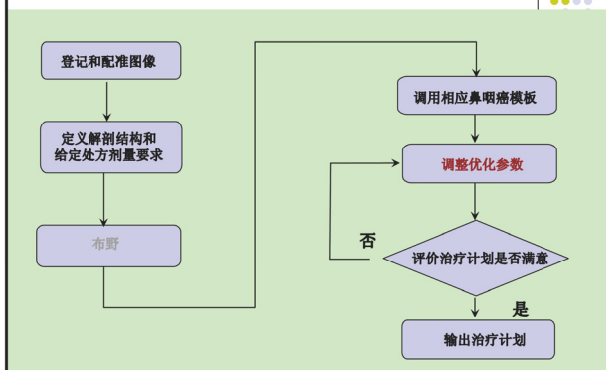




鼻咽癌计划设计

中国医学科学院肿瘤医院
徐英杰

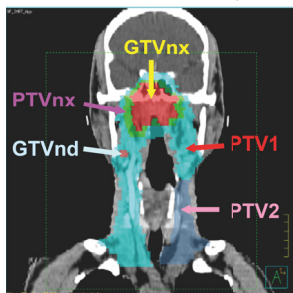
鼻咽癌计划设计的基本过程



靶区定义和剂量处方

- 分期T4N1M0
- 靶区剂量处方（靶区勾画按照本科室的治疗规范）

靶区名称	总剂量 (Gy)	单次剂量 (Gy)	次数 (F)
GTVrx	73.92	2.24	33
GTVrd	69.96	2.12	33
PTVrx	69.96	2.12	33
PTV1	60.06	1.82	33
PTV2	60.06	1.82	33

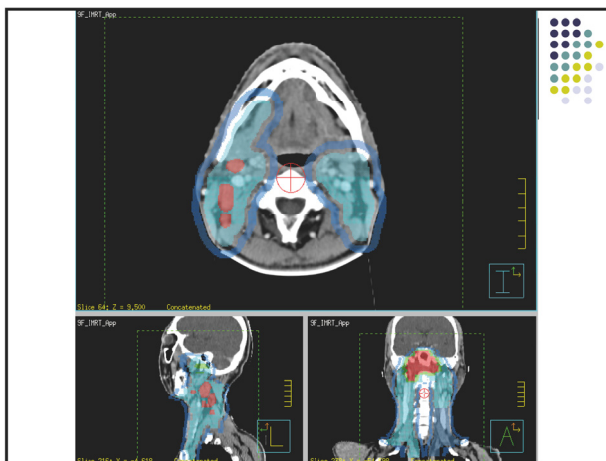


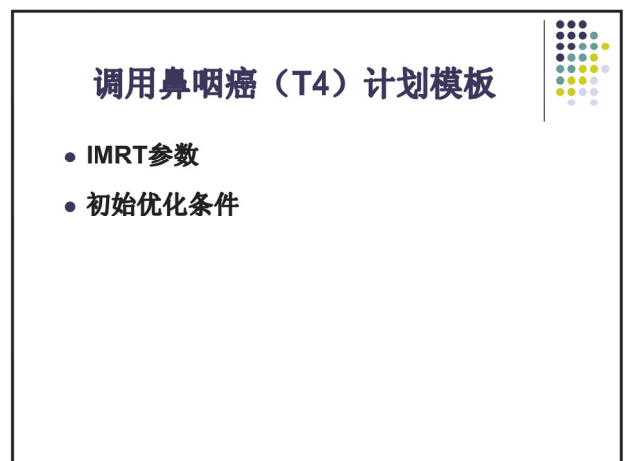
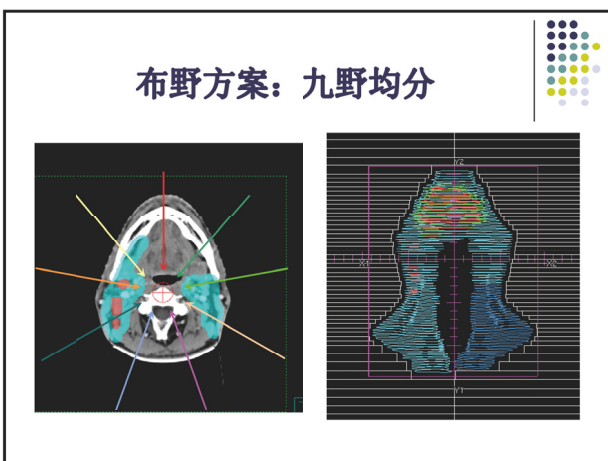
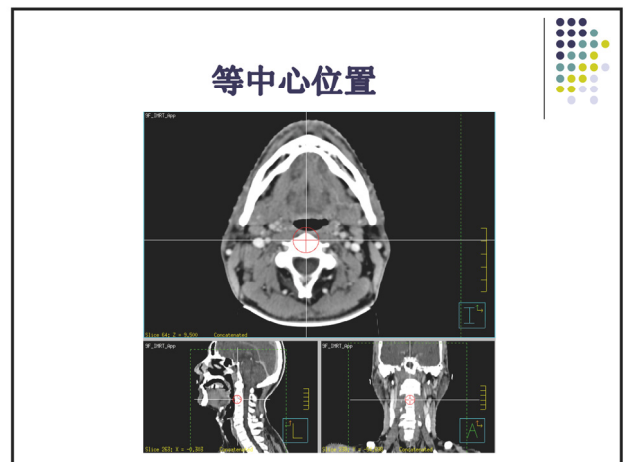
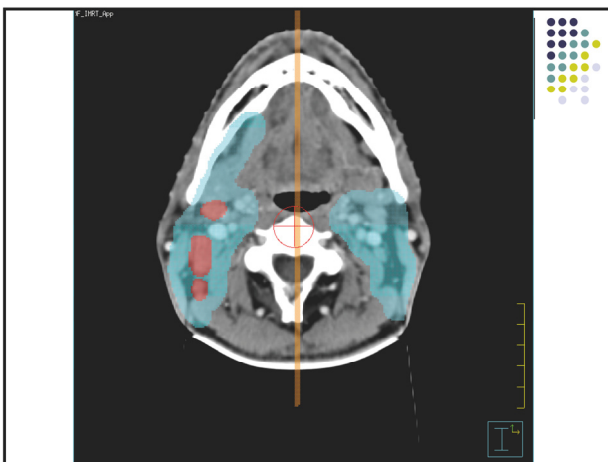
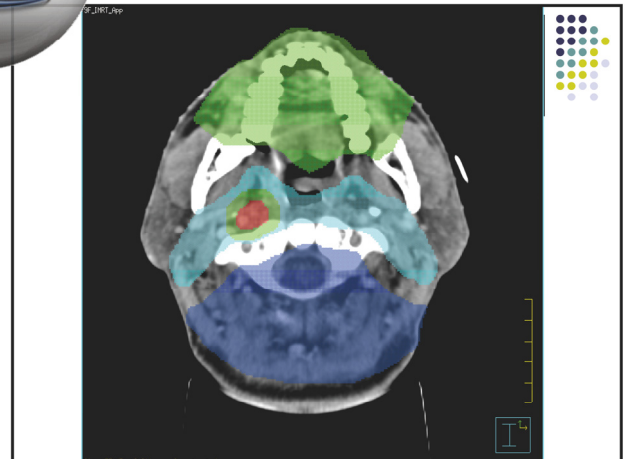
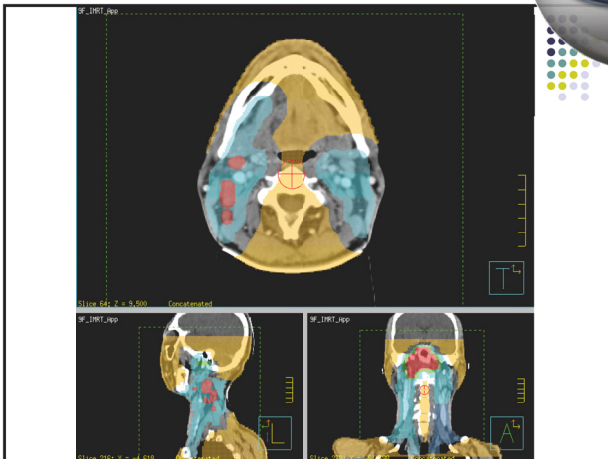
危及器官定义和剂量限值

中文名称	英文名称	限定剂量 (Gy)
脑干	Brain stem (stem)	≤ 54
脊髓	Spinal cord (cord)	≤ 40
腮腺	Parotid	50%体积 < 30 ~ 35
晶体	Lens	≤ 9
视神经	Optic nerve	≤ 54
视交叉	Optic chiasm	≤ 54
喉、气管	Larynx, Trachea	≤ 40 ~ 45
下颌骨	Mandible	≤ 60
颞颌关节	Temporomandibular Joint (TMJ)	≤ 50
颞叶	Temporal lobe (TL)	≤ 54 ~ 60
垂体	Pituitary	≤ 54 (蝶窦受侵者除外)

剂量成形结构的勾画

- 剂量分布形状控制
 - Ring
 - NT
 - Fan
 - Others





布野方案：九野均分

调用鼻咽癌（T4）计划模板

- IMRT参数
- 初始优化条件



IMRT参数

IMRT Parameters

Optimization Conversion Trial SF-IMRT_App

Beam 5-1 Optimization Type Allow jaw motion/ Split beam? Max iterations 100

Stopping tolerance 0.0001

Apply tumor overlap fraction? Yes No

MLC delivery? Yes No

Minimum segment MUs 15

DMPO Settings

Maximum number of segments 110 Compute final dose? Yes No

Delivery Constraints

Minimum segment area 15 cm² Overlap distance 2 cm

Leaf/jaw overlap 0.5 cm

Dismiss Machine R6-600CD Copy Machine Defaults Help

优化条件—靶区

ROI	Type	Constrain	Target cGy	% Volume	% Variation	Weight	Objective Value	a	gEUD
GTVnc-Stem	Max Dose		17600			30	0.055484		
GTVnc-Stem	Min DVH		17400	95		30	1.00746E-06		
GTVnc-Stem	Min Dose		17350			30	0.00722541		
GTVnc-Stem	Uniform Dose		17450			1	0.00408017		
GTVnc	Max Dose		17150			20	0.014203		
GTVnc	Min DVH		16850	95		30	0		
GTVnc	Min Dose		16750			30	1.96733E-05		
GTVnc	Uniform Dose		16870			1	0.00238527		
PTVnc-GTVnc	Max Dose		17200			20	0.0418939		
PTVnc-GTVnc	Min DVH		16880	95		30	0.00523632		
PTVnc-GTVnc	Min Dose		16900			20	0.0120835		
PTVnc-GTVnc	Uniform Dose		17050			1	0.00485877		
PTVnc-GTVnc	Max Dose		16250			20	0.0872791		
PTVnc-GTVnc	Min DVH		16006	97		100	0.00228879		
PTVnc-GTVnc	Min Dose		15850			100	0.045141		
PTVnc-GTVnc	Uniform Dose		16100			10	0.0826362		
PTVnc	Max Dose		16250			80	---		
PTVnc	Min DVH		16006	95		80	---		
PTVnc	Min Dose		15800			85	---		
PTVnc	Uniform Dose		16100			20	---		

优化条件—危及器官和剂量成形结构

ROI	Type	Constrain	Target cGy	% Volume	% Variation	Weight	Objective Value	a	gEUD
Brain Stem PRV	Max Dose		5200			80	0.0360831		
Brain Stem PRV	Max EUD		11700			1	0.0187642	1	2220.71
Brain PRV/Brain	Max Dose		1400			00	0.00206701		
Brain PRV/Brain	Max EUD		2200			0.9	0.00542314	1	2406.16
Brain PRV	Max Dose		14500			30	0.0060826		
Brain PRV	Max EUD		2500			0.3	0.00473386	1	3202.2
Brain PRV	Max Dose		3900			1	0.00943773		
Brain PRV	Max EUD		2600			0.5	0.00751723	1	3312.86
Brain PRV	Max Dose		1800			100	0.00591596		
Brain PRV	Max EUD		1450			0.5	0.00448635	1	545.421
Brain PRV	Max Dose		800			100	0.00286125		
Brain PRV	Max EUD		1500			0.5	0.00183861	1	567.788
Brain PRV	Max EUD		3500			0.5	0.000470653	1	9740.11
Brain PRV	Max EUD		1400			0.5	0.00183042	1	4841.17
Brain PRV	Max Dose		1500			30	0.00114300		
Brain PRV	Max EUD		2000			0.2	0.000565546	1	2237.81
Brain PRV	Max Dose		15400			1	0.0178337		
Brain PRV	Max Dose		15400			1	0.00234431		
Brain PRV	Max Dose		15400			1	0.00288289		

优化条件—危及器官和剂量成形结构

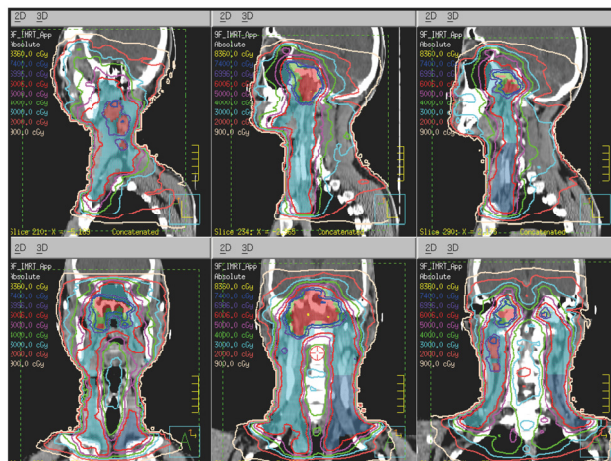
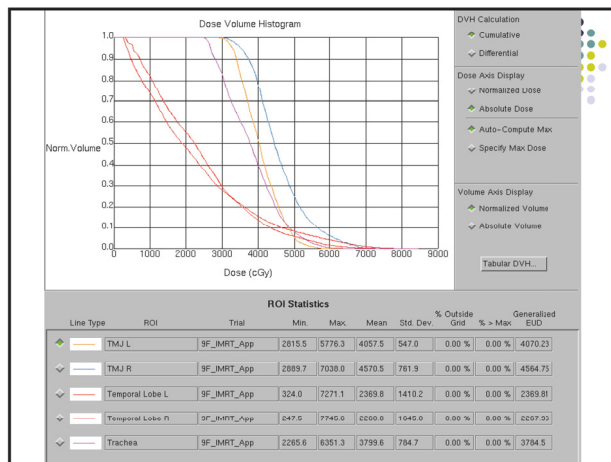
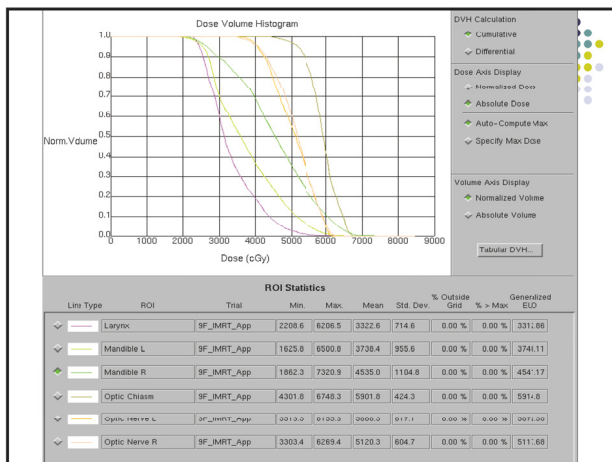
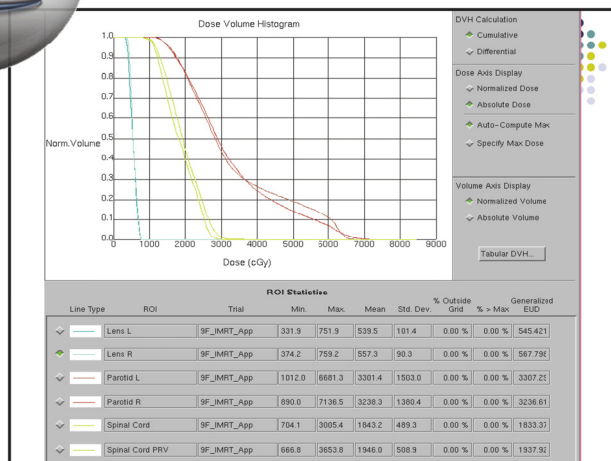
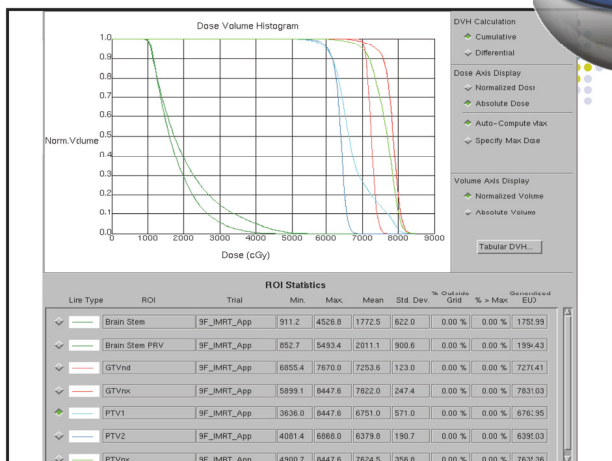
ROI	Type	Constrain	Target cGy	% Volume	% Variation	Weight	Objective Value	a	gEUD
Parotid L	Max DVH		3000	142		30	3.26112E-05		
Parotid L	Max EUD		2300			1	0.0383605	1	3307.29
Parotid R	Max DVH		3000	142		30	0.000376729		
Parotid R	Max EUD		2300			1	0.0331662	1	3236.81
Parotid L	Max Dose		3700			50	8.56161E-07		
Parotid L	Max EUD		1650			1	0.00608986	1	1937.92
Parotid R	Max EUD		3800			0.2	0.000202286	1	4070.23
Parotid R	Max EUD		3800			0.2	0.00162005	1	4564.75
Temporal Lobe L	Max EUD		1800			0.2	0.00400547	1	2369.81
Temporal Lobe R	Max EUD		1800			0.2	0.00270356	1	2267.86
Trachea	Max Dose		3900			1	0.019347		
Trachea	Max EUD		2500			0.5	0.0023991	1	3784.5
Trachea	Max Dose		2500			2	0.0817109		
mid-4000	Max Dose		3500			2	0.0281468		
mid-4000	Max Dose		1750			20	0.0189216		
mid-4000	Max Dose		2800			3	0.0955215		
mid-4000	Max Dose		3800			25	0.120137		
mid-4000	Max Dose		16000			30	0.00922239		
mid-4000	Max Dose		16996			10	0.00336641		
mid-4000	Max Dose		2800			4	0.0343004		
mid-4000	Max Dose		2500			20	0.0275344		

调整和添加优化条件

ROI	Type	Constrain	Target cGy	% Volume	% Variation	Weight	Objective Value	a	gEUD
5000	Max Dose		2000			15	0.0388056		
5000	Max Dose		1500			10	0.000719088		
6000-c	Min Dose		6000			120	0.00418898		
7000-h	Max Dose		6500			110	0.0272305		
7000-h-c	Max Dose		6500			112	0.0357927		
4000-h	Max Dose		3500			1	0.0116671		

计划评价

- 剂量分布：横断位、冠状位和矢状位
- DVH
- 计划实施效率
 - 总子野数：110
 - 总MU：1257
 - 治疗时间：~15min





小 结

- 模板：规范计划流程；减少计划时间
- 定义剂量成形结构：控制剂量分布
- 危及器官设置Max EUD：使该器官整体剂量下降，得到更好的保护

致 谢

- 感谢戴建荣老师、符贵山老师、李明辉、陈辛元等物理室同事在计划设计过程中给予了很好的提示和建议
- 感谢胡逸民老师和戴建荣老师在本幻灯制作过程中提供修改意见

