Our experience in the treatment of head and neck tumor with IMRT technique and 3D Conformal Radiotherapy

Authors :

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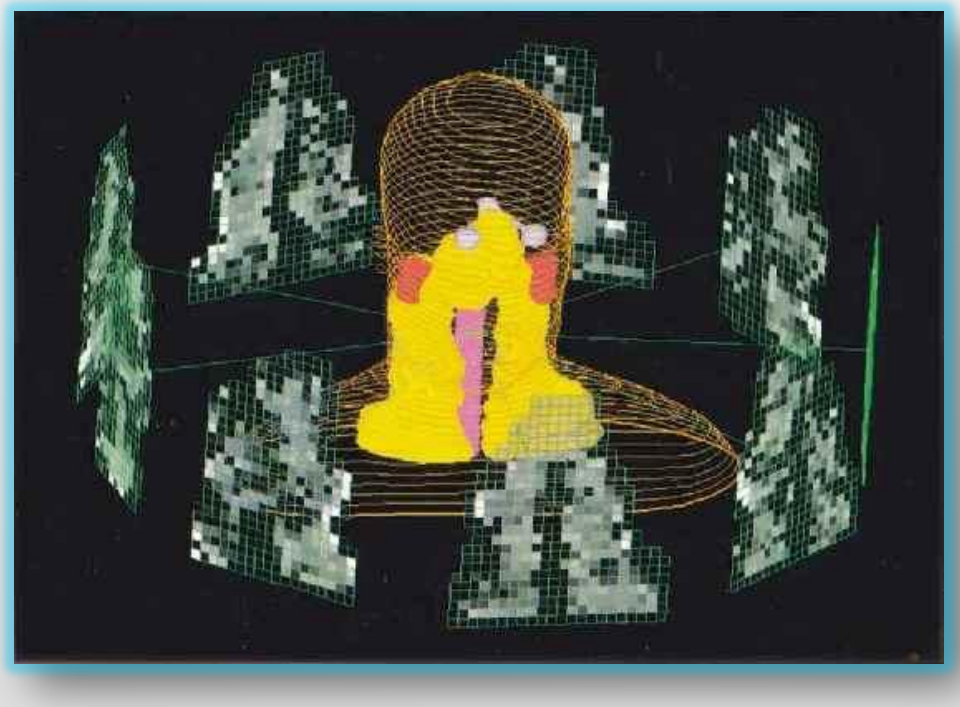
- IMRT - Intensity Modulated Radiotherapy

- Advanced product in the RT technology
- Aims to deliver radiation more precisely to the tumor, while relatively limiting dose to the surrounding normal tissues

- 7 position Gentry and in every position we have at least 25 segments of radiation



Why IMRT?

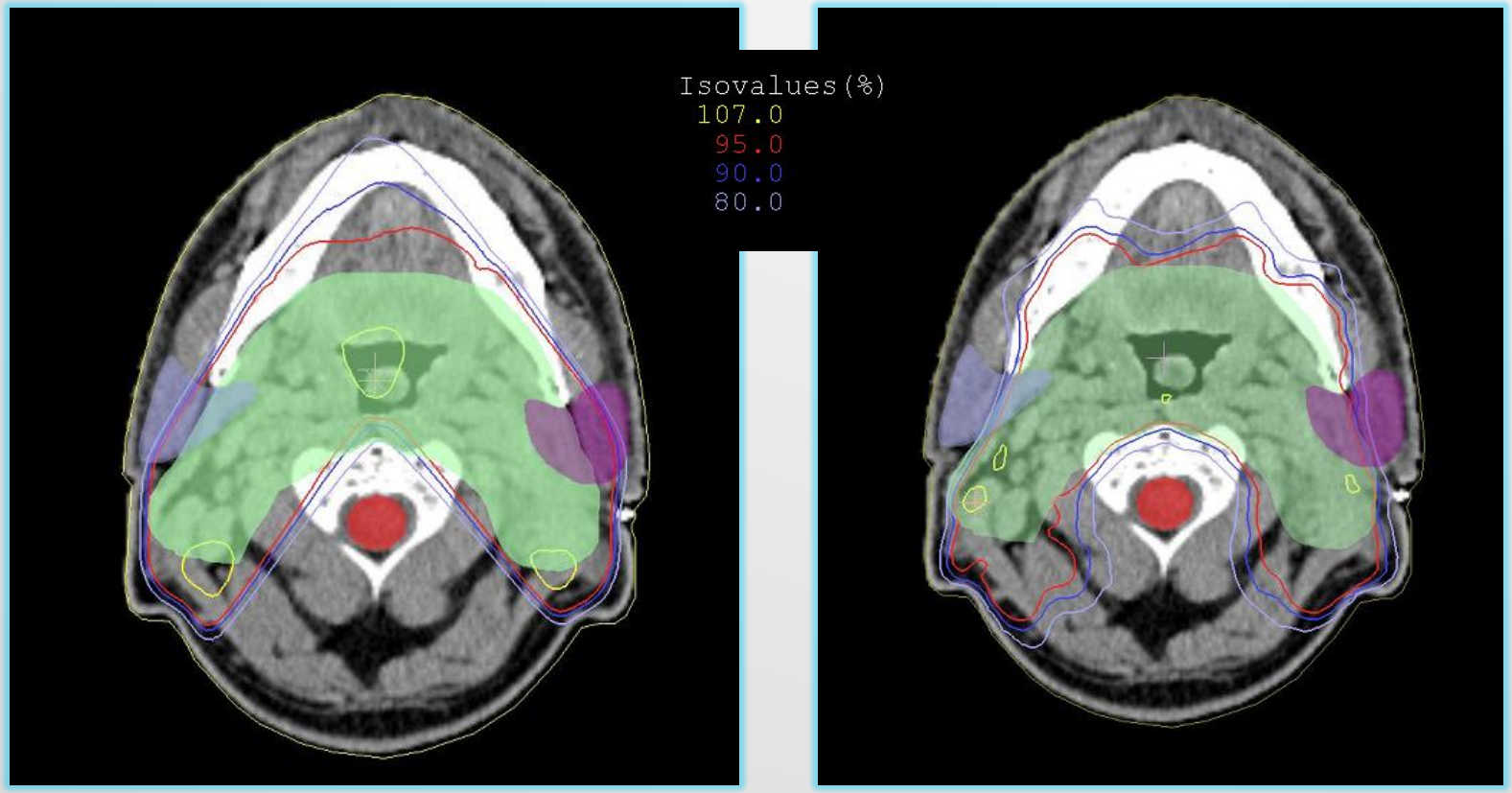
- IMRT - useful especially in concave and complex volume
- Reduces doses to the OAR
- Improves homogeneity of plans
- The possibility of working with SIB

3D

- ConPas

IMRT

- 0°,51°,102°, 153°,204°,255°,306°



- The main goal of IMRT :
  - Increase the radiation dose to the tumor tissue
  - Minimise radiation to surrounding healthy tissue

- IMRT of head and neck allows you the treatment of various targets with different doses of radiation, while at the same time it minimizes the radiation to surrounding critical structures such as the parotid gland, optic chiasm and mandible

IMRT at KBC Zagreb - PTV and OAR

PTV3	66Gy/30fr	2.2 Gy/fr
PTV2	60Gy/30fr	2.0 Gy/fr
PTV1	54Gy/30fr	1.8 Gy/fr
Spinal cord	D_{max}<45Gy	
Brain stem	D_{max}<54Gy	
Parotid glands	D_{mean}<25Gy	
Cochlea	D_{max}<45Gy	

Benefits :

- Improvement of the quality of life after treatment with IMRT in comparison to the 2D or 3D conformal radiotherapy
- Reducing of xerostomia
- Shortening the number of fractions on the machine from 35 to 30 fractions

Disadvantages :

- A limited number of patients on the unit due to the length of radiation
- The large amount of work of physicists and oncologists

- The time physician and medical physicist spend in making IMRT plan increases to about 3 times the standard conformal radiotherapy plan

Physicists :

- Three days to create a plan
- Two hours to check a plan
- Half a day for checking and entering data

Oncologist :

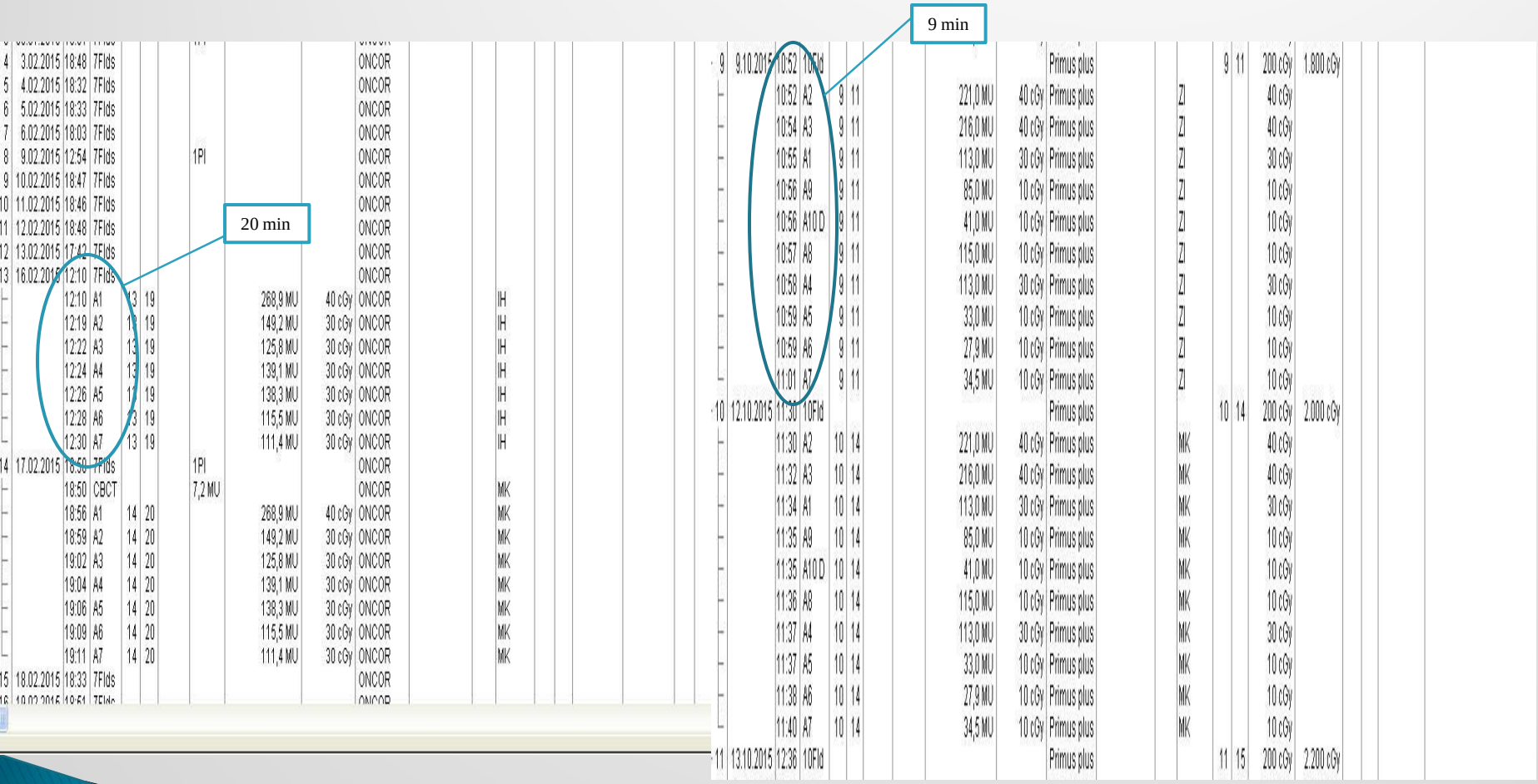
- Two hours more for contouring
- Longer presence at the first fraction of radiation

Radiation technologists :

- More precise position of the patient
- Longer time of radiation on a linear accelerator
- More frequent checkup of the patients position with CBCT and/or EPID

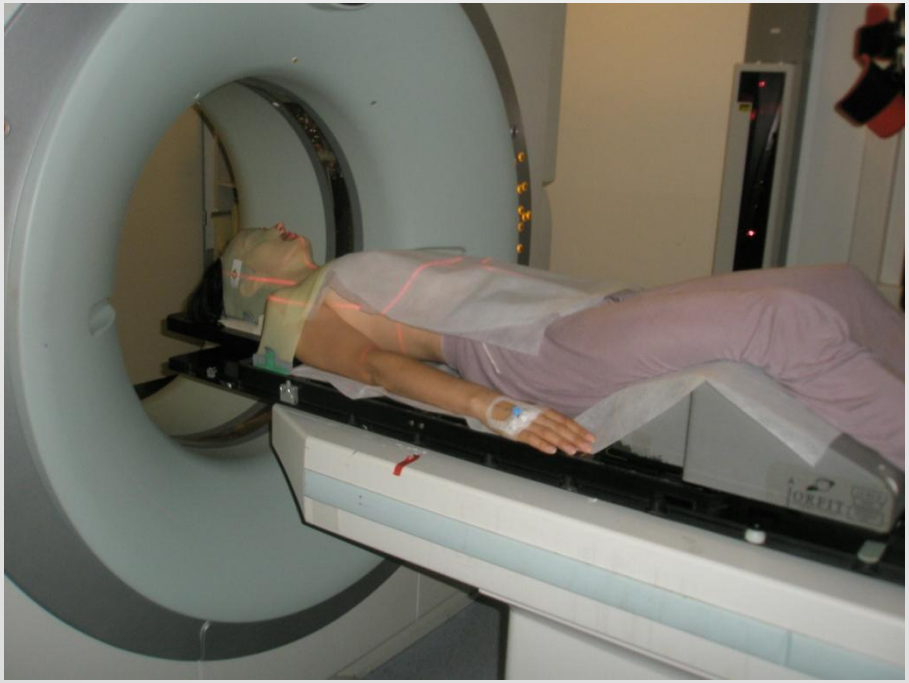
The time of radiation on the machine

- The difference IMRT and 3DCRT



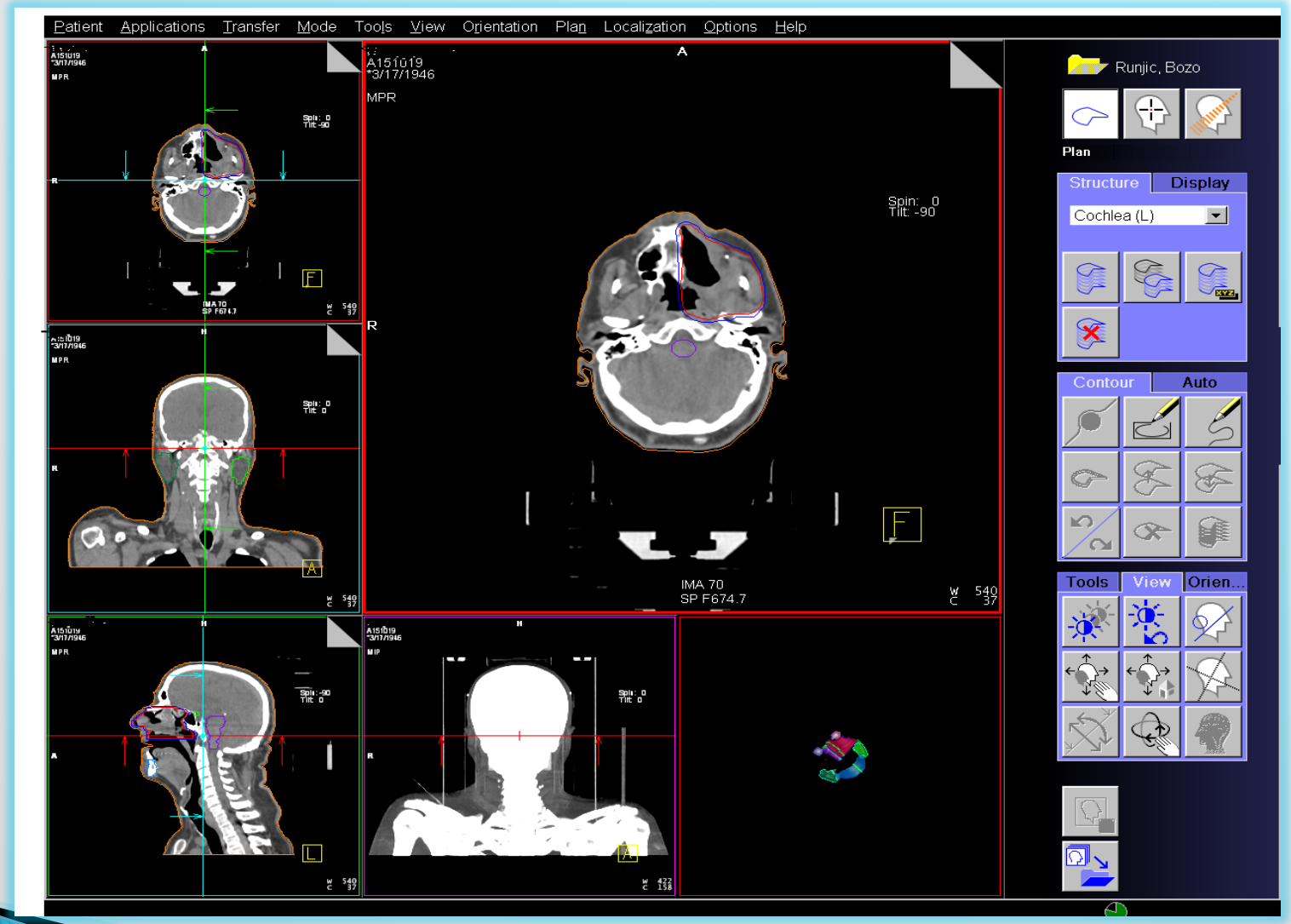
Protocol for IMRT

- CT Simulator- position and mask identical to 3D conformal radiotherapy

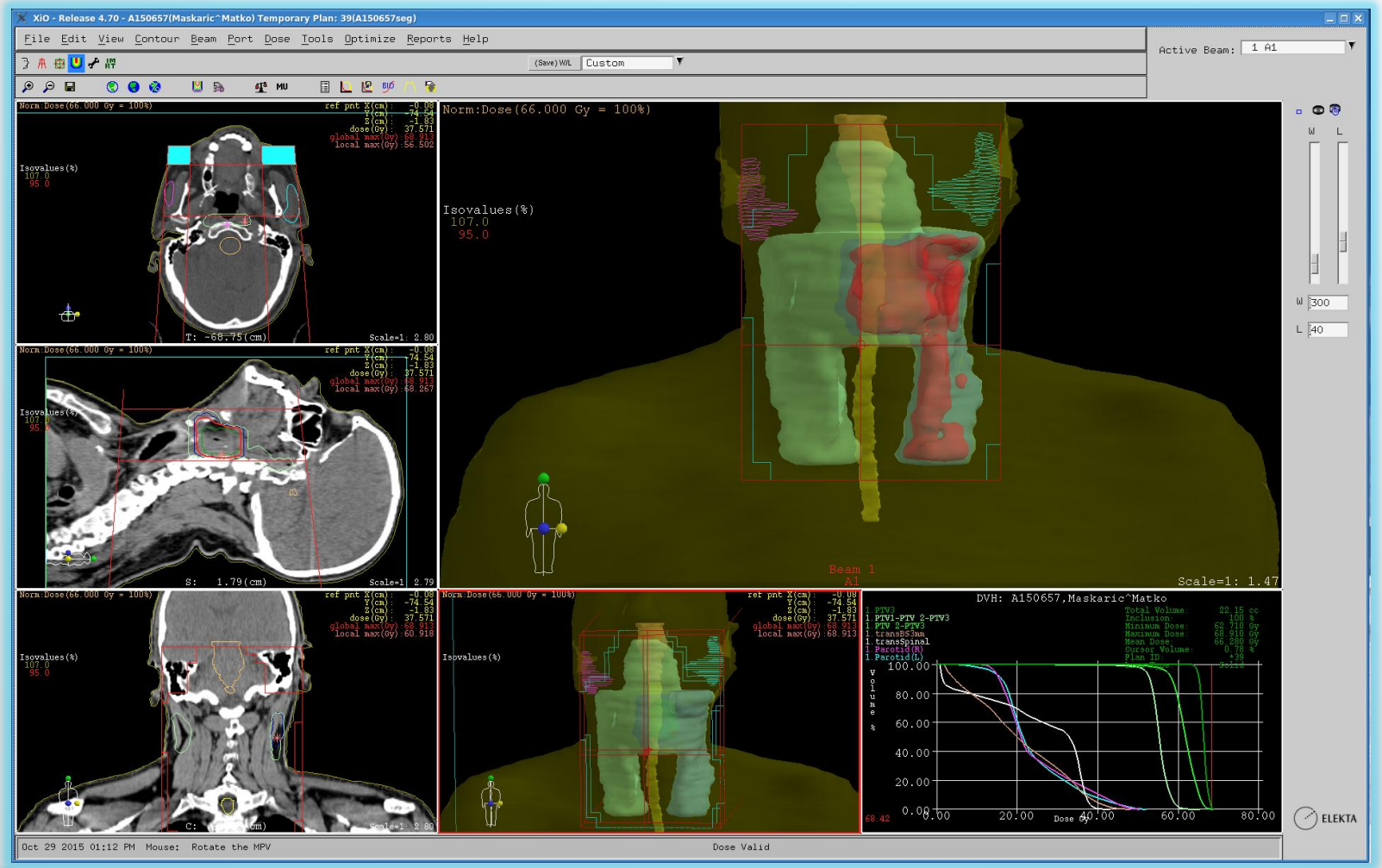


Double shell immobilization system (DSPS)

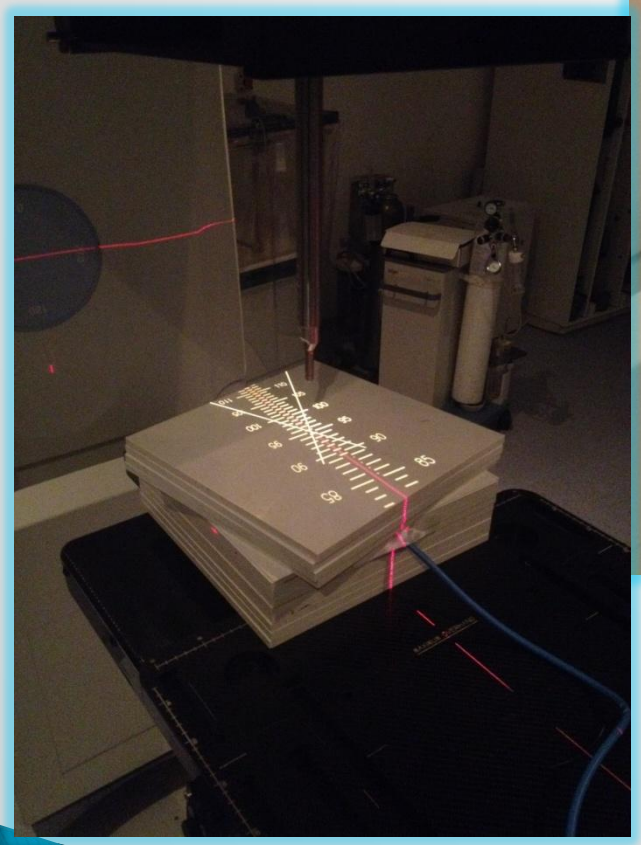
Contouring of skin and organs risk :

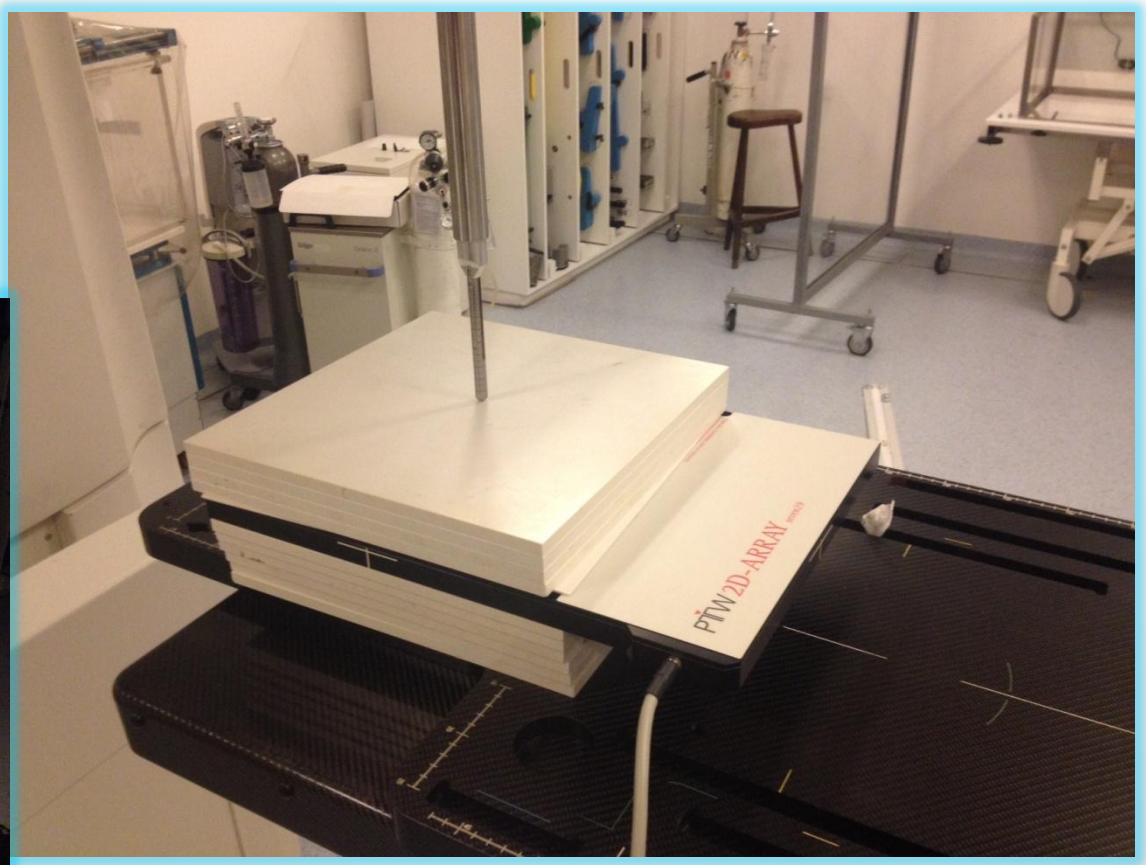


Creating a plan



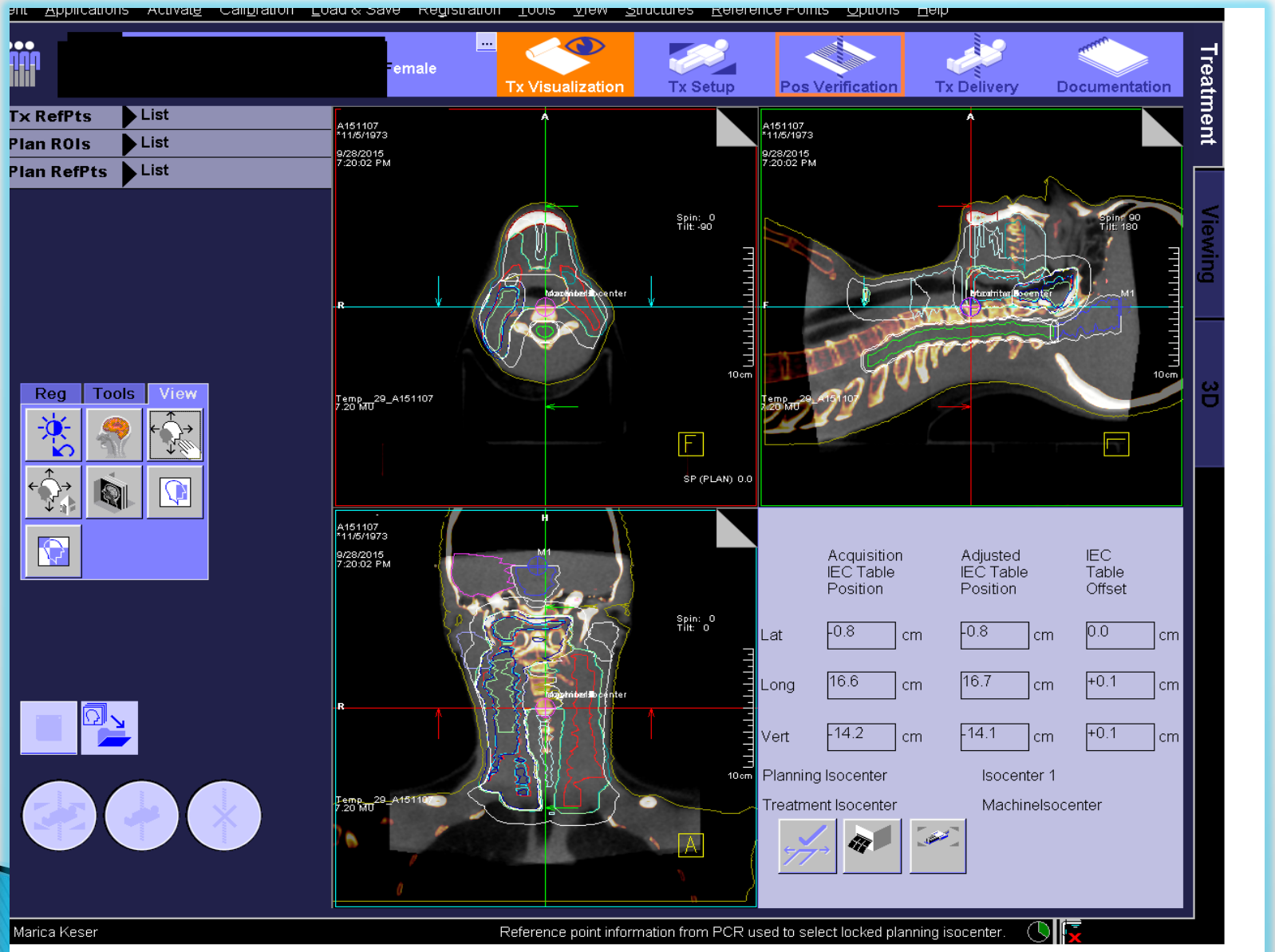
- QA

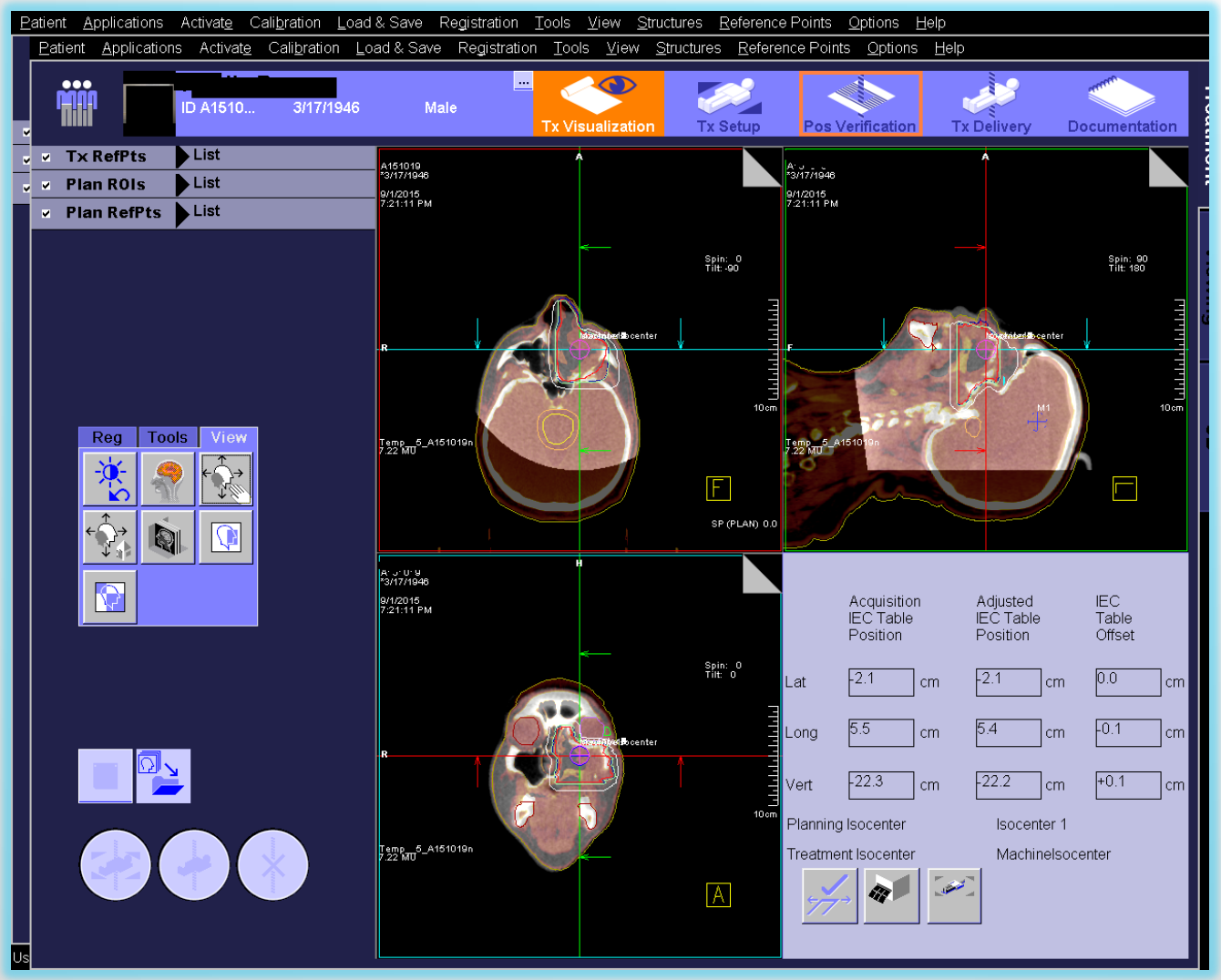




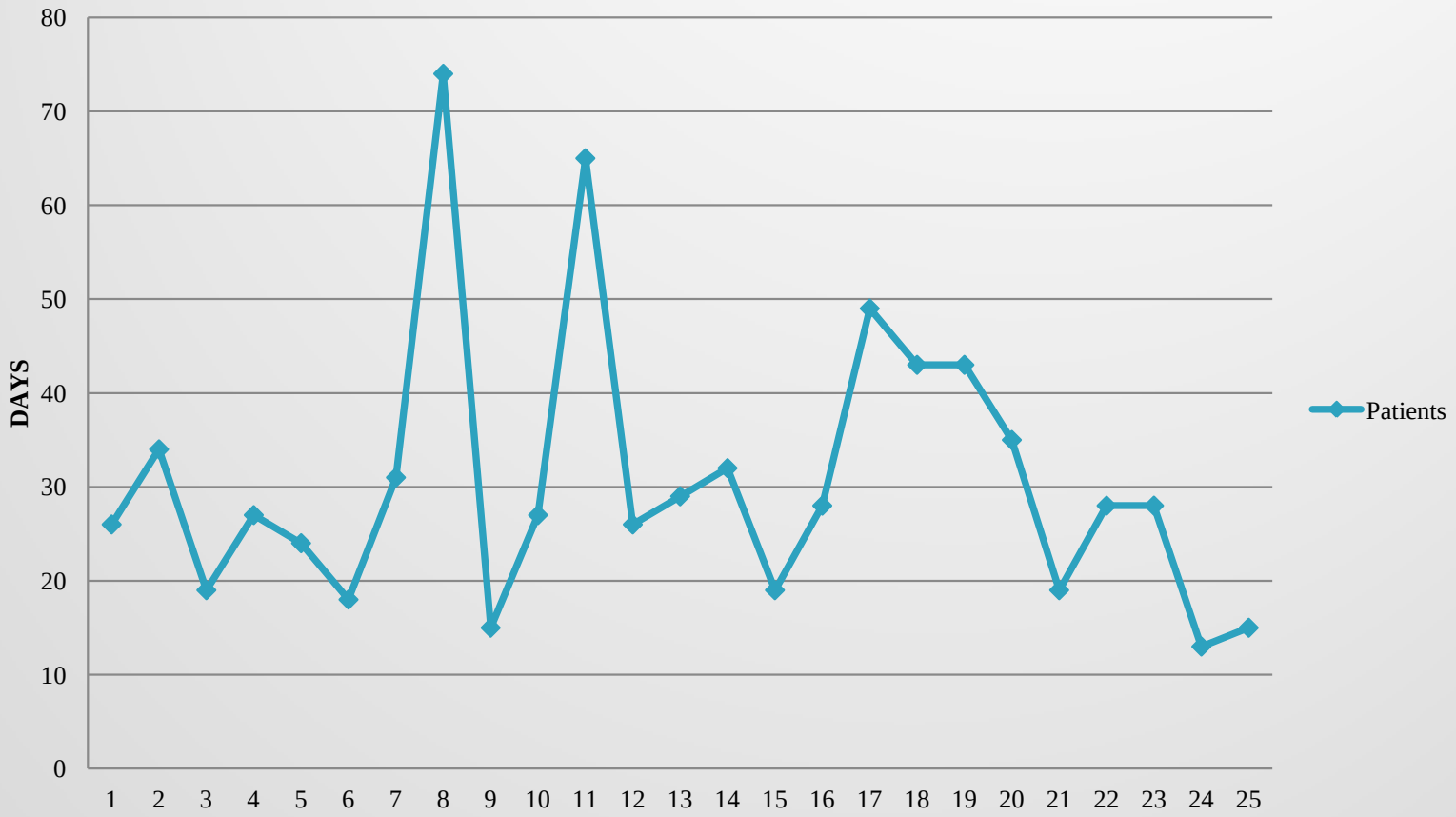
- **Checking the position of the radiation at linear accelerator -Simens Oncor Expression**

Verification of patients position

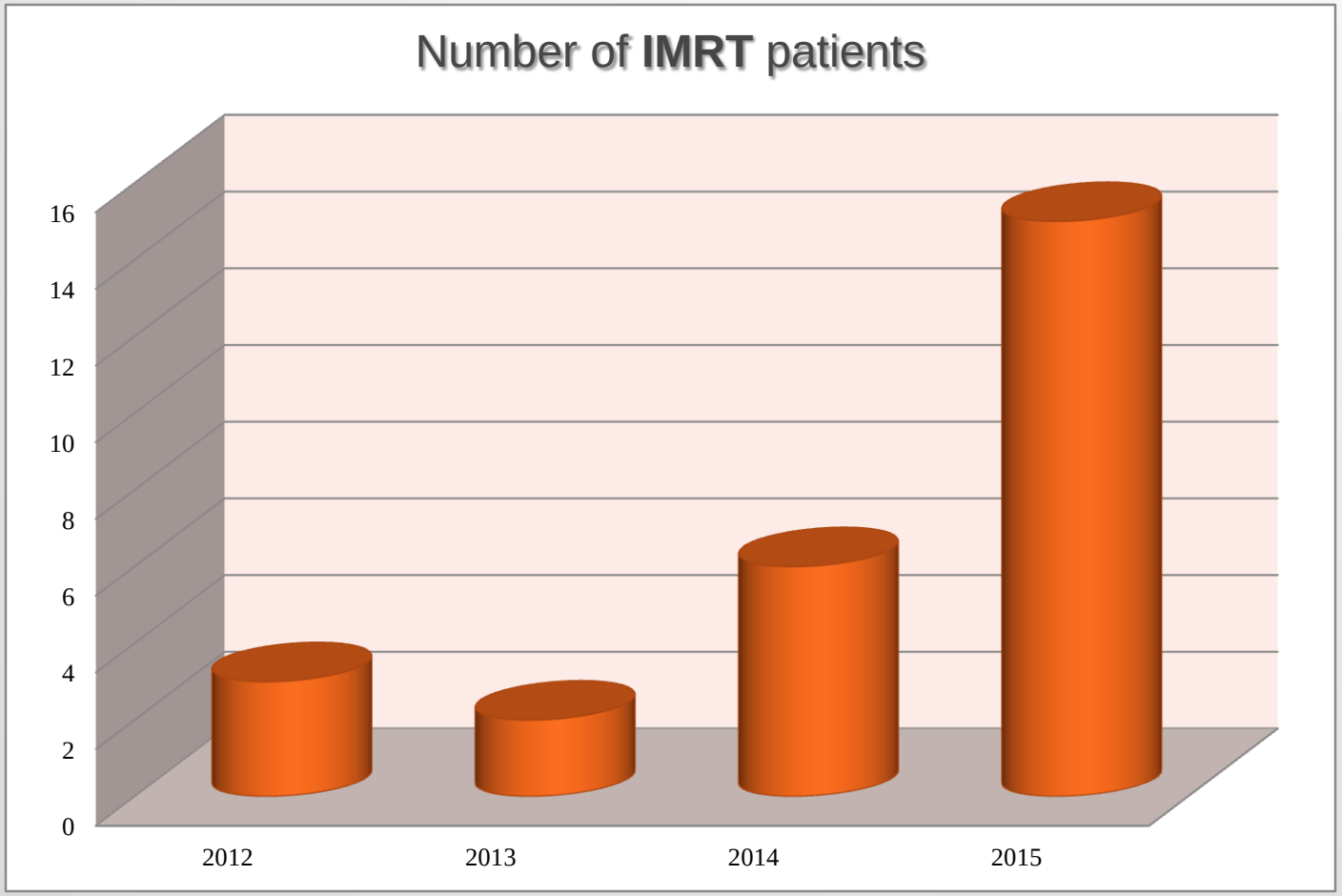



Patient Applications Activate Calibration Load & Save Registration Tools View Structures Reference Points Options Help
ID A1510... 3/17/1946 Male
Tx Visualization
Tx Setup
Pos Verification
Tx Delivery
Documentation
Tx RefPts List
Plan ROIs List
Plan RefPts List
Reg Tools View
Acquisition IEC Table Position
Adjusted IEC Table Position
IEC Table Offset
Lat -2.1 cm -2.1 cm 0.0 cm
Long 5.5 cm 5.4 cm -0.1 cm
Vert -22.3 cm -22.2 cm +0.1 cm
Planning Isocenter
Isocenter 1
Treatment Isocenter
MachineIsocenter

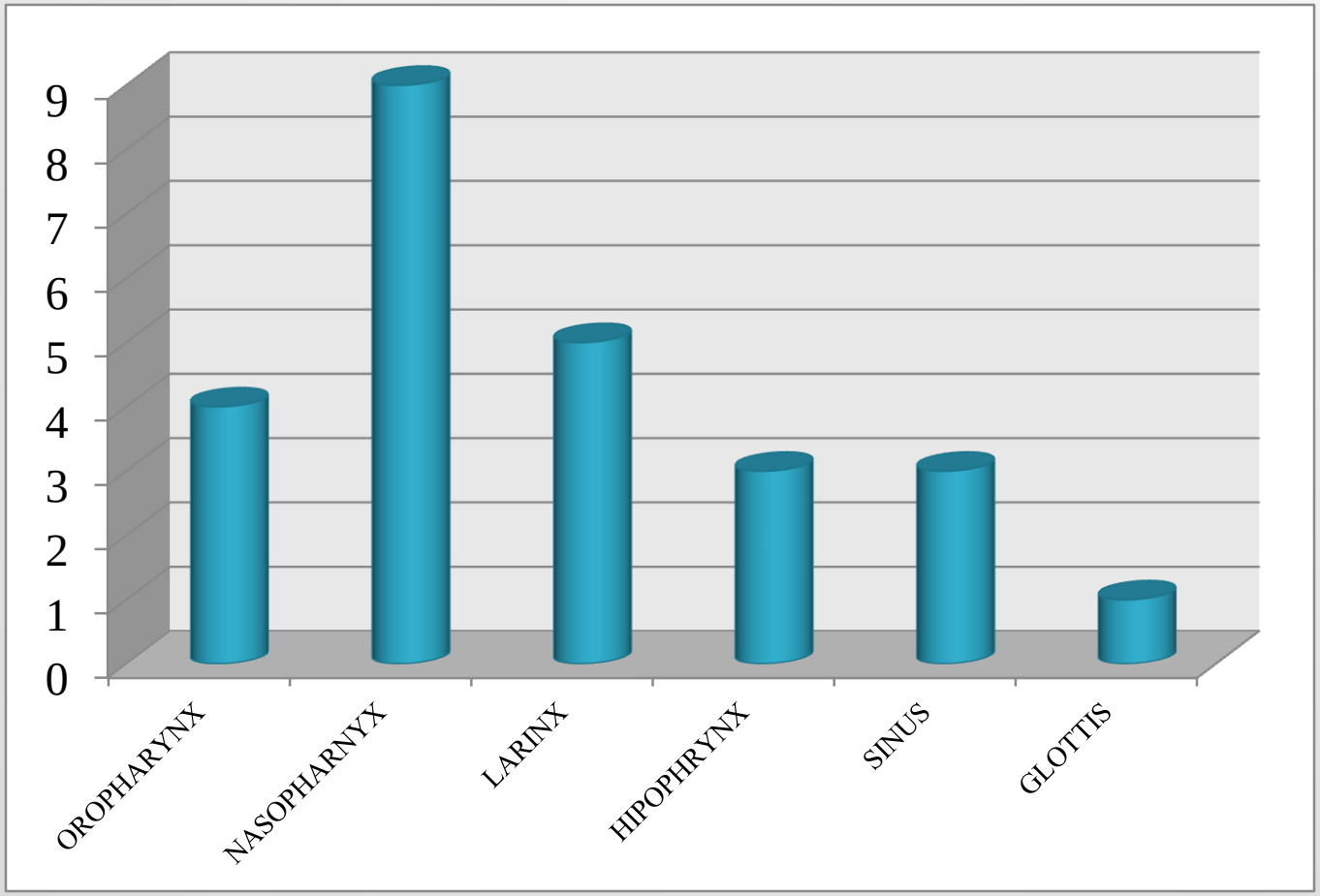
- **The time from planning to radiation is an average of 29 days**



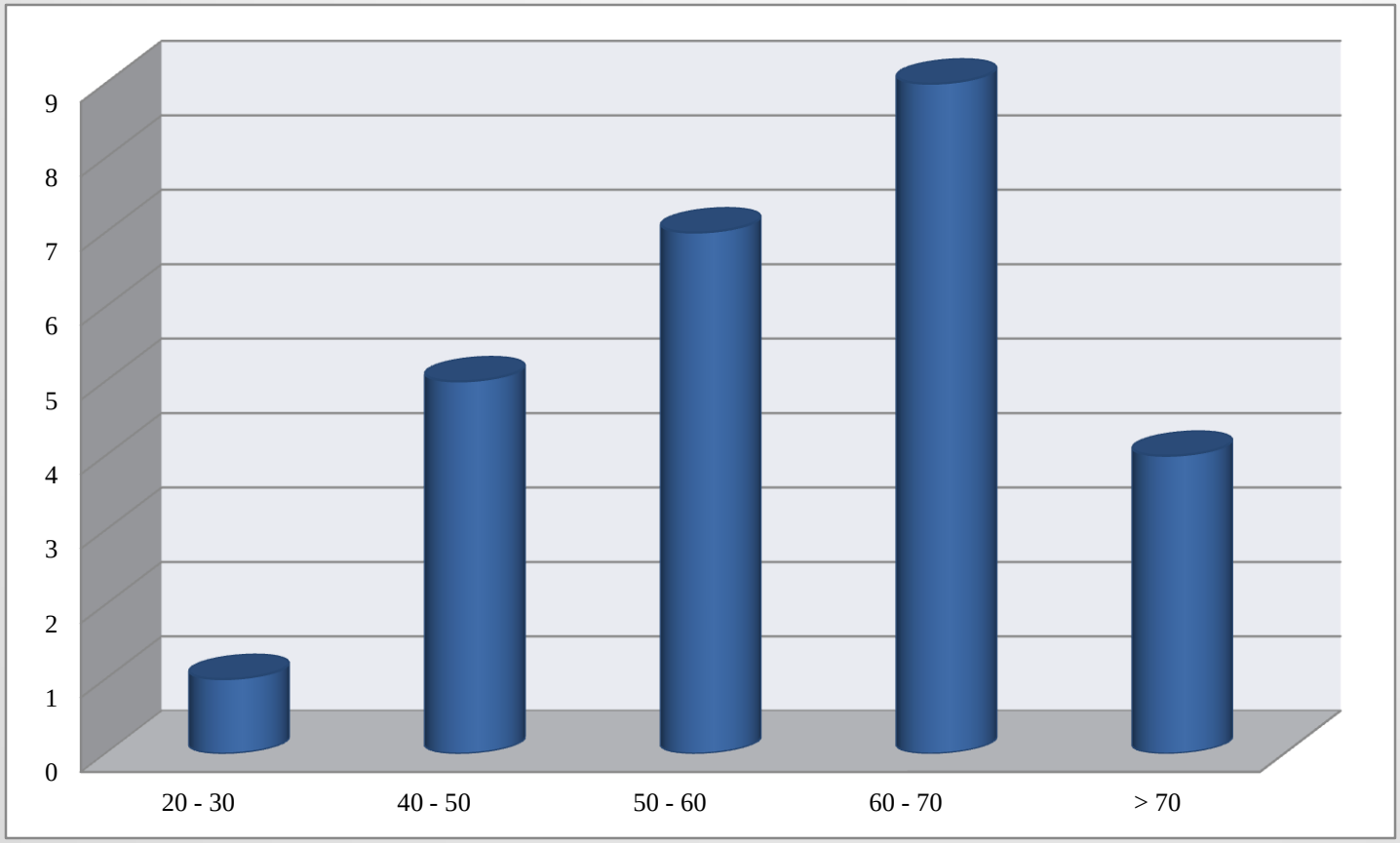
- At UHC Rebro we started with IMRT in July 2012
- To date we have covered the 25 patients


Number of IMRT patients
16
14
12
10
8
6
4
2
0
2012
2013
2014
2015

- The most common diagnosis in the implementation of IMRT at UHC Rebro



- The age of patients



Our observations :

- Greater shift in the vertical direction on half of the treatment (likely due to the loss of weight)
- Minor skin reactions compared to 3D conformal radiotherapy
- Better general condition and submission of radiation

Clinical observations :

- Less dryness of oral cavity (xerostomia)
- Less difficulty in swallowing (dysphagia)
- Milder skin reactions
- Better control of disease

Disadvantages:

- Due to its higher output and input doses, alopecia on the neck

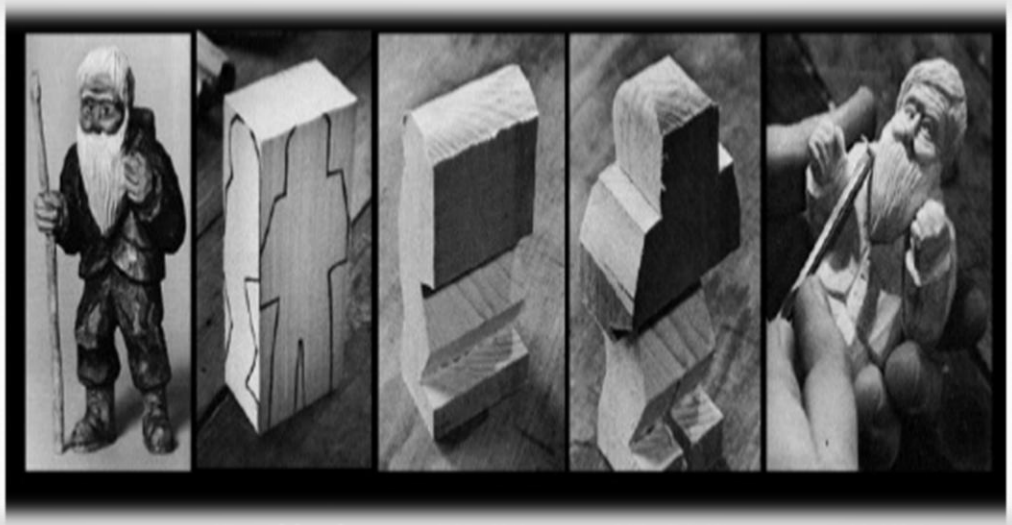
Conclusion :

- There is advantage of IMRT over 3D conformal radiotherapy

- A better local control of disease
- Better coverage of the tumor
- Increased saving of healthy tissue
- Less toxic reaction to radiation

Plans for the future :

- More of IMRT for head and neck patients
- Starting with IMRT on the other localizations (the prostate)
- Adding table in calculation



Total body 2D RT 3D RT IMRT

Thank you for your cooperation and assistance

- Med.physicist: Jurica Bibić
- Prim.dr.sc. Zoran Rakušić
- Velimir Karadža, head RTT

Thank you