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AIRO2022
Radioterapia di precisione per un'oncologia innovativa e sostenibile
BOLOGNA, 25-27 NOVEMBRE
PALAZZO DEI CONGRESSI
Associazione Italiana
Radioterapia e Oncologia clinica
Società Italiana di Radiobiologia

Adaptive volumetric modulated arc radiation therapy for head and neck cancer: evaluation of benefit on target coverage and sparing of organs at risk.

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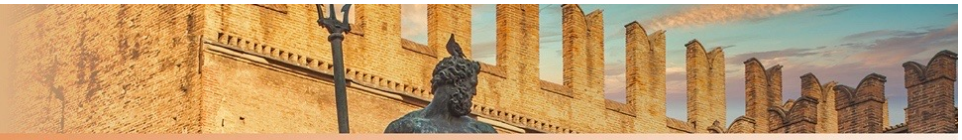

DICHIARAZIONE

Relatore: Maria Ausilia Teriaca

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)

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Background

During the long course of RT, patients with head and neck cancer (HNC) may develop significant anatomical changes.

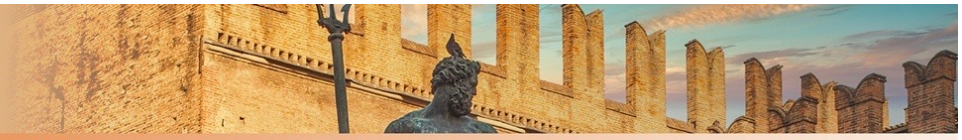
Principal factors:

1) shrinkage of large tumor and/or nodal masses;
2) weight loss;
3) resolution of postoperative changes.

Background

Re-planning with adaptive radiotherapy (ART) may:

- ensure adequate dose coverage;
- sparing of organs at risk (OARs).



Aims

To investigate the dosimetric and clinical consequences of **adaptive radiotherapy** on patients with **head and neck cancer** treated with Volumetric Modulated Arc Radiation Therapy

Materials and Methods

Single-center retrospective analysis of HNC patients treated with ART, with or from 2014 to 2021.

Inclusion criteria:

- ✓Radical or adjuvant intent
- ✓with or without concomitant systemic therapy

Materials and Methods

Dose of treatment

- Radical RT: **66-69.96 Gy** on cT and cN+
  54-54.45 Gy on the elective neck

delivered in 30 – 33 fractions with VMAT-SIB technique

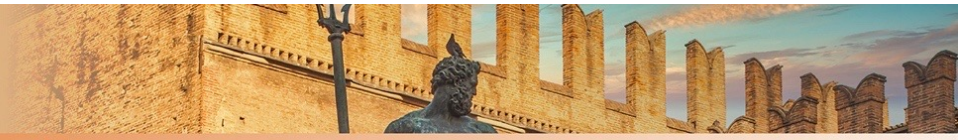
- Adjuvant RT: **60 or 66 Gy** (if R+ and ECE+) on pT and pN+
  54 Gy on the elective neck

delivered in 30 fractions with VMAT-SIB technique

Materials and Methods

Patients were treated with a pre-defined re-planning strategy for:

- cT3-4 or cN3 stage disease
- relevant weight loss
- shrinkage of the primary tumor and/or nodal disease observed at daily CBCT



Materials and Methods

Three different scenarios were considered as indicative to express the impact of the ART on the treated patients:

1) first simulation CT and original plan (**OPLAN**)

2) second simulation CT and adapted plan (**APLAN**)

3) second simulation CT and original plan (**DPLAN**)

OPLAN was compared to **APLAN** and to **DPLAN**

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Results

Patients' characteristics

56 patients were included in our analysis:

- 35 (63%) received **radical RT**
- 36 (64%) received concomitant systemic therapy

Median age was 69 years; male sex ++ (64%)

Oropharynx (30%) was the most common primary tumor site, followed by oral cavity (25%).

Results

Target coverage

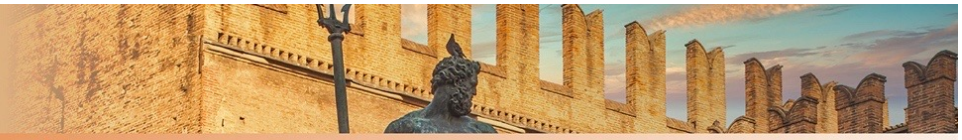
DVH derived statistics for target coverage in the 57 H&N patients in our series.

Primary Tumor Target	DVH metric	S*	Median (p25-p75) %	Difference with S1*	%	P**
PTV	$V_{95\%}$	1	98.72 (97.96-99.34)			
		2	98.64 (97.25-99.37)	- 0.08	-0.08%	0.35
		3	94.70 (87.10-97.60)	-4.02	-4.07%	0.00
CTV	$V_{95\%}$	1	99.96 (99.77-99.99)			
		2	99.91 (99.31-99.99)	-0.05	-0.05	0.30
		3	97.90 (92.33-99.58)	-2.06	-2.06	0.00

*) S, scenario: 1, OPLAN; 2, APLAN; 3) DPLAN

**) statistical significance was evaluated considering scenario 1 as the reference using the Mann Whitney test.

Dose coverage would have been significantly reduced for CTV but above all for PTV without an adaptive strategy.



Results

At the comparison of **DPLAN** with **OPLAN**, all the **OARs** showed an increase of dose for the majority of the studied parameters.

- Median **spinal cord** D2cc increased from 27.9 Gy to 31.4 Gy (p=0.00).
- The V15, V30 and V45 increased by 21% (p=0.00), 15% (p=0.00), and 16% (p=0.00) for **right parotid gland** and 16% (p=0.00), 19% (p=0.00), and 20% (p=0.00) for **left parotid gland**.
- A difference of 37% was observed for **oral cavity** V40 (p=0.00).

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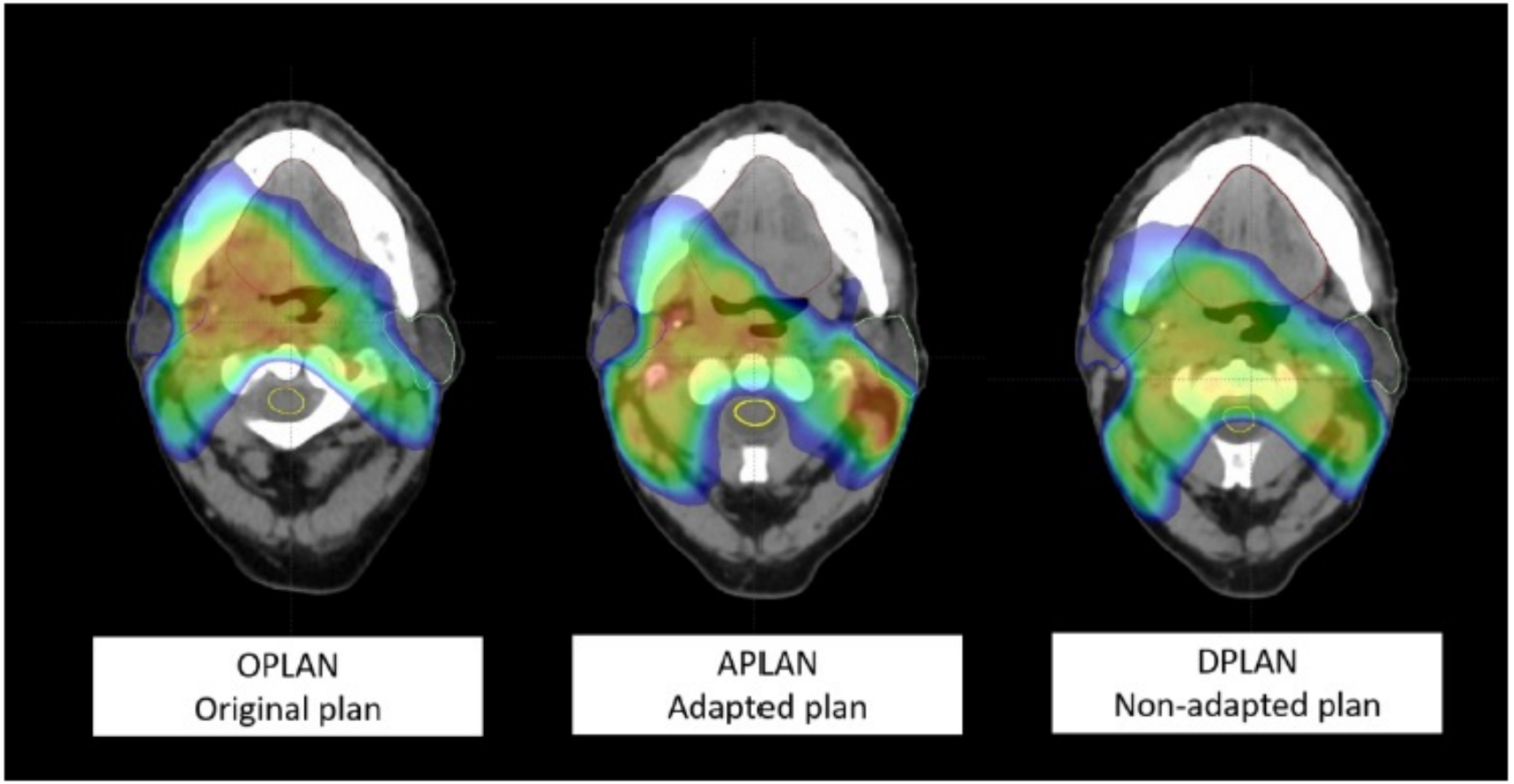
OPLAN
Original plan
APLAN
Adapted plan
DPLAN
Non-adapted plan

- The most frequent **grade 1-2** adverse events (acute and tardive) were dermatitis radiation, mucositis oral, dysphagia, pharyngeal mucositis, dry mouth, dysgeusia, fatigue, weight loss.

- **No grade ≥ 3** toxicity was recorded.

Conclusions

The adaptive strategy with re-planning in HNC patients could bring potential benefit in terms of side effects and disease control:

- ✓ avoidance increasing the **dose to OARs**
- ✓ better **target coverage**

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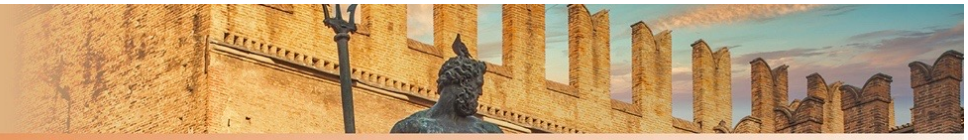

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Grazie per l'attenzione!

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