VMAT技术在Eclipse和 Pinnacle计划系统的应用

天津肿瘤医院放射治疗科物理室

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1. NPC病例设计方案
2. 基于DVH图计划评估
3. 小结

根据临床处方要求NPC用两程计划来完成

Phase1：PTV1，PTV2　　1.82Gy/28F

PGTVnx，PGTVnd　2.12Gy/28F

Phase2: PTV1　　1.82Gy/5F

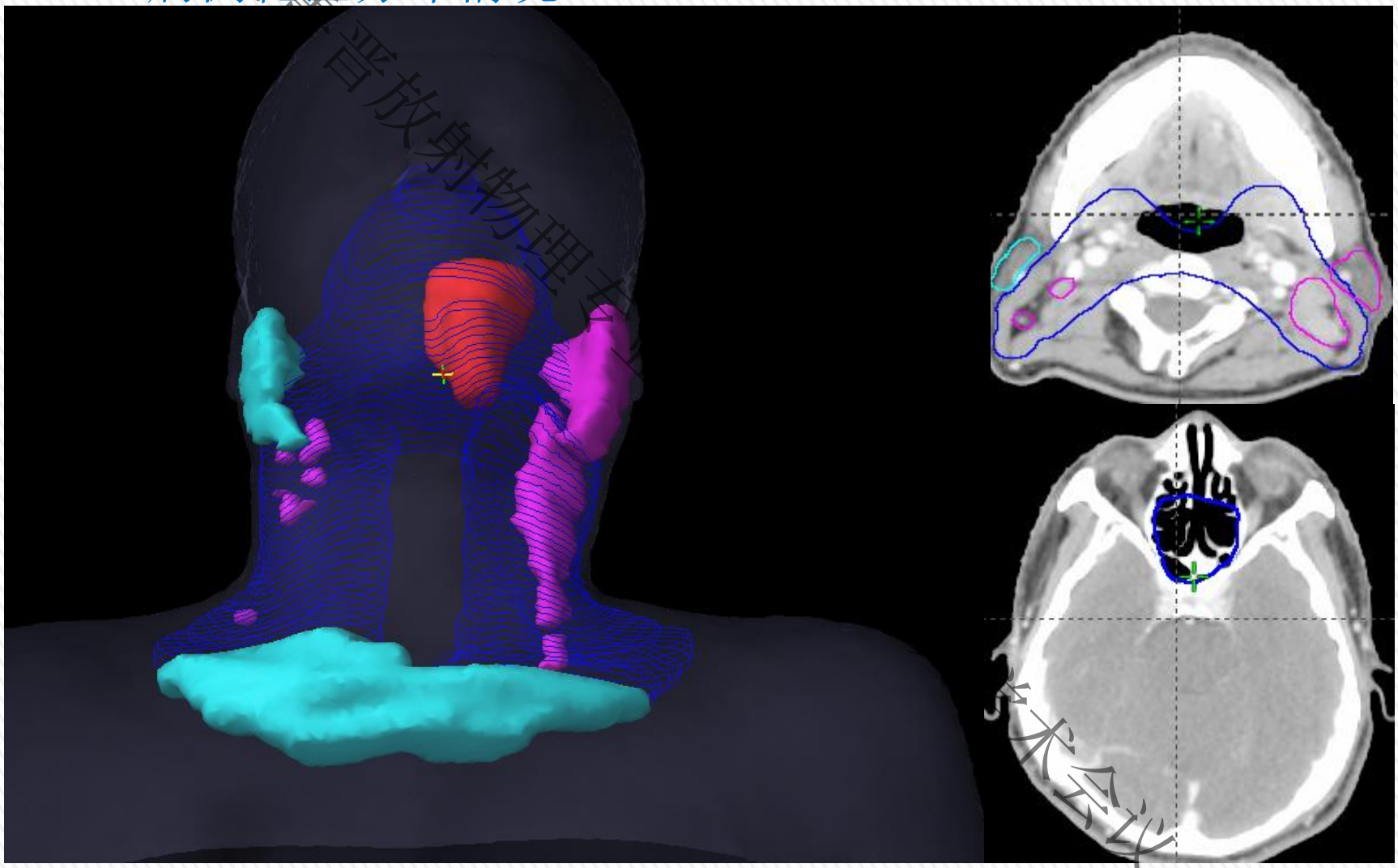
PGTVnx，PGTVnd　2.12Gy/5F

为了便于两程计划设计设为：

PTV1，PTV2　　1.82Gy/33F

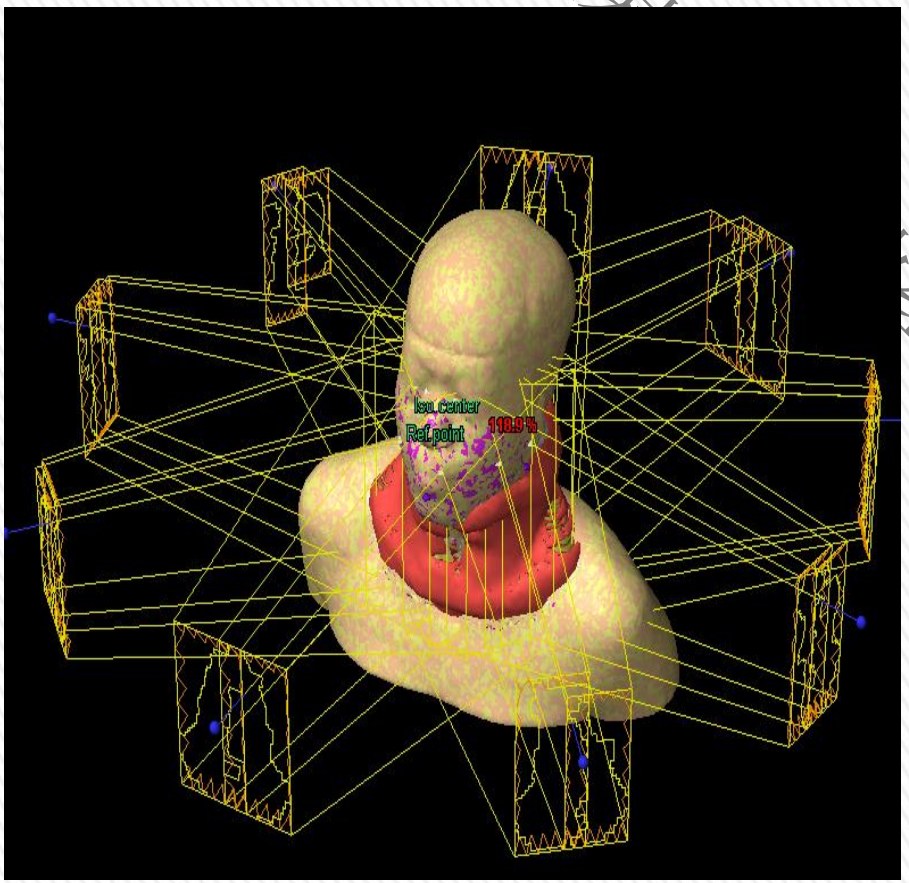
PGTVnx，PGTVnd　2.12Gy/33F

NPC病例靶区分布情况

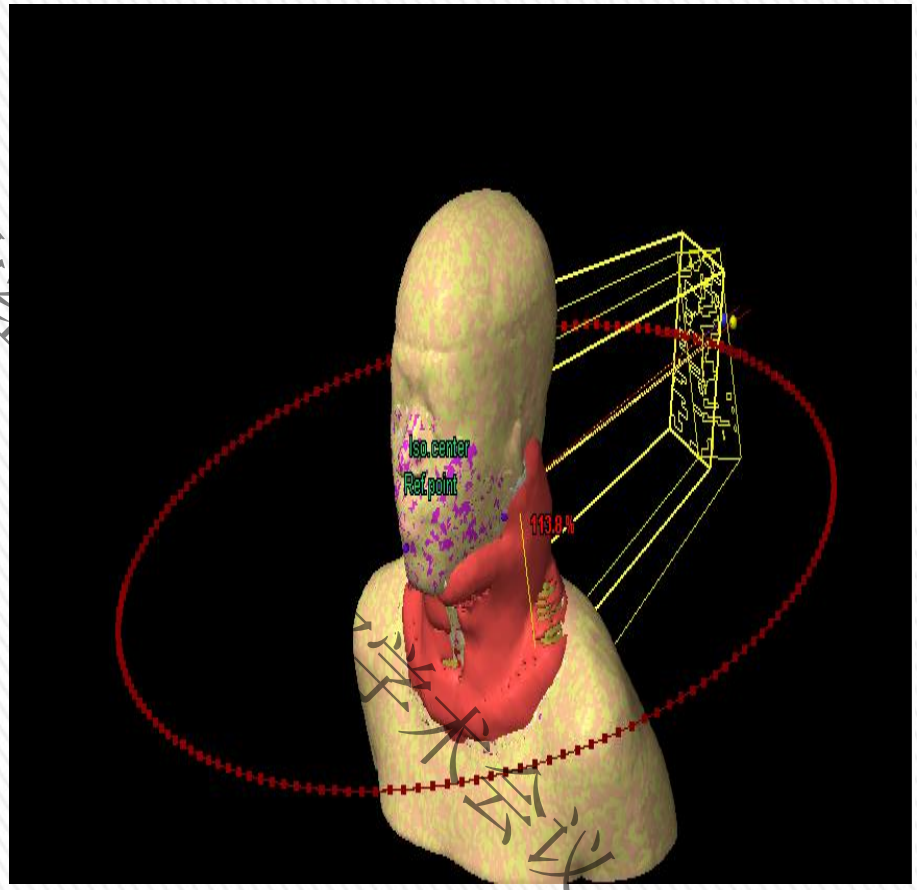


1. NPC病例设计方案

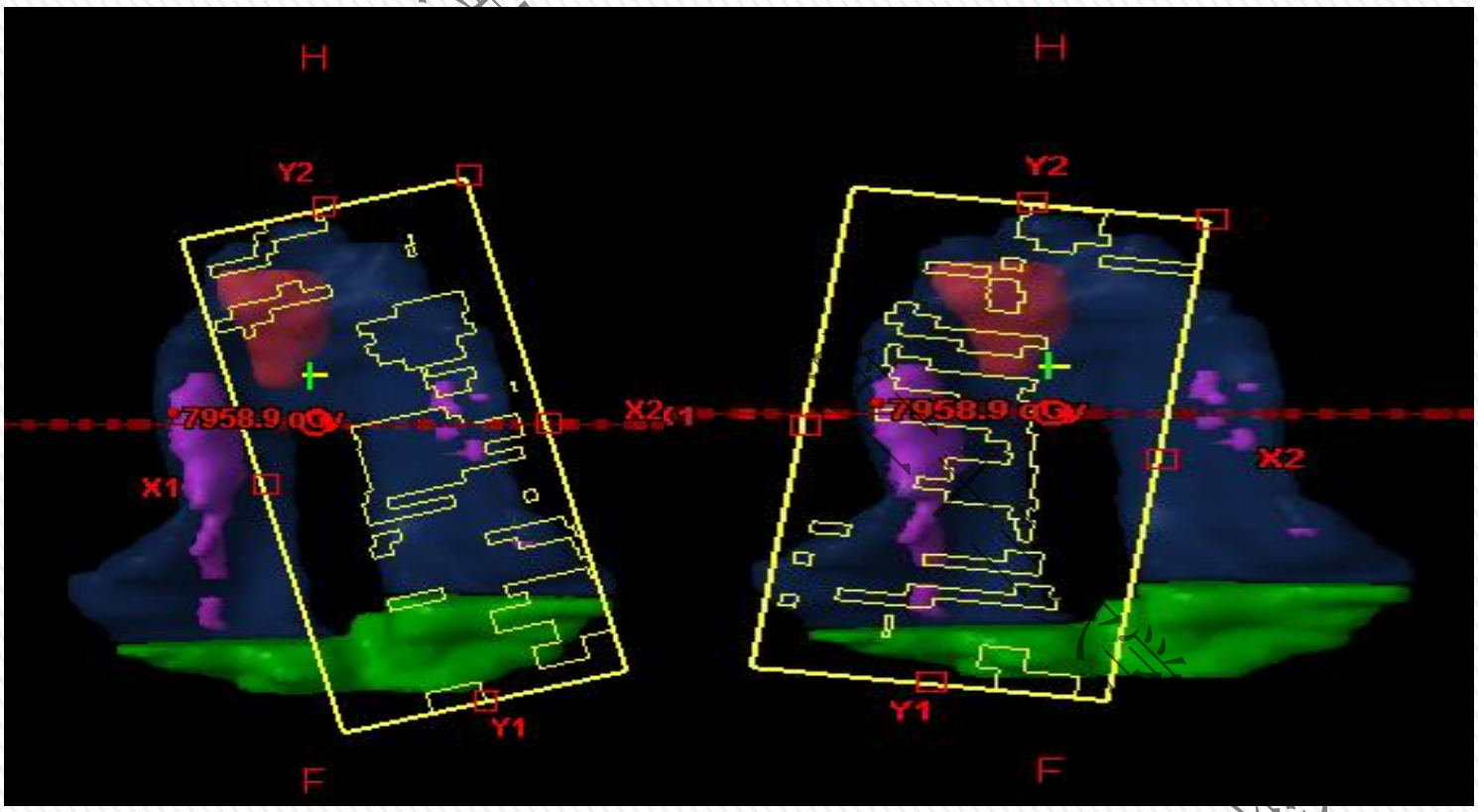
----静态IMRT布野方式



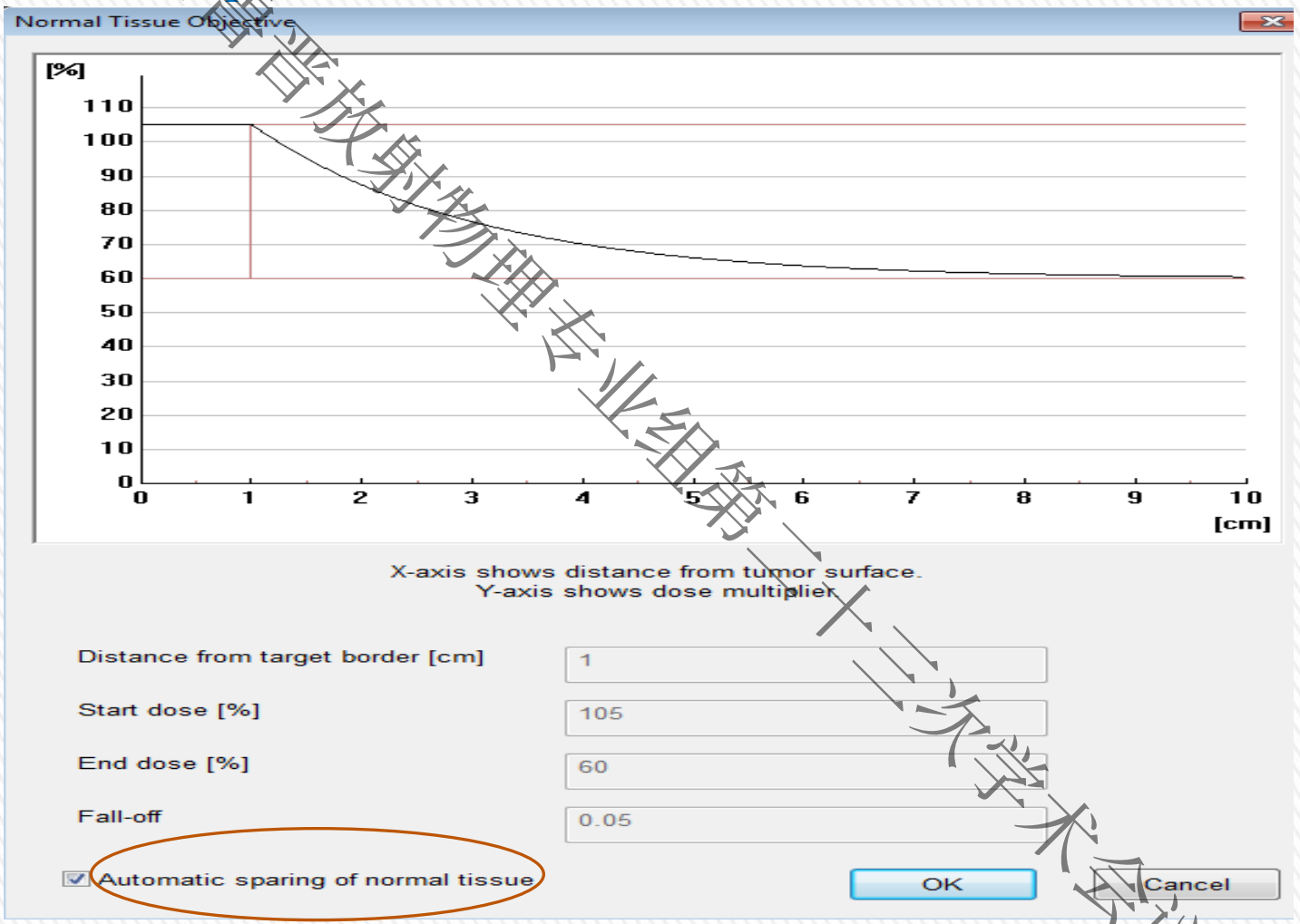
---VMAT 两个弧



等中心位于PTV1中心，Collimator angle=15°或352°
jaw= 11.0cm*23.4cm或11.2cm*22.6cm



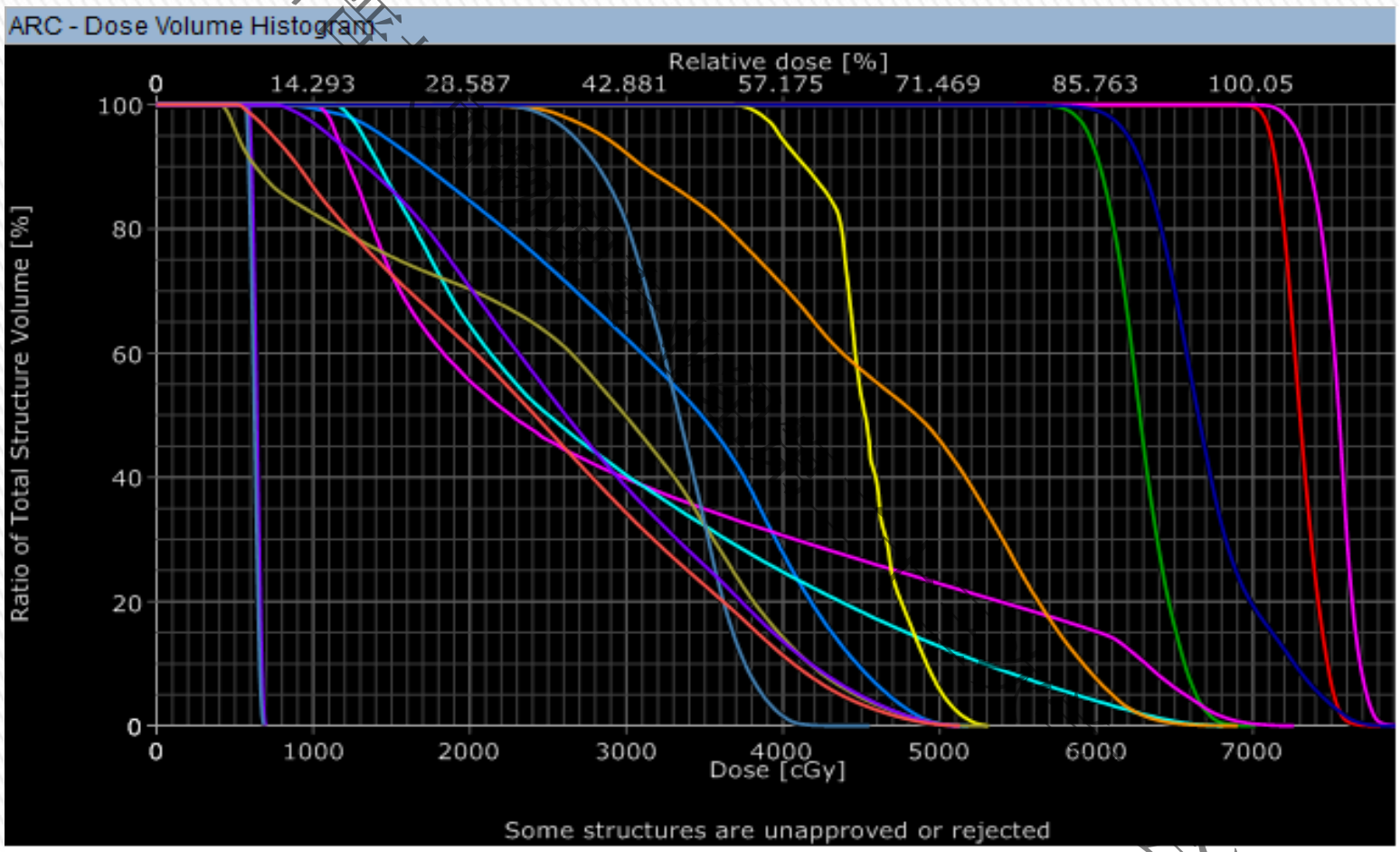
Eclipse计划系统中优化之前选择NTO



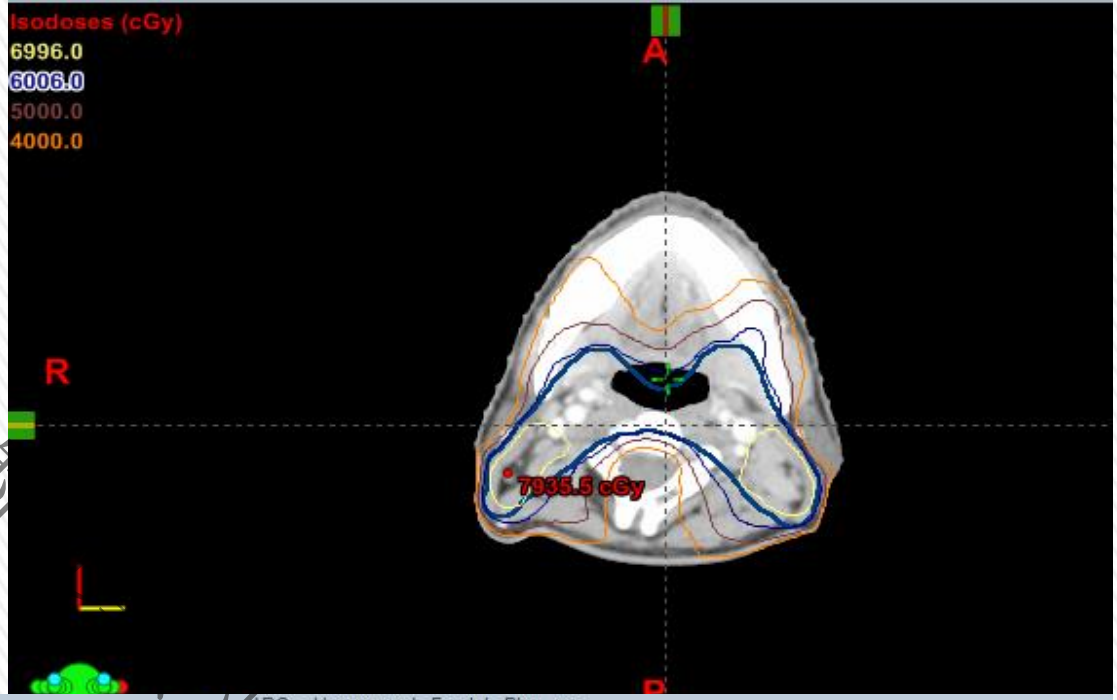
优化过程中充分利用“Level Hold”反复调节给定的参数使计划达到目标

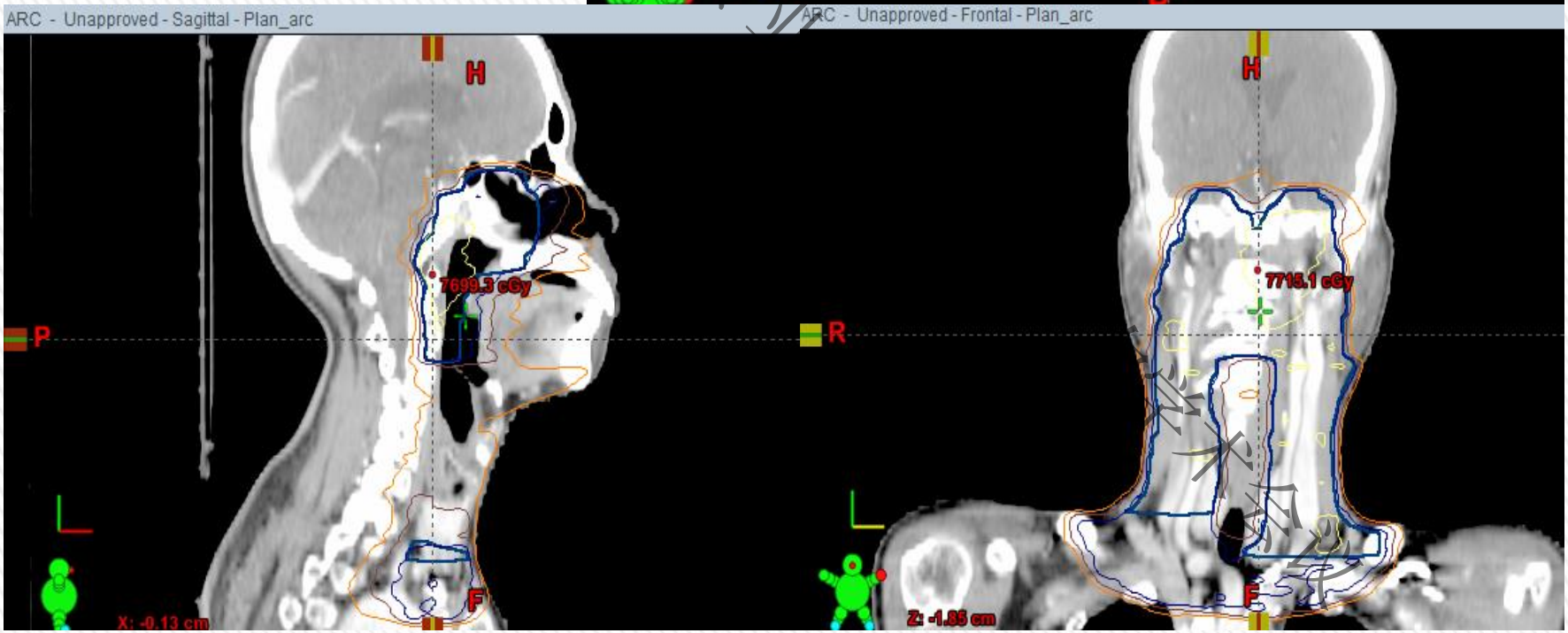
2. 基于DVH图计划评估

Rapidarc DVH图



截面图剂量分布情况


Isodoses (cGy)
6996.0
6006.0
5000.0
4000.0
A
R
L
P
7935.5 cGy


ARC - Unapproved - Sagittal - Plan_arc
H
P
L
F
7699.3 cGy
X: -0.13 cm
ARC - Unapproved - Frontal - Plan_arc
H
R
L
F
7715.1 cGy
Z: -1.86 cm

Rapidarc、Smartarc与静态IMRT靶区接受剂量对比

Target	MinDose (Gy)			MaxDose (Gy)			MeanDose (Gy)		
	Rap.	Sta.	Sma.	Rap.	Sta.	Sma.	Rap.	Sta.	Sma.
PGTVnd	69.4	64.8	65.9	79.6	82.5	77.7	75.3	76.4	73.0
PGTVnx	67.1	59.6	60.0	78.3	83.2	77.5	73.1	75.2	73.6
PTV1	48.4	28.7	29.8	79.6	83.2	77.7	67.1	67.3	65.4
PTV2	51.2	52.5	51.1	70.2	72.8	66.7	62.8	65.1	63.5

Rapdiarc, Smartarc与静态IMRT重要器官比较结果

Organ	MaxDose(Gy)			MeanDose(Gy)		
	Rap.	Sta.	Sma.	Rap.	Sta.	Sma.
Opt.nerve_L+2mm	51.3	53.7	52.8	27.0	32.6	30.1
Opt.nerve_R+2mm	51.3	54.9	50.5	24.5	31.6	29.1
Opt.chiasm+2mm	51.9	54.8	52.9	32.5	38.9	37.2
Pituitary	53.2	52.5	49.9	45.3	42.4	44.3
Len-L	7.0	6.6	7.0	6.4	6.2	6.2
Len_R	6.9	6.8	6.8	6.2	6.2	5.7

Rapdiarc, Smartarc与静态IMRT重要器官比较结果

Organ	1cc(Gy)			MeanDose(Gy)		
	Rap.	Sta.	Sma.	Rap.	Sta.	Sma.
Cord+5mm	40.3	42.5	41.0	33.1	32.0	33.2
Brainstem+3mm	48.4	52.9	51.0	26.9	30.1	32.0

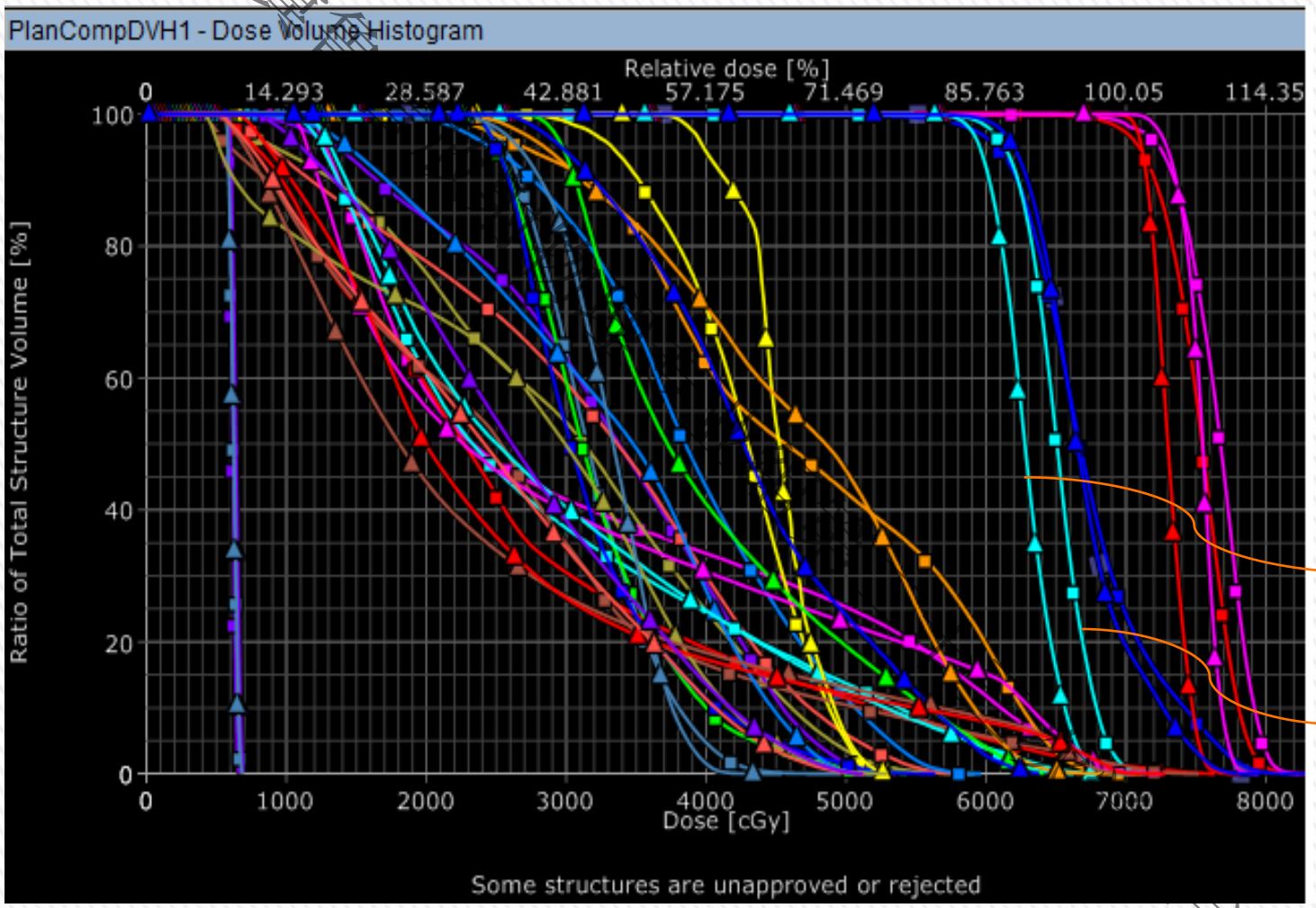
Rapdiarc, Smartarc与静态IMRT重要器官比较结果

Organ	V30(%)			MeanDose(Gy)		
	Rap.	Sta.	Sma.	Rap.	Sta.	Sma.
Parotid_L	40	41.4	45	30.1	32.1	32.2
Parotid_R	40	36.8	40	29.7	28.9	29.0

Rapdiarc, Smartarc与静态IMRT重要器官比较结果

Organ	V50(%)			MeanDose(Gy)		
	Rap.	Sta.	Sma.	Rap.	Sta.	Sma.
Mandible	45	42.5	24	46.6	46.7	41.4
Temp.joint_L/R	22.7/19.0	1.3/1.3	1.0/2.0	43.4/40.4	31.9/32.2	35.2/40.7
Temp.Lobe_L/R	12.6/12.6	11.4/11.4	9.0/9.0	25.8/24.6	26.4/26.6	23.7/24.9

Rapidarc计划与静态IMRT计划DVH图比较



Rapidarc

Step-and-Shoot IMRT

3. 小结

A. MU值

Step-and-Shoot IMRT----1061MU

Rapidarc ----827MU

Smartarc ----648MU

B. Dose Delivery Time

Step-and-Shoot IMRT----Evaluated 20min

Rapidarc ----2.48min

Smartarc ----2.33min

C. 靶区及重要器官接受剂量

动态弧计划质量相似于或优于传统的静态IMRT计划

谢谢

在此感谢Varian公司的任青老师及王伟主任对工作的支持 ！