione giornaliera

NB: inserire solamente i dati in ROSSO

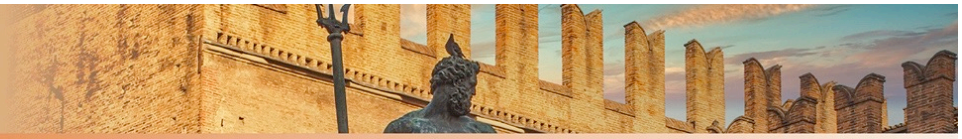
TRATTAMENTO PREVISTO		
Data Inizio	[dd/mm/yyyy]	30/03/20
Data Fine prevista	[dd/mm/yyyy]	21/05/20
Durata prevista	[Day]	52
Frazioni Previste	[Day]	39
Dose/frazione	[Gy]	2
Sedute eseguite	[Day]	34
INFO TRATTAMENTO PREVISTO		
Dose Totale	[Gy]	78
BED al tumore prevista	[Gy]	108,4
BED al tessuto sano sprevista	[Gy]	130,000
T delay (Specifico per tipologia di cancro)	[Gy]	28
Alpha Beta Tumore	[Gy]	3
Alpha Beta Tessuto Sano	[Gy]	3

MODIFICHE TRATTAMENTO		
Data Fine modificata	[dd/mm/yyyy]	29/05/20
Durata Modificata	[Day]	60
Numero giorni di recupero	[Day]	5
Numero frazioni di recupero al giorno	n°	1
Frazioni totali di recupero	n°	5
INFO TRATTAMENTO MODIFICATO		
BED al tumore prevista	[Gy]	108,4
BED persa per interruzione	[Gy]	7,2
BED raggiunta a causa interruzione	[Gy]	101,2
Dose/Frazione per recuperare BED persa	[Gy]	3,53
BED al tumore con recupero	[Gy]	122,9
% di BED (-) o (+) al tumore vs. senza interruzione	[%]	13,40
BED al tessuto sano prevista	[Gy]	130,0
BED al tessuto sano dopo recupero	[Gy]	151,7
% di BED (-) o (+) al tessuto sano vs. senza interruzione	[Gy]	16,7
EQD2	[Gy]	91,0
Numero Frazioni da 2 Gy (EQD2)	[N°Frazioni]	45,5
INFO TRATTAMENTO SE MODIFICATA DOSE CONSIGLIATA		
Dose Corretta	[Gy]	2,5
BED al tumore prevista senza interruzioni	[Gy]	108,4
BED al tumore con recupero dose corretta	[Gy]	107,5
BED al tessuto sano prevista senza interruzioni	[Gy]	130,0
BED al tessuto sano dopo recupero con "dose corretta"	[Gy]	136,3
% di BED (-) o (+) al tessuto sano vs. senza interruzione	[Gy]	4,81
EQD2 con "dose corretta"	[Gy]	74,3
Numero Frazioni da 2 Gy (EQD2)	[N°Frazioni]	37,2
k		0,9

< > May 2020

Wk	Mo	Tu	We	Th	Fr	Sa	Su
18	27	28	29	30	1	2	3
19	4	5	6	7	8	9	10
20	11	12	13	14	15	16	17
21	18	19	20	21	22	23	24
22	25	26	27	28	29	30	31
23	1	2	3	4			

1th	2th	3th	4th	5th	6th	7th	8th	9th
Lun	Lun	Lun	Lun	Lun	Lun	Lun	Lun	Lun
Mar	Mar	Mar	Mar	Mar	Mar	Mar	Mar	Mar
Mer	Mer	Mer	Mer	Mer	Mer	Mer	Mer	Mer
Giov	Giov	Giov	Giov	Giov	Giov	Giov	Giov	Giov
Ven	Ven	Ven	Ven	Ven	Ven	Ven	Ven	Ven
Sab	Sab	Sab	Sab	Sab	Sab	Sab	Sab	Sab
Dom	Dom	Dom	Dom	Dom	Dom	Dom	Dom	Dom
Fatte	Fermo	Recupero						



TAKE HOME MESSAGE

➡ **PRESERVE OVERALL TIME, TOTAL DOSE, AND DOSE PER FRACTION**

- 👍 **Weekend treatments**
- 👍 **Increase number of daily fractions**
- 👎 **Increased dose per fraction**

➡ **ACCEPTING THE TREATMENT EXTENSION AND DELIVERING EXTRA FRACTIONS**

- 👎 **Same daily dose per fraction**
- 👎 **Same twice-daily dose per fraction**
- 👍 **Increased dose per fraction**

➡ **DISCUSS ANY CHANGES IN PLANNING WITH THE PATIENT**

UNIVERSITY of ROME, SAPIENZA

Prof. Vincenzo Tombolini

UNIVERSITY of L'AQUILA

Prof. Giovanni Luca Gravina

SAN SALVATORE HOSPITAL

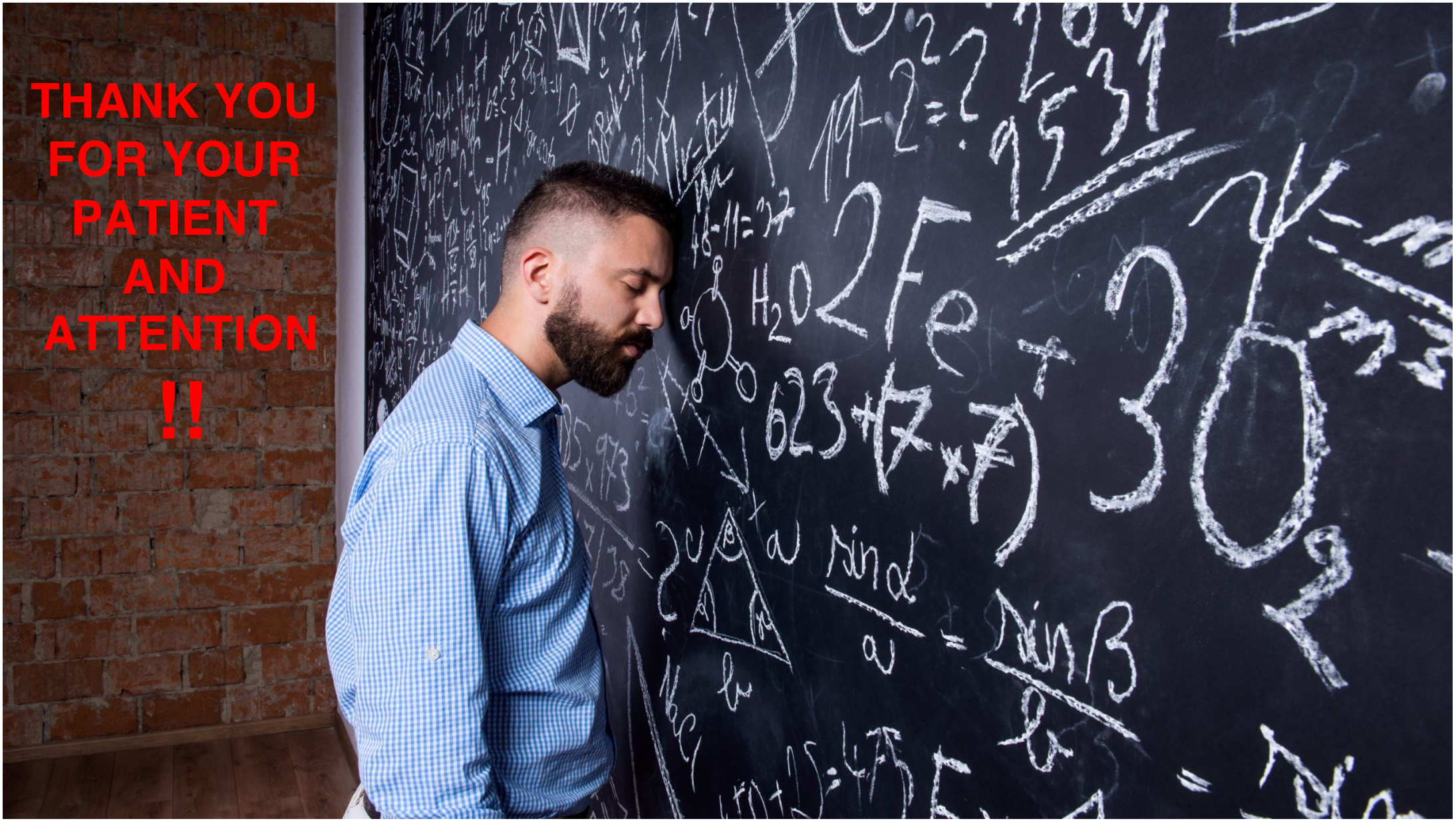
Dott.ssa. Francesca Vittorini

BAMBINO GESÙ CHILDREN'S HOSPITAL

Prof. Franco Locatelli
Dott.ssa Rosella Rota

ITALIAN NATIONAL INSTITUTE OF HEALTH

Dott.ssa Luisa Milazzo
Dott.ssa Francesca Vulcano


THANK YOU
FOR YOUR
PATIENT
AND
ATTENTION
!!