



CTU

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Treatment planning basics

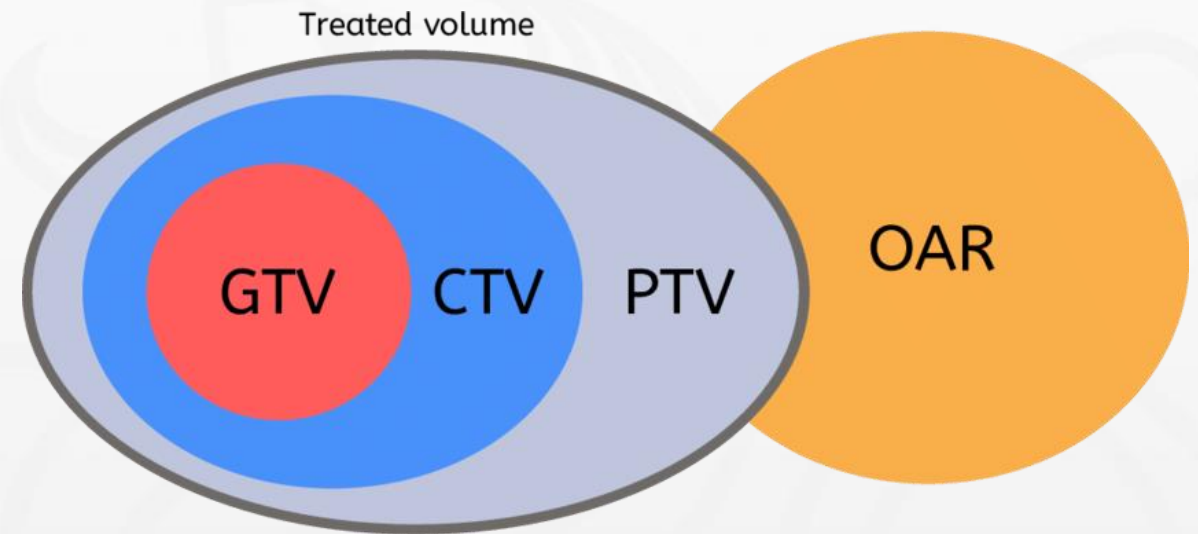
Petra Trnková

Treatment planning basics

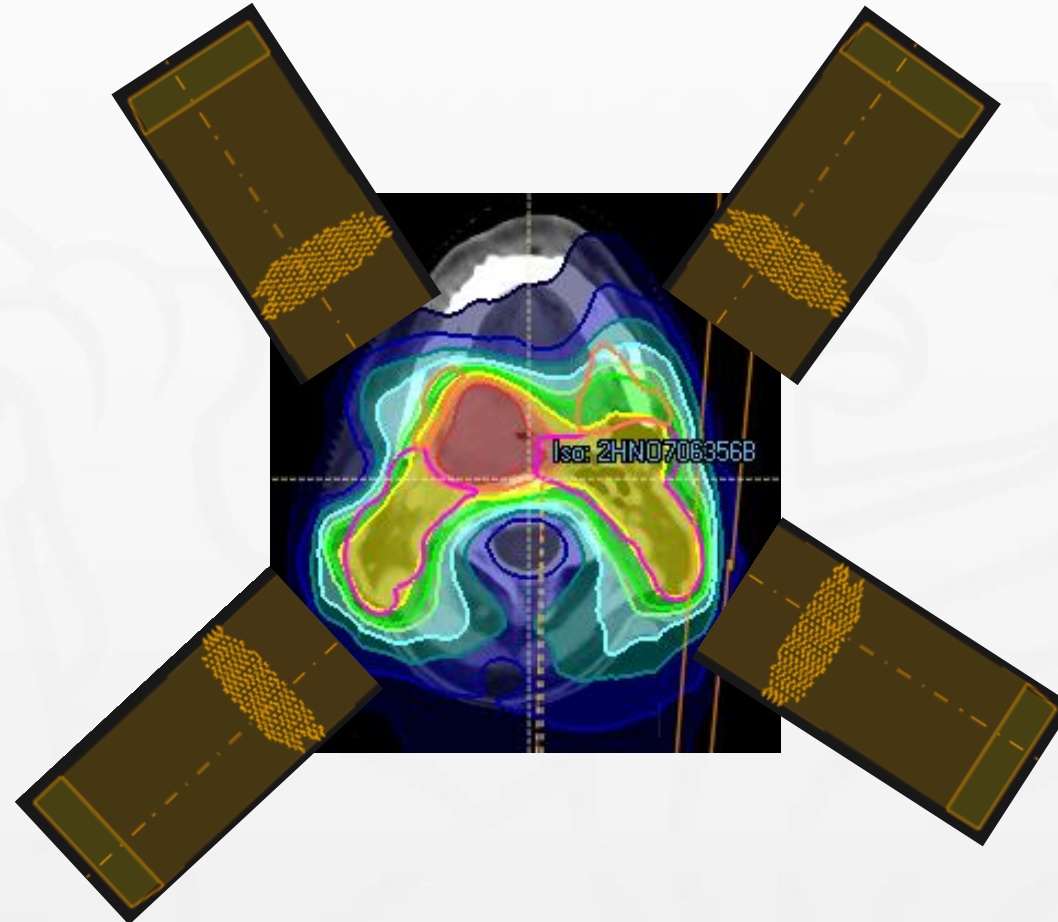
- Treatment planning structures:
 - Organs at risk
 - Target structures: GTV, CTV, ITV, PTV
- Beam selection
- Plan optimization
- Plan evaluation

Treatment planning structures

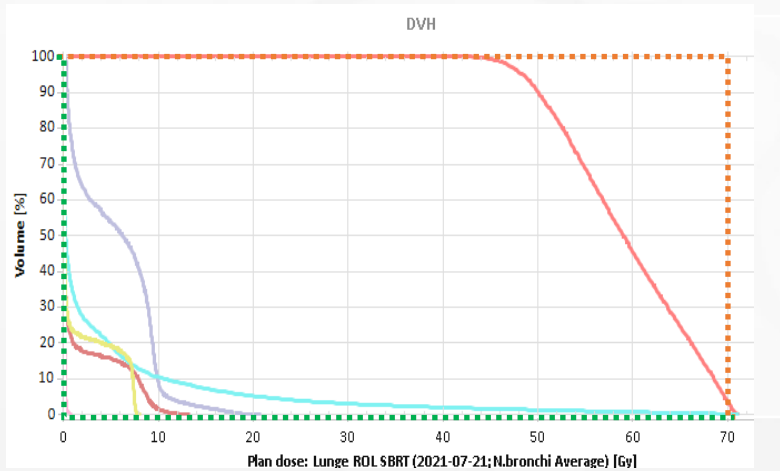
- GTV = gross tumour volume (visible mass)
- CTV = clinical target volume (microscopic spread)
- PTV = planning target volume (safety margins)
- OAR = organ at risk



Beam selection

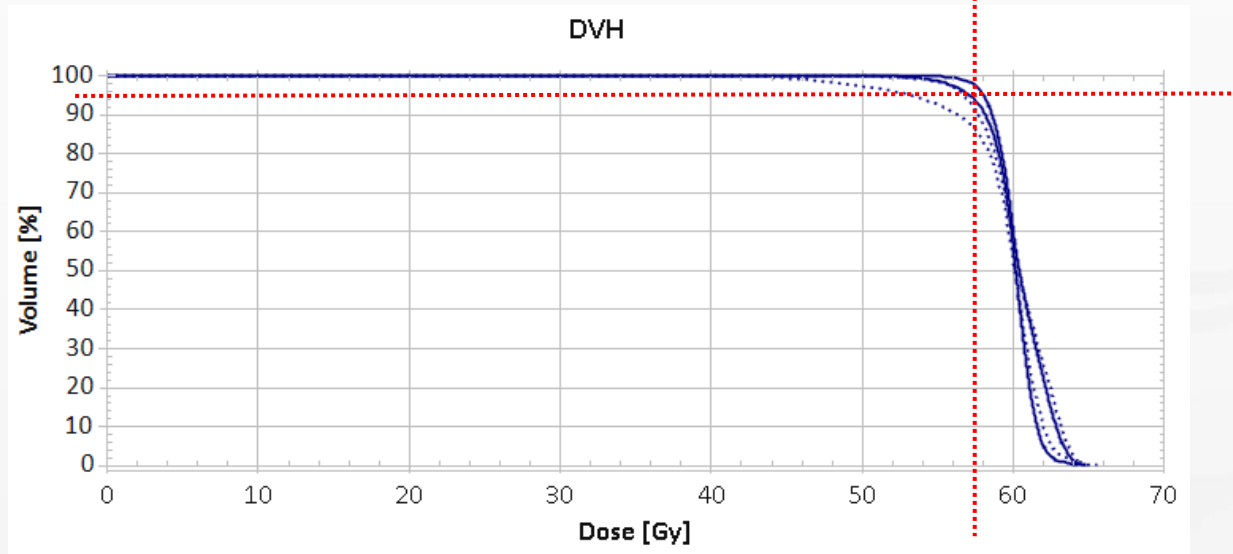
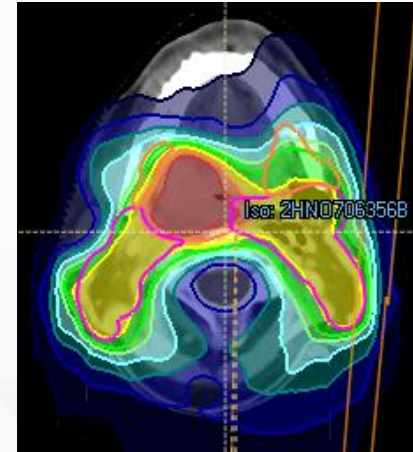


Plan optimisation










Function	Constraint	Dose	ROI	Description	Robust	Weight	Value	EUD [Gy]
Physical composite objective							0.2057	
Max dose		Beam set	TMjoint_L	Max dose 45.43 Gy		40.00	0.0000	
Max dose		Beam set	TMjoint_R	Max dose 45.43 Gy		40.00	0.0013	
Max dose		Beam set	SpinalCord	Max dose 28.00 Gy		40.00	0.0029	
Max dose		Beam set	SpinalCordPRV	Max dose 32.00 Gy		80.00	0.0061	
Max dose		Beam set	BrainstemPRV	Max dose 31.00 Gy		80.00	2.3123E-4	
Max dose		Beam set	Brainstem	Max dose 26.00 Gy		40.00	5.2314E-5	
Dose fall-off		Beam set	Parotid_L	Dose fall-off [H]54.00 Gy [L]10.00 Gy, Low dose distance 2.10 cm		20.00	0.0132	
Max dose		Beam set	Cochlea_L	Max dose 31.80 Gy		40.00	0.0000	
Max dose		Beam set	Cochlea_R	Max dose 31.80 Gy		40.00	7.9159E-7	
Max dose		Beam set	Cerebellum	Max dose 31.80 Gy		40.00	0.0000	
Dose fall-off		Beam set	Cerebellum	Dose fall-off [H]50.88 Gy [L]20.00 Gy, Low dose distance 1.50 cm		20.00	0.0017	
Max DVH		Beam set	Mandible	Max DVH 65.00 Gy to 1% volume		40.00	0.0000	
Dose fall-off		Beam set	PharynxConst	Dose fall-off [H]54.00 Gy [L]47.00 Gy, Low dose distance 0.90 cm		20.00	0.0022	
Dose fall-off		Beam set	Larynx	Dose fall-off [H]54.00 Gy [L]45.00 Gy, Low dose distance 0.90 cm		20.00	0.0069	
Dose fall-off		Beam set	Body	Dose fall-off [H]63.60 Gy [L]38.00 Gy, Low dose distance 1.00 cm		20.00	0.0169	
Dose fall-off		Beam set	Body	Dose fall-off [H]63.60 Gy [L]30.00 Gy, Low dose distance 3.50 cm		20.00	0.0071	
Dose fall-off		Beam set	Esophagus	Dose fall-off [H]50.88 Gy [L]38.00 Gy, Low dose distance 1.50 cm		20.00	0.0011	
Dose fall-off		Beam set	Eye_L	Dose fall-off [H]50.88 Gy [L]5.00 Gy, Low dose distance 1.50 cm		20.00	0.0024	
Dose fall-off		Beam set	Eye_R	Dose fall-off [H]50.88 Gy [L]7.00 Gy, Low dose distance 1.50 cm		20.00	5.1247E-4	
Max dose		Beam set	Lens_L	Max dose 5.45 Gy		40.00	0.0000	
Target EUD		Beam set	PTV_LK_li_6360+636SQB=6996	Target EUD 63.60 Gy, Parameter A 1		50.00	0.0024	62.62
Max dose		Beam set	PTV_LK_li_6360+636SQB=6996	Max dose 64.00 Gy		200.00	2.3046E-4	
Min dose		Beam set	PTV_LK_li_6360+636SQB=6996	Min dose 58.51 Gy		200.00	1.0736E-4	
Min DVH		Beam set	PTV_LK_li_6360+636SQB=6996	Min DVH 62.00 Gy to 99% volume		200.00	0.0035	
Target EUD		Beam set	PTV_LK_re_RP_6360+636SQB=6996	Target EUD 63.60 Gy, Parameter A 1		50.00	2.2668E-4	63.30
Max dose		Beam set	PTV_LK_re_RP_6360+636SQB=6996	Max dose 64.00 Gy		200.00	1.5549E-4	
Min dose		Beam set	PTV_LK_re_RP_6360+636SQB=6996	Min dose 58.51 Gy		200.00	1.0968E-7	
Min DVH		Beam set	PTV_LK_re_RP_6360+636SQB=6996	Min DVH 62.00 Gy to 99% volume		200.00	7.0451E-4	
Target EUD		Beam set	PTV_Hals_re_6000	Target EUD 60.00 Gy, Parameter A 1		50.00	3.9759E-7	59.99

Plan evaluation



D_{xx} – Dose to x % volume
 D_{xxcc} – Dose to x cc volume
 V_{xx} – Volume of xx % of prescribed dose
 V_{xxGy} – Volume of xx Gy

1	Beam set dose: 1HNO...	 PTV_Hals_li_6000	At least 95.00 % volume at 57.00 Gy dose	98.41 %		
1	Evaluation dose: HNO,...	 PTV_Hals_li_6000	At least 95.00 % volume at 57.00 Gy dose	94.08 %		
1	Beam set dose: 1HNO...	 PTV_Hals_re_6000	At least 95.00 % volume at 57.00 Gy dose	95.38 %		
1	Evaluation dose: HNO,...	 PTV_Hals_re_6000	At least 95.00 % volume at 57.00 Gy dose	87.99 %	