

# Gruppo di studio Re-Irradiazione

XXVI CONGRESSO NAZIONALE AIRO

30 SETTEMBRE, 1-2 OTTOBRE 2016

RIMINI PALACONGRESSI

## Proposta di studio multicentrico

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ART  
Advanced Radiation  
Therapy

# Proposta di studio multicentrico

## **RE.VOL.V.E.R. study**

**RE**-treatment **VOL**umes: **V**alue for prediction of  
**E**ffects of **Re**-irradiation.

A Centralized Imaging Analysis from Italian  
Multicenter Series.

# RE.VOL.V.E.R. study

RE-treatment **VOL**umes: **V**alue for prediction of **E**ffects of **R**e-irradiation

- Why?

Re-RT cases have increased in number and aroused interest among ROs in this decade of advanced technology.

Japanese Survey on Re-RT: patient numbers treated by reirradiation in responding institutes

	2004-2009 (5 years)	2010-2014 (5 years)	2014 (single year)
Total number	183	562	193
Brain	33	171	55
Bone mets	42	123	42
Chest	44	103	30
Head and Neck	36	86	28
Abdomen-Pelvis	26	64	10

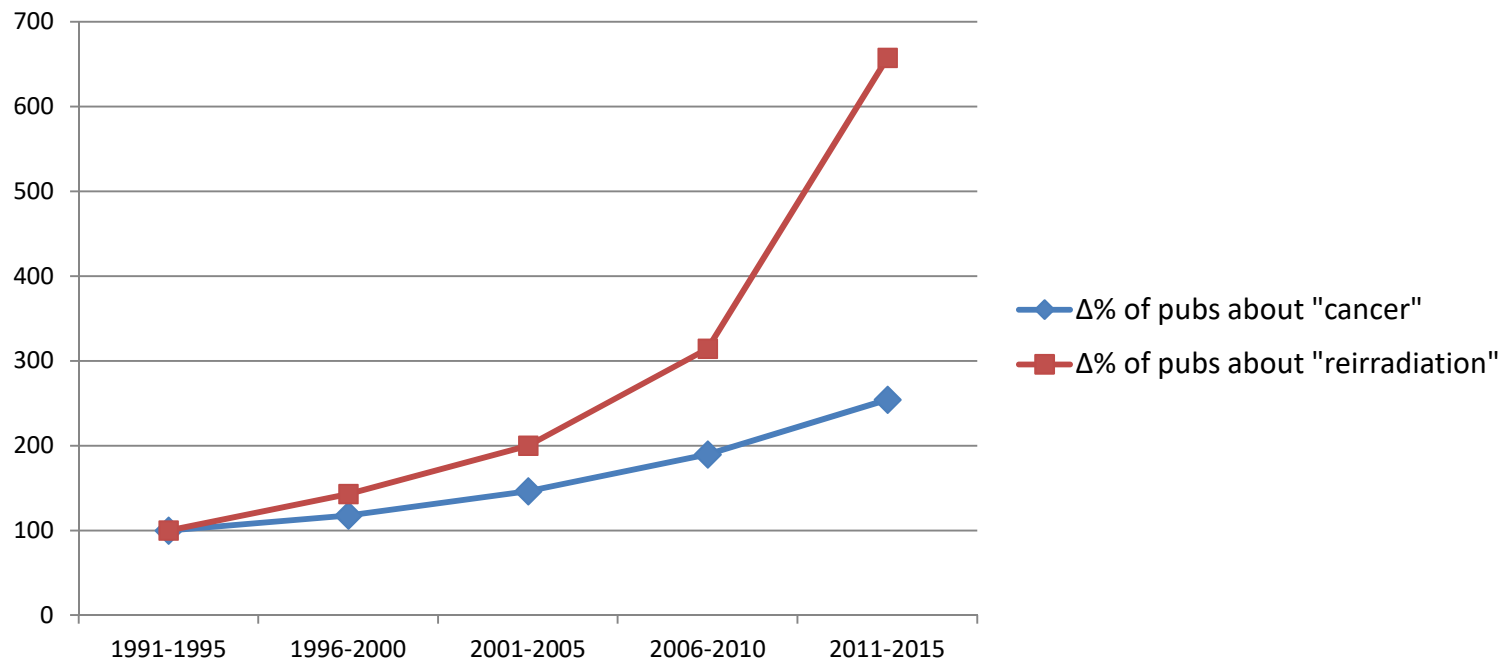
Yamazaki H et al. *Journal of Radiation Research* 2016

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Search in pubmed database, November 2015

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## Main factors determining the use of Re-RT and Re-RT purpose (radical or palliative)

Patient

- P.S.
- Life expectancy

Tumor

- Initial tumor site and stage
- Presence of other active lesions,
- Duration of the relapse-free interval

Treatment :

- Previous radiation dose, technique, dose per fraction, use of concurrent chemotherapy
- Response

Normal tissue :

- Clinically apparent late effects from initial RT
- Residual radiation tolerance of the normal tissues (including BED calculation)
- Interval since initial treatment

# RE.VOL.V.E.R. study

**RE-treatment VOLUMes: Value for prediction of Effects of Re-irradiation**

- **Why?**

Re-RT cases have increased in number and aroused interest among ROs in this decade of advanced technology.

Barriers to the use of Re-RT

- Risks of normal tissue complications and the lack of adequate data on recovery from radiation injury
- Paucity of data available to determine the Re-RT schedule and dose fractionation– volume relationships

The presently available database systems do not facilitate the easy retrieval of Re-RT cases

An easy system for Re-RT case information retrieval from databases is essential for the future exploration of Re-RT utility

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RE-treatment **VOL**umes: **V**alue for prediction of **E**ffects of **R**e-irradiation

- How?

**Moddicom**: a Complete and Easily Accessible open-source Library for Prognostic Evaluations Relying on Image Features

Moddicom is able to handle DICOM/DICOMRT objects, and can present to the user, in a R software environment, data structures representing CT, MR and Radiation Dose Distribution voxels, Region of Interests, DVHs, and image features classified in morphological, textural and statistical

- it is free

- it works on a common and well-know statistical software package,

- Moddicom has shown to be effective and useful to find relations between image features and clinical outcome.



Dinapoli N et al. Conference paper : 36th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, At Milan

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**RE-treatment VOLumes: Value for prediction of Effects of Re-irradiation**

- For what?

**Moddicom** allows

- to perform radiomic analysis: extraction of a large amount (400+) quantitative features from medical images (i.e. tumor image intensity, texture and shape and size of the tumor) providing a comprehensive quantification of the tumor phenotype
- to identify the overlap between initial RT fields and the Re-RT field and perform DVH analysis

**to build a predictor of Tumour Control Probability (TPC) and Normal Tissue Complication Probability (NTCP) to support clinical decision**

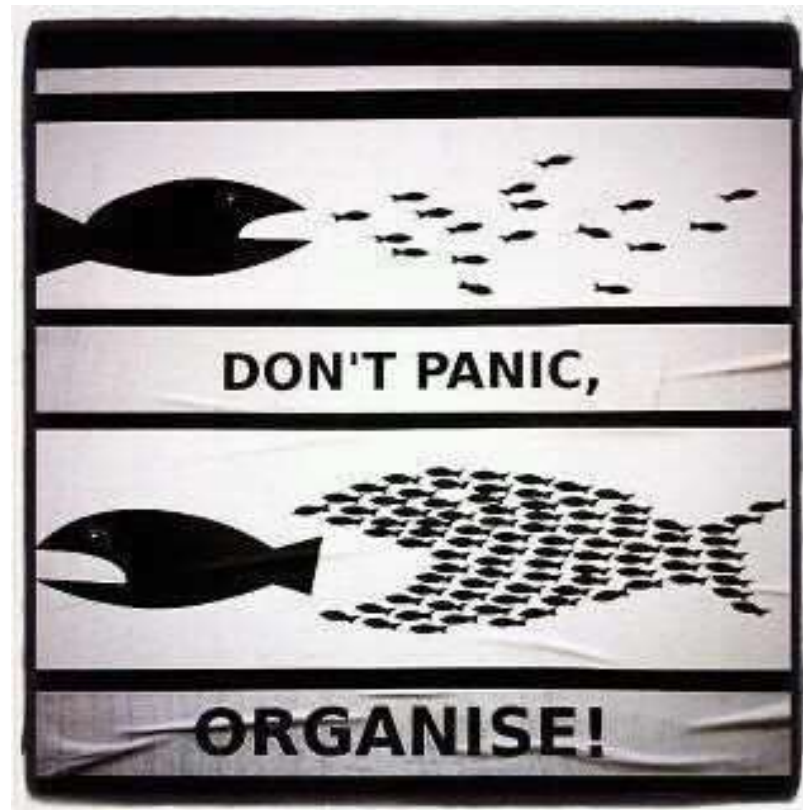


# RE.VOL.V.E.R. study

**RE**-treatment **VOL**umes: **V**alue for prediction of **E**ffects of **Re**-irradiation

Inclusion criteria:

- Re-treated patients
- Available of diagnostic imaging, DICOM information of initial RT and Re-RT
- Available pre-treatment and follow-up data



# RE.VOL.V.E.R. study

**RE**-treatment **VOL**umes: **V**alue for prediction of **E**ffects of **Re**-irradiation

## Questions?

- Tumor site/s?
- End-points :
  - Time to local/distant progression? Symptom improvement? Overall survival?
  - grade  $\geq 3$  acute/ grade  $\geq 2$  late toxicities occurrence?
- Partecipating centers?