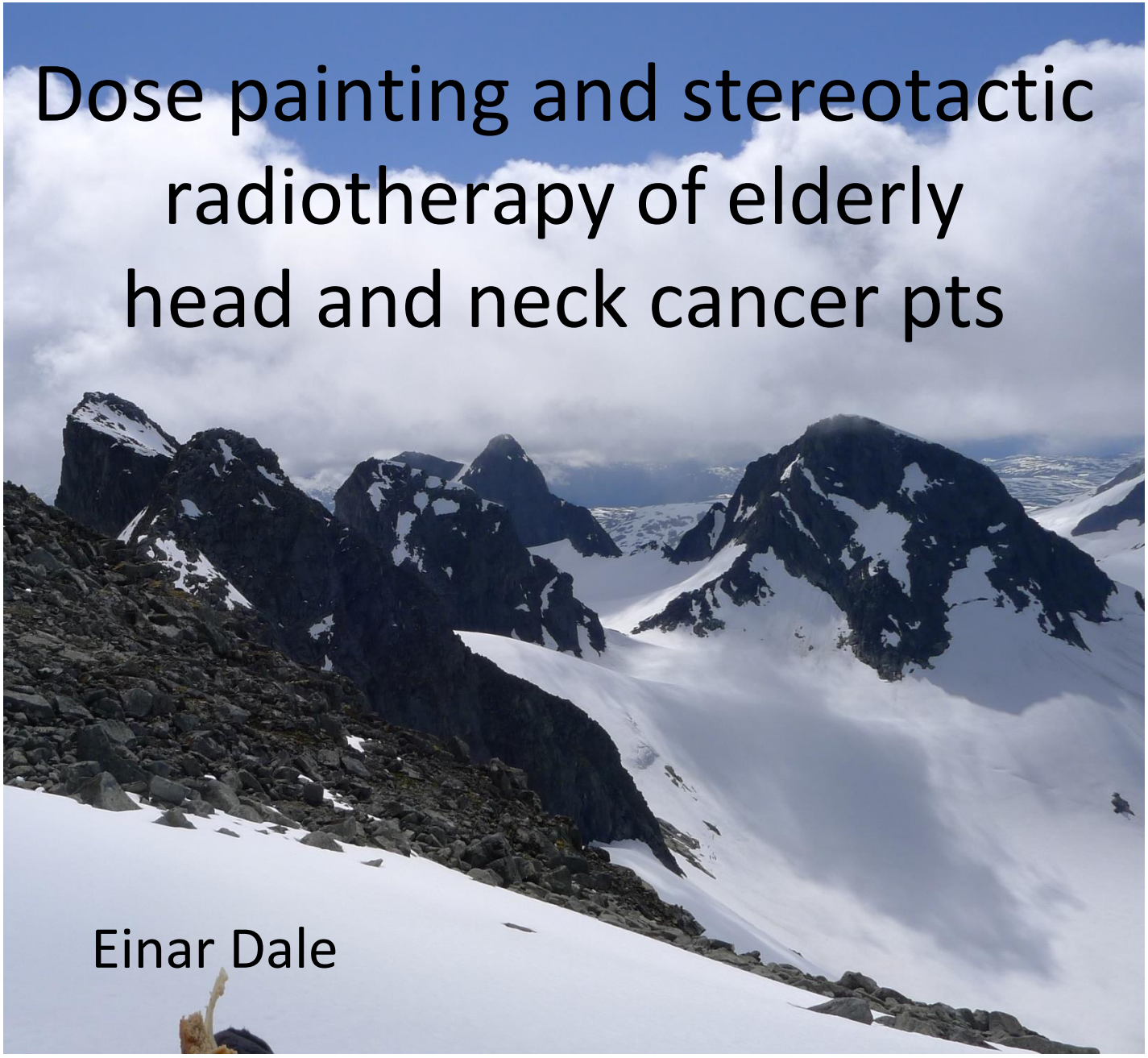
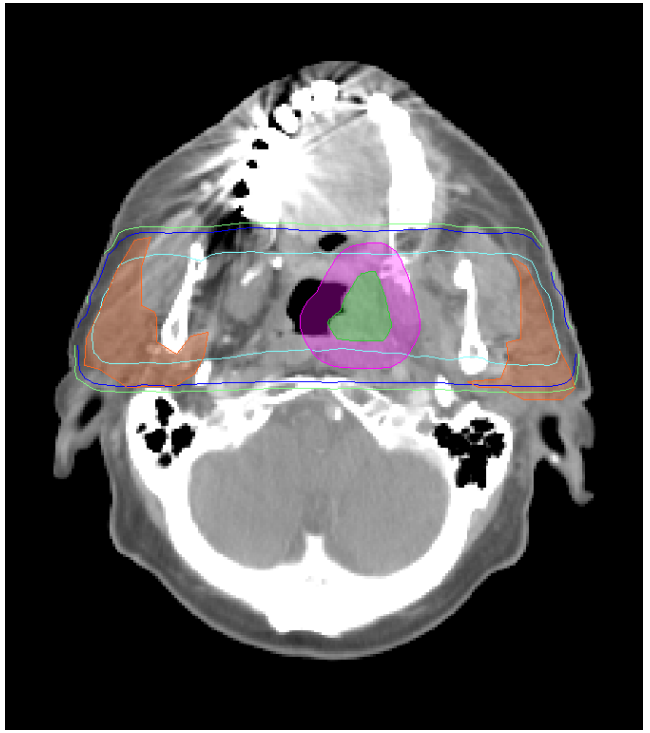
Dose painting and stereotactic radiotherapy of elderly head and neck cancer pts

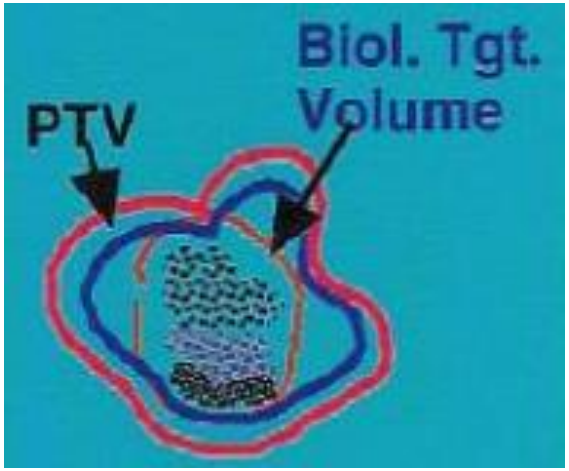


Einar Dale

Background

- Radiotherapy is a balance between tumor and side effects
- Traditionally radiotherapy has been administered with a homogeneous dose to the tumor
- The dose painting hypothesis is to increase the dose to the most aggressive sub volumes of the tumor as depicted on biological imaging – and thereby improve local control – without increasing the level of side effects





Ling et al IJROBP 2000

ELSEVIER

Seminars in
RADIATION
ONCOLOGY

Molecular Imaging-Guided Radiotherapy for the Treatment of Head-and-Neck Squamous Cell Carcinoma: Does it Fulfill the Promises?

Vincent Grégoire, MD, PhD,[*,†] Daniela Thorwarth, PhD,[‡] and John Aldo Lee, Eng, PhD[†]

2017

... in the coming years, one may expect to position the dose painting approach in the armamentarium for the treatment of patients with head-and-neck squamous cell carcinoma.

MR linac

The ViewRay™ System

- Washington University in Saint Louis
- UW Madison

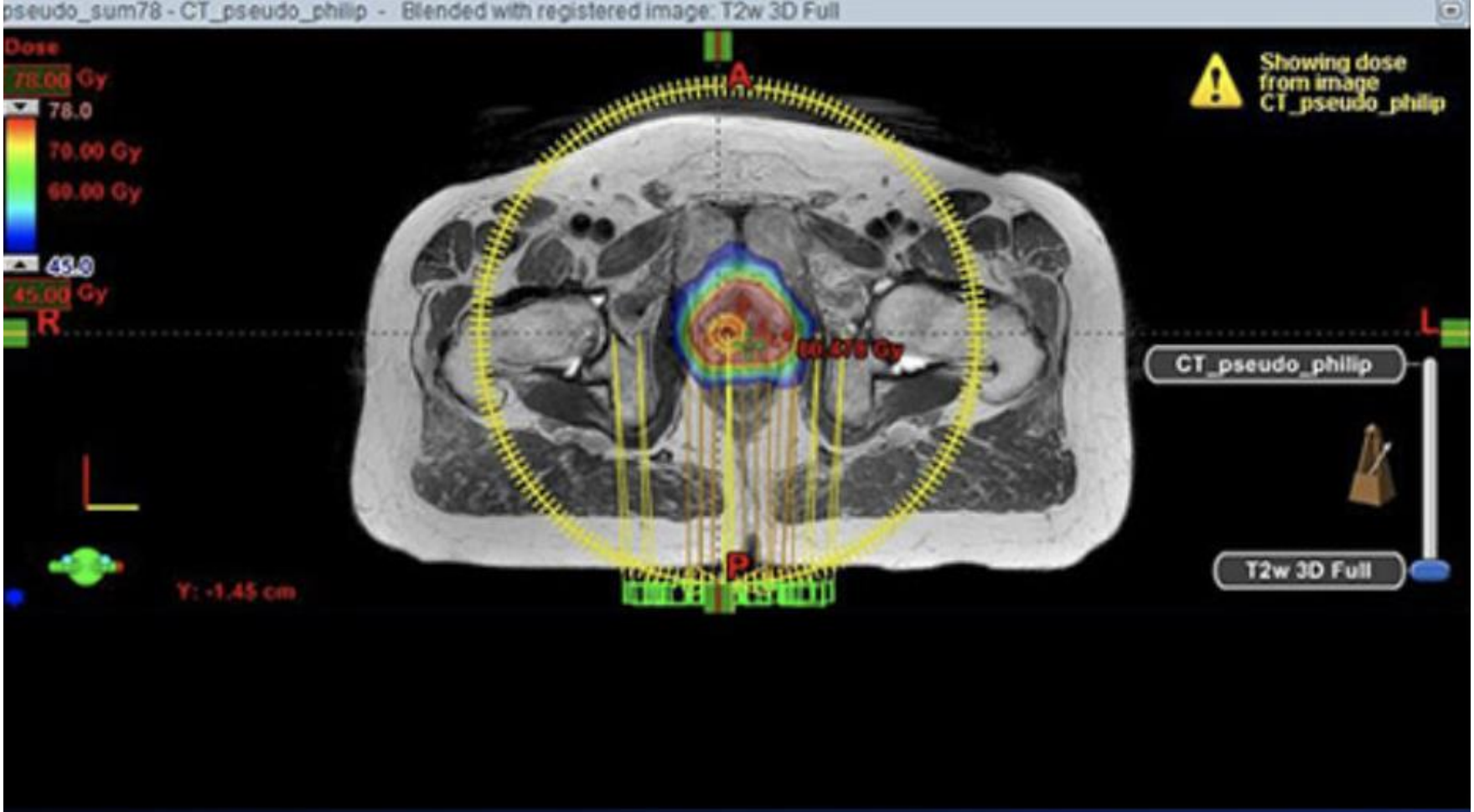
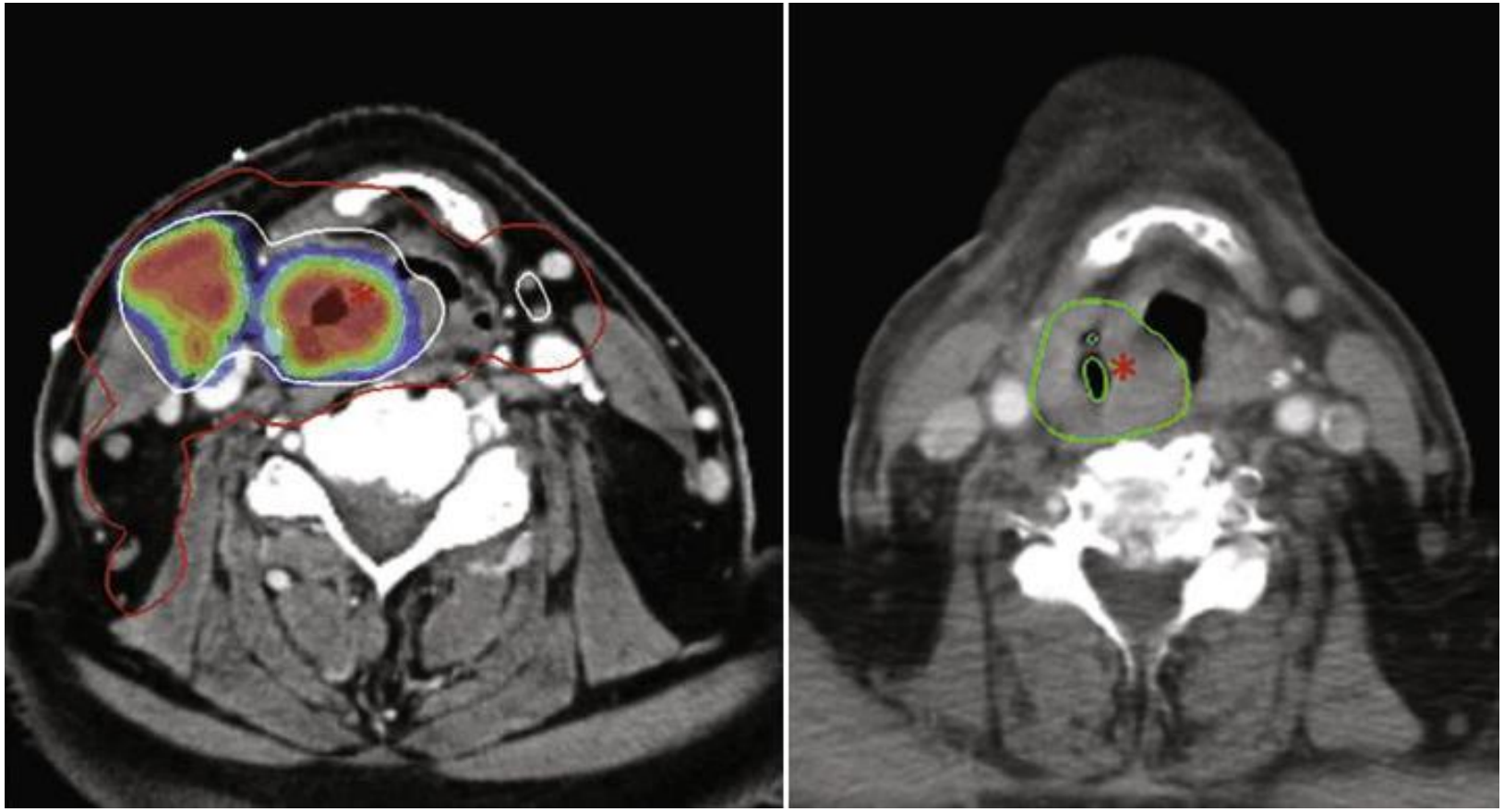


Image 2: RT dose plan based on MR-only simulation, overlay on T2W 3D imaging

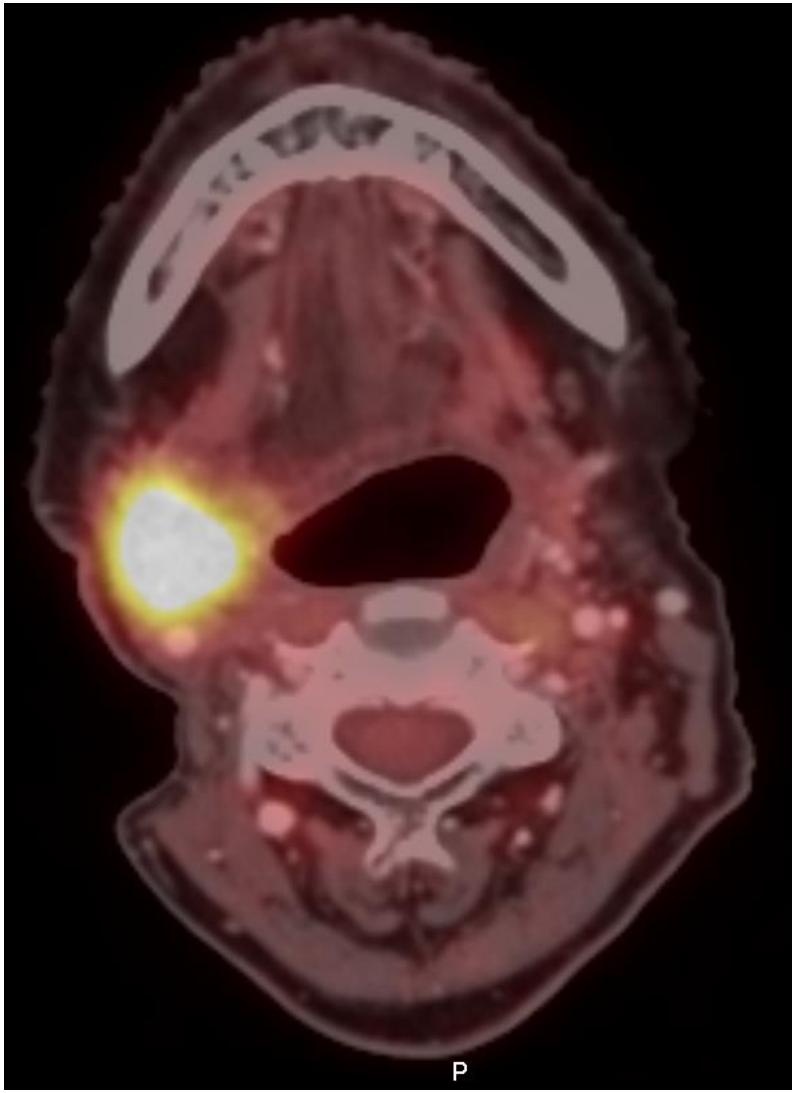
Image courtesy of Docrates Cancer Center, Helsinki, Finland

Dose painting rationale: Recurrences often localised in the 18F-FDG-PET avid volume and high RT dose volume

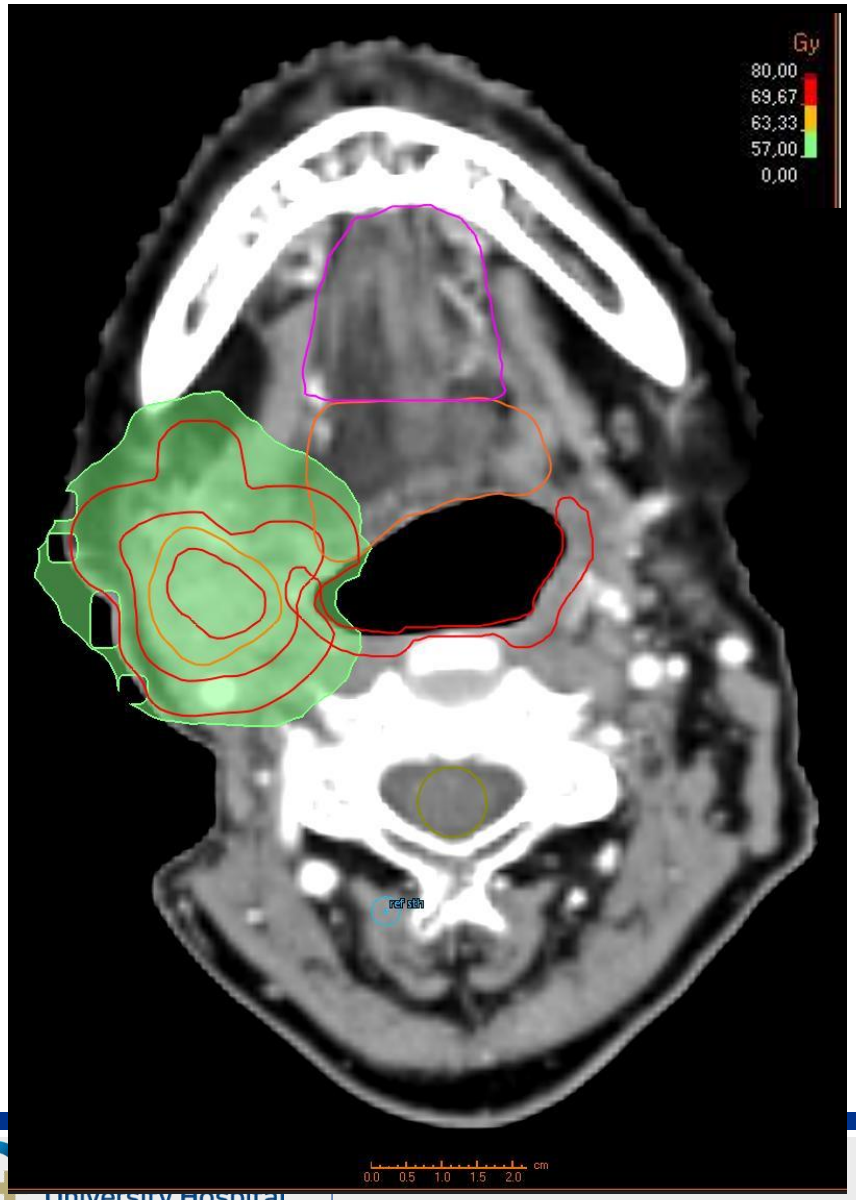


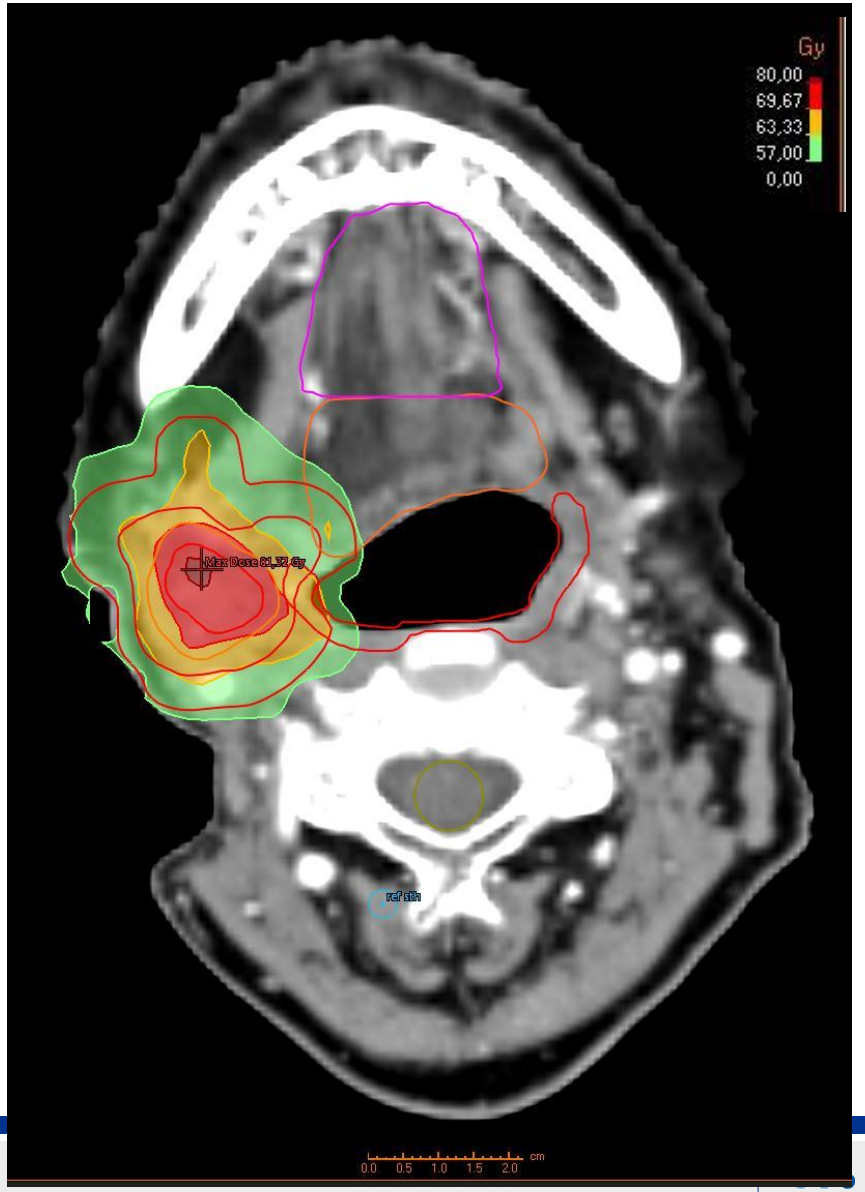
Hypopharyngeal cancer. Recurrence on CT (right) at the location of the primary tumor, 7 months after primary radiochemotherapy; Due et al R&O -14.

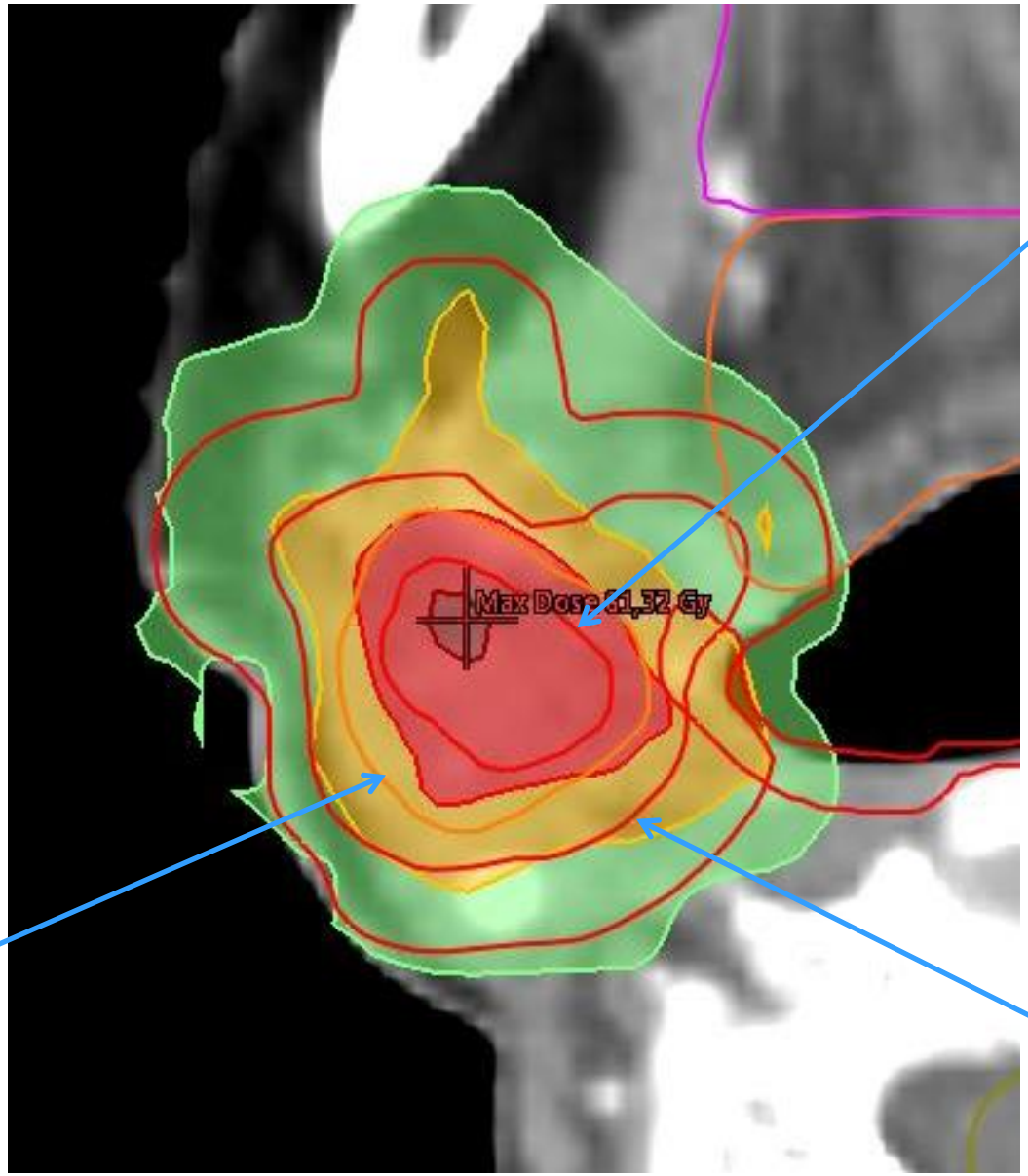
Lymph node recurrence (hypopharyngeal cancer)



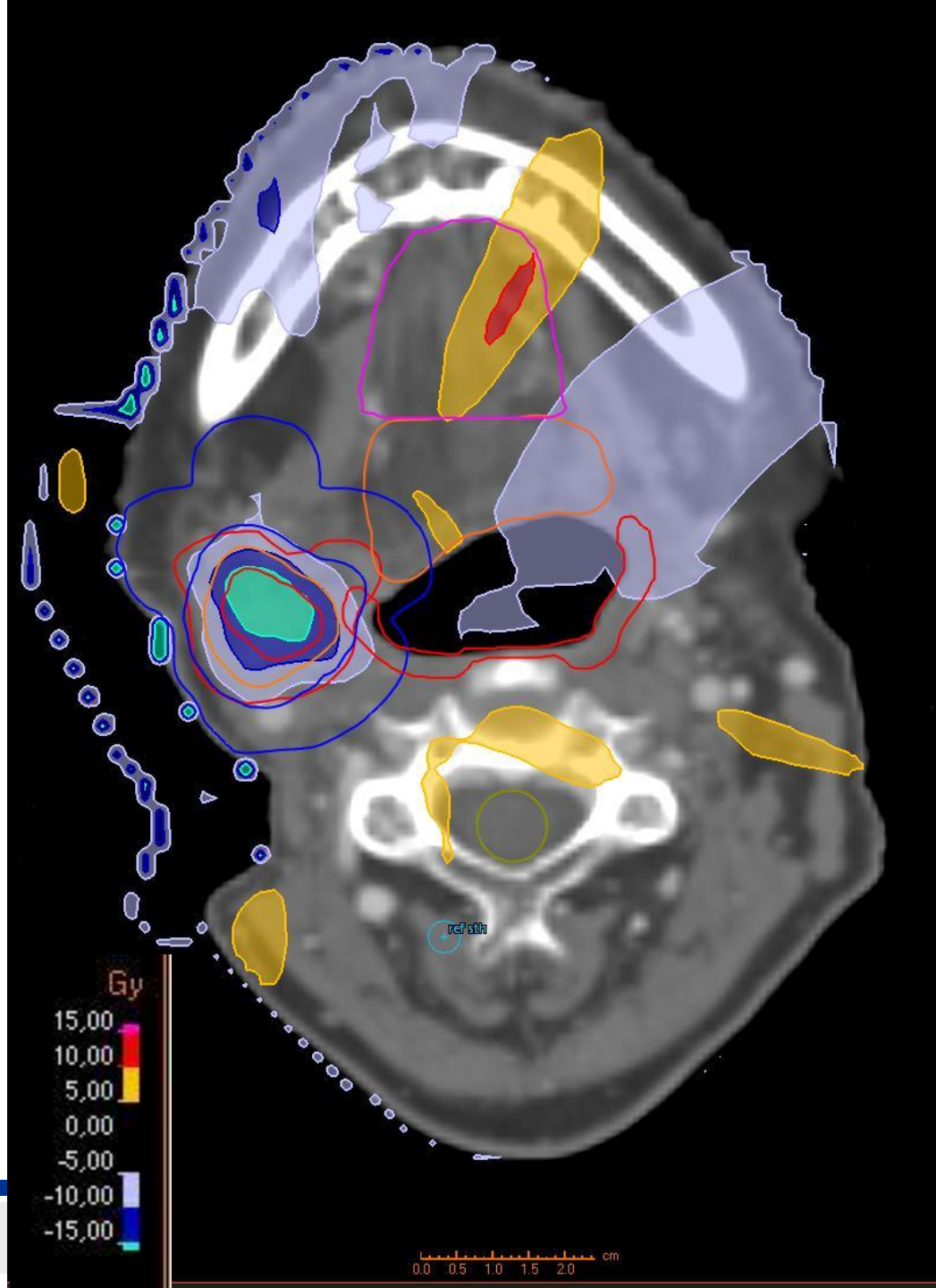
Conventional vs dose painting



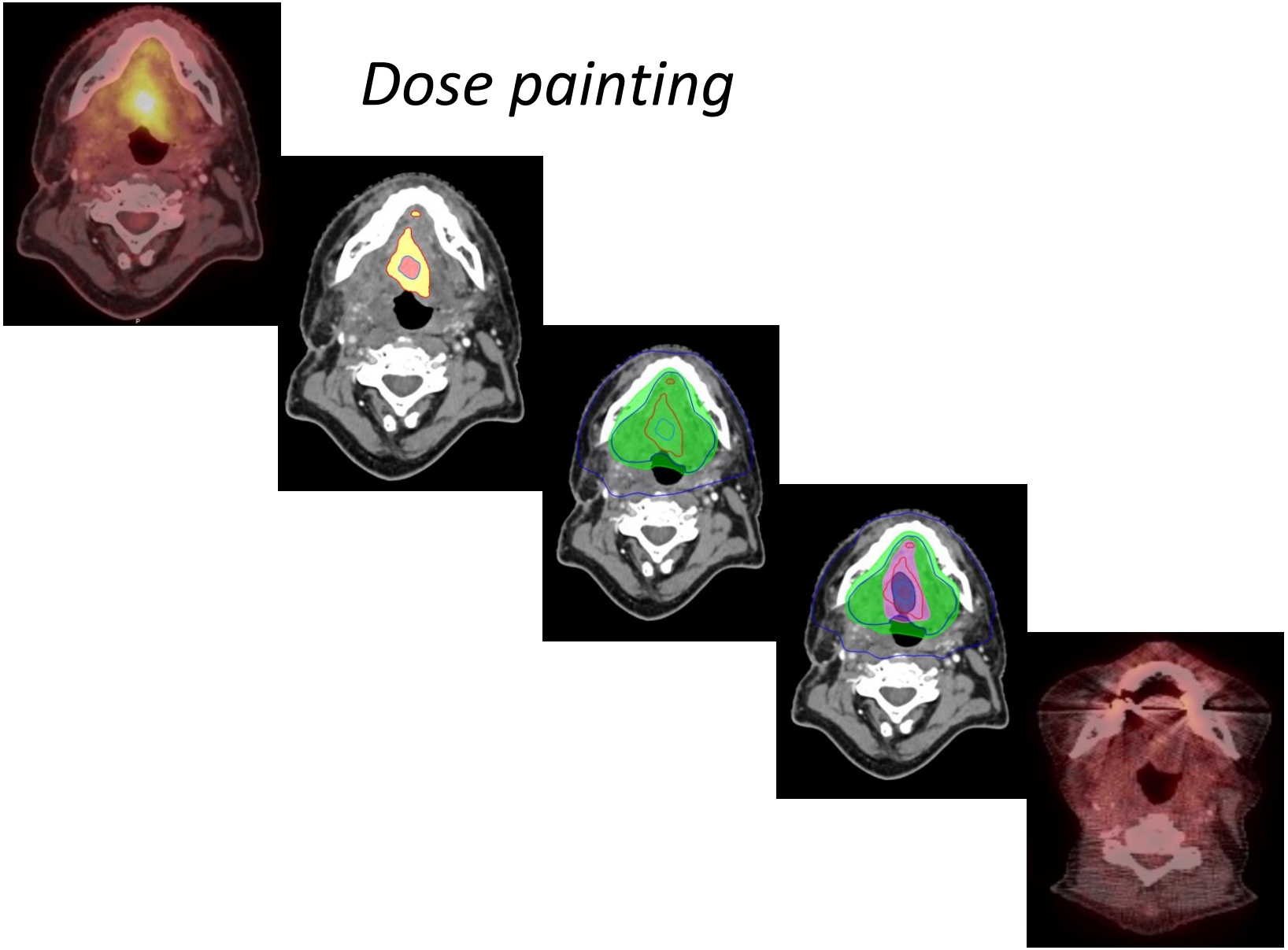



GTV73Gy
GTV66Gy
GTV60Gy

Subtraction between dose painting and conventional RT (red favours DP)



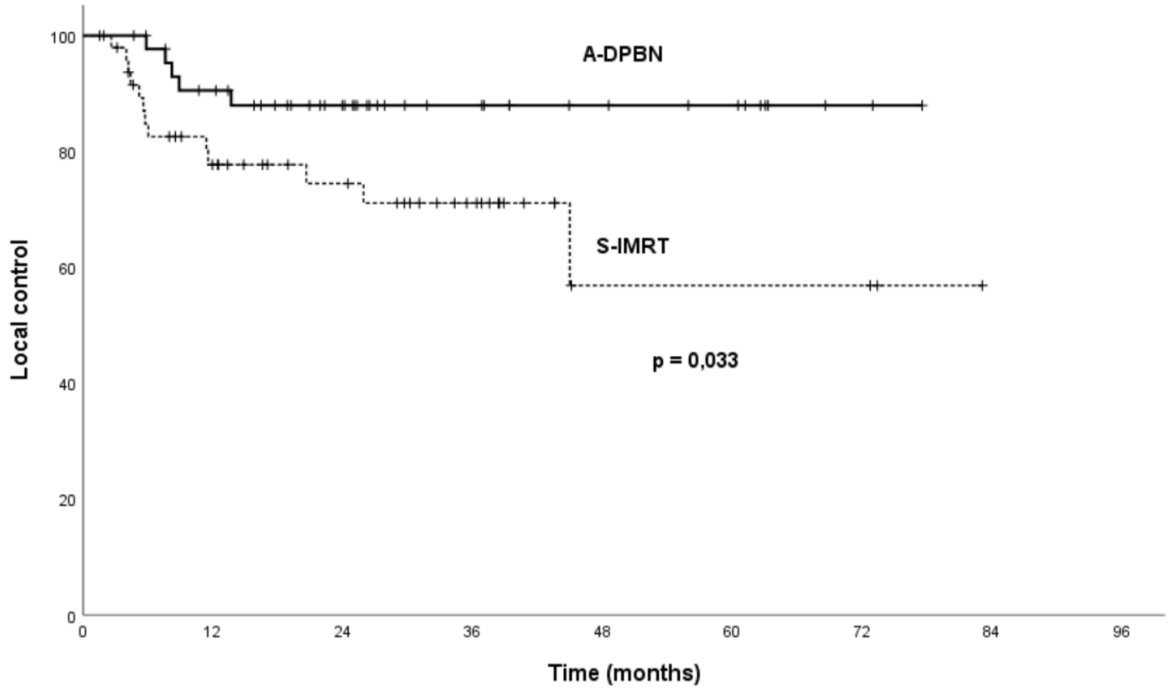
Dose painting



ESTRO 2019

Local control

	A-DPBN	S-IMRT
1Y	91%	78%
2Y	88%	75%



ACTA ONCOLOGICA, 2017
https://doi.org/10.1080/0284186X.2017.1364867

Taylor & Francis
Taylor & Francis Group

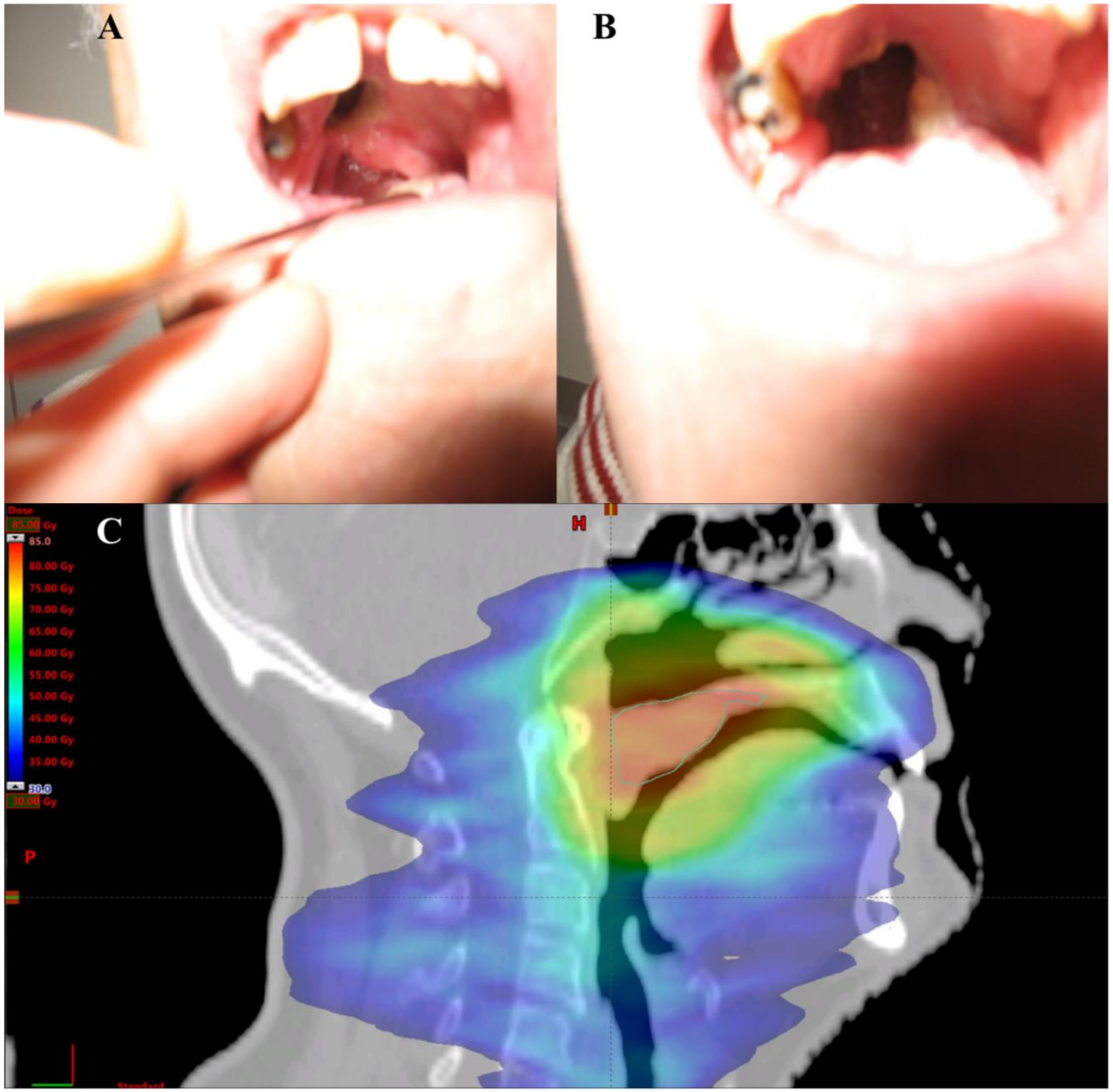
ORIGINAL ARTICLE

Late mucosal ulcers in dose-escalated adaptive dose-painting treatments for head-and-neck cancer

Luiza Ana Maria Olteanu[a], Fréderic Duprez[a], Wilfried De Neve[a,b], Dieter Berwouts[c], Tom Vercauteren[a], Wouter Bauters[d], Philippe Deron[e], Wouter Huvenne[e], Katrien Bonte[e], Ingeborg Goethals[c], Julie Schatteman[a] and Werner De Gersem[b]

Results: From 39 studied patients, nine developed late grade 4 mucosal ulcers. The continuation to either smoke or drink alcohol after therapy was the factor that showed a strong (eight out of nine patients) association with the occurrence of grade 4 ulcers. Six of the patients who continued to smoke or/and drink had $D_{1.75cc}$ and $NID2_{1.75cc}$ above 84Gy and 95.5Gy, respectively. Seven of the patients with grade 4 had the dose levels above these thresholds, but even if the $D_{1.75cc}$ threshold was significant in the prediction of late grade 4 ulcers, it could not be considered as the only contributing factor. Conclusions: The search for patterns provided strong reasons to apply a dosimetrical threshold for the peak-dose volume of 1.75 cm3 as a preventive measure for late grade 4 mucosal ulcers. Also, patients that continue to smoke or drink alcohol after therapy have increased risk to develop late mucosal ulcers.

Skade i bløte gane etter dose painting



Rasmussen et al, Radiotherapy & oncology 2016

Dose painting trial at Oslo University Hospital

- Part of a larger study, RIOT- Re-Irradiation or Other Treatment of patients with Head and Neck cancer unsuited for radical radiotherapy, Evaluation with Patient Reported Outcome
- Main study: Inclusion June -15 to May -19: 151(?) pts
- *Sub study IIb: RIDPAINT Dose-painting feasibility trial. N = 10.*

RIDPAINT - purpose

Primary Outcome Measure:

- To test the feasibility (success rate and workload) of FDG-PET guided dose painting for patients with recurrent or second primary head and neck cancer.

Secondary Outcome Measures:

- Evaluate acute toxicity
- Evaluate tumour response (at 3 months after RT) with PET-CT according to RECIST and SUV analyses.
- Evaluate time to (clinical) progression.

RIDPAINT – inclusion criteria

- Referred for reirradiation of the head & neck (recurrence or second primary)
- Inoperable disease
- Histology: Squamous cell carcinoma
- < grade 3 late tox. from previous radiotherapy
- > 12 months since previous radiotherapy
- ECOG ≤ 2

Hvordan har det gått?

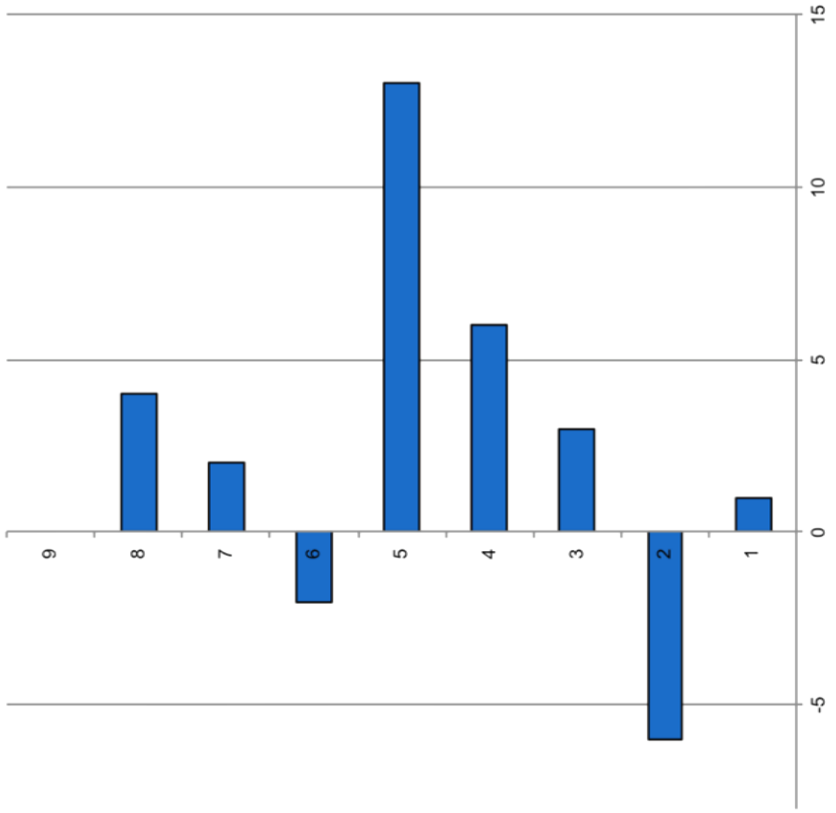
- 3/5 har residivert. En ”in-field” og to både ”in-field” og regionalt.
- Til sammenlikning: 9 fått konvensjonell strålebehandling. 3 residiv. 3 døde innen et år av tox/komorbiditet(?). 3 residivfrie. Korteste oppfølgingstid 16 mnd.

Hvordan har det gått?

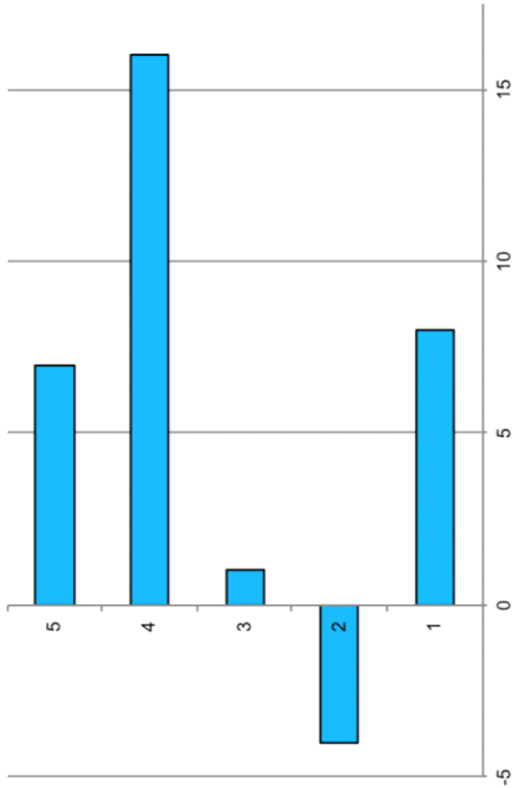
- 5 behandlet siden juni -16. Siste mars -17.
- Ca 10 rebestrålingspasienter (uopererte) pr år. (10 opererte henvist for rebestråling.)
- Dose painting teknikken krever at minste diameter på tumor er ca 2 cm.

Difference in score between baseline and two months after treatment, summed values for all parameters

Conventional treatment



Dose painting



Stereotaksi

- Ikke en leveringsteknikk, men et 'behandlingskonsept'
- Små veldefinerte målvolum
- Høy fraksjonsdose
- En eller få fraksjoner
- Høy presisjon
- Spesialtilpassede behandlingsapparater
- ... tillater/ønsker inhomogen dose i målvolum (130-150%)

Hva kan/bør behandles stereotaktisk?

- Små, ofte inoperable tumorer
- Historisk: Kun for intrakranielle indikasjoner (gliom, meningion, AVM, hjernemetastaser)
- Siste ca 20 årene: Også for ekstrakranielle indikasjoner
    - Lunge
    - Lever
    - Skjelett
    - Hode/hals
    - Prostata
    - Nyre

Stereotaktisk strålebehandling - hode- halskreft

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Phase II trial

Multi institutional phase II study of concomitant stereotactic reirradiation and cetuximab for recurrent head and neck cancer

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