

Developing a new IMRT technique for treatment of gastric cancer

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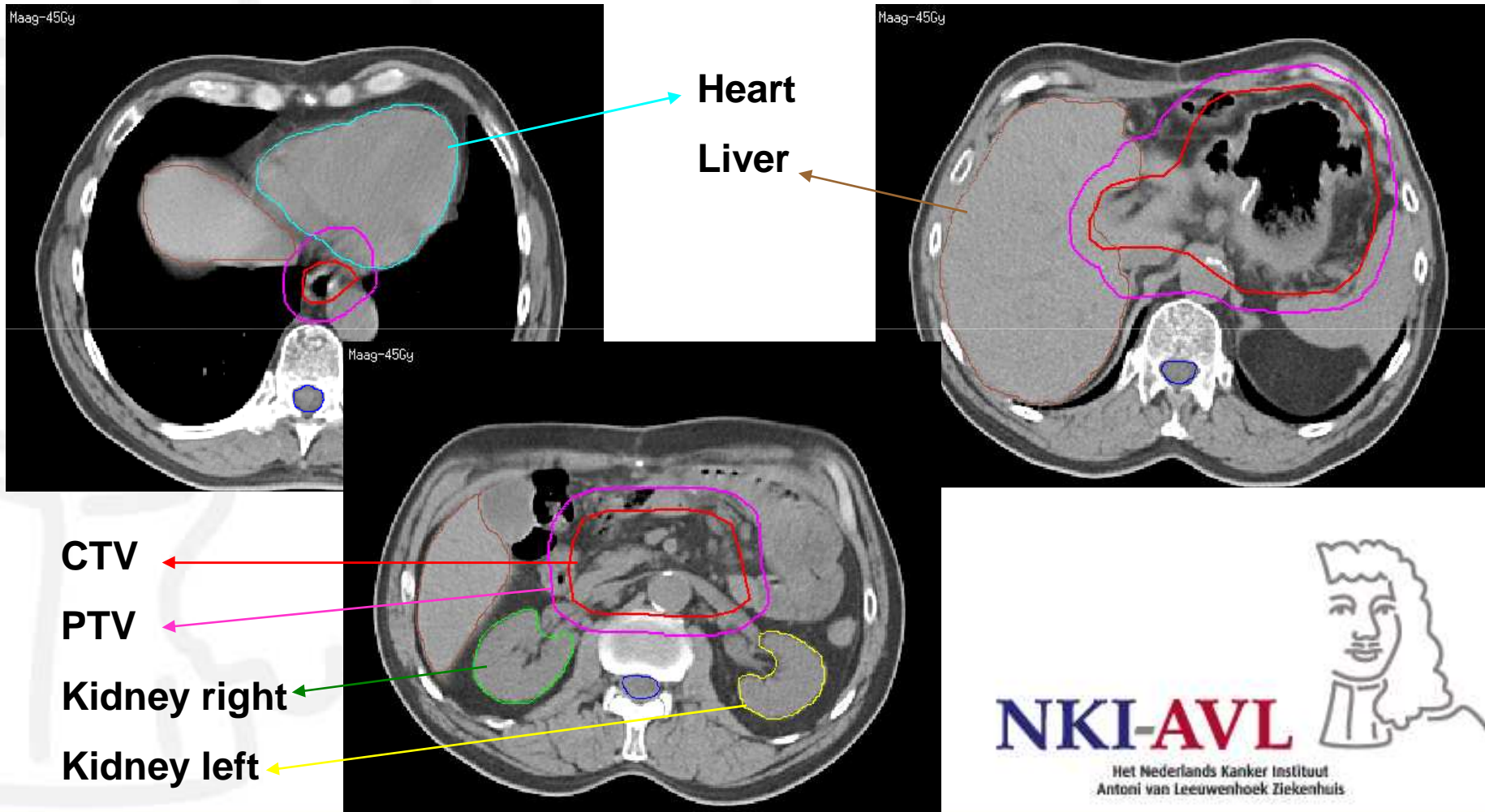
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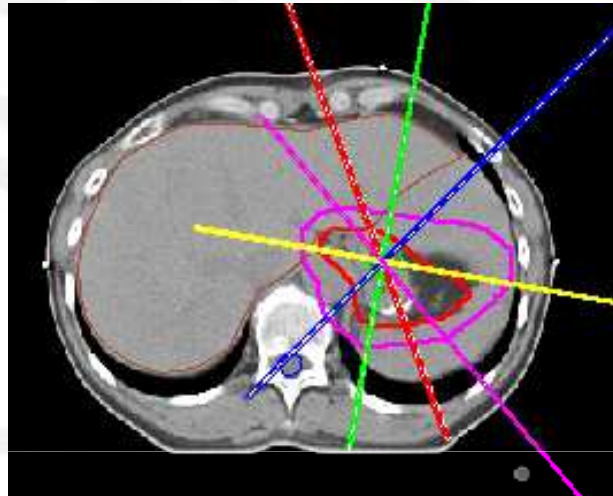
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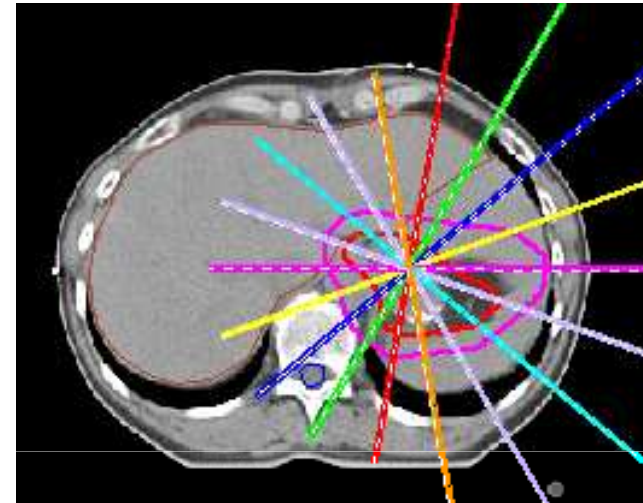
CTV and OARs



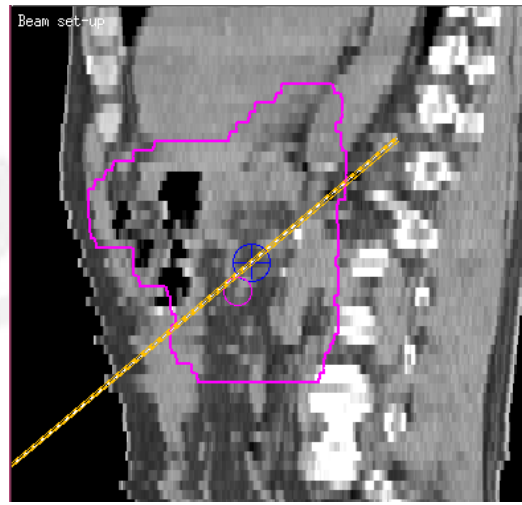
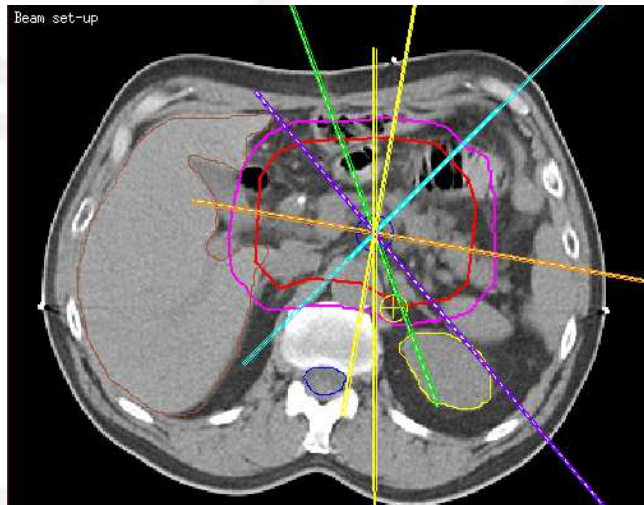
Step 1: Beam directions



5-field

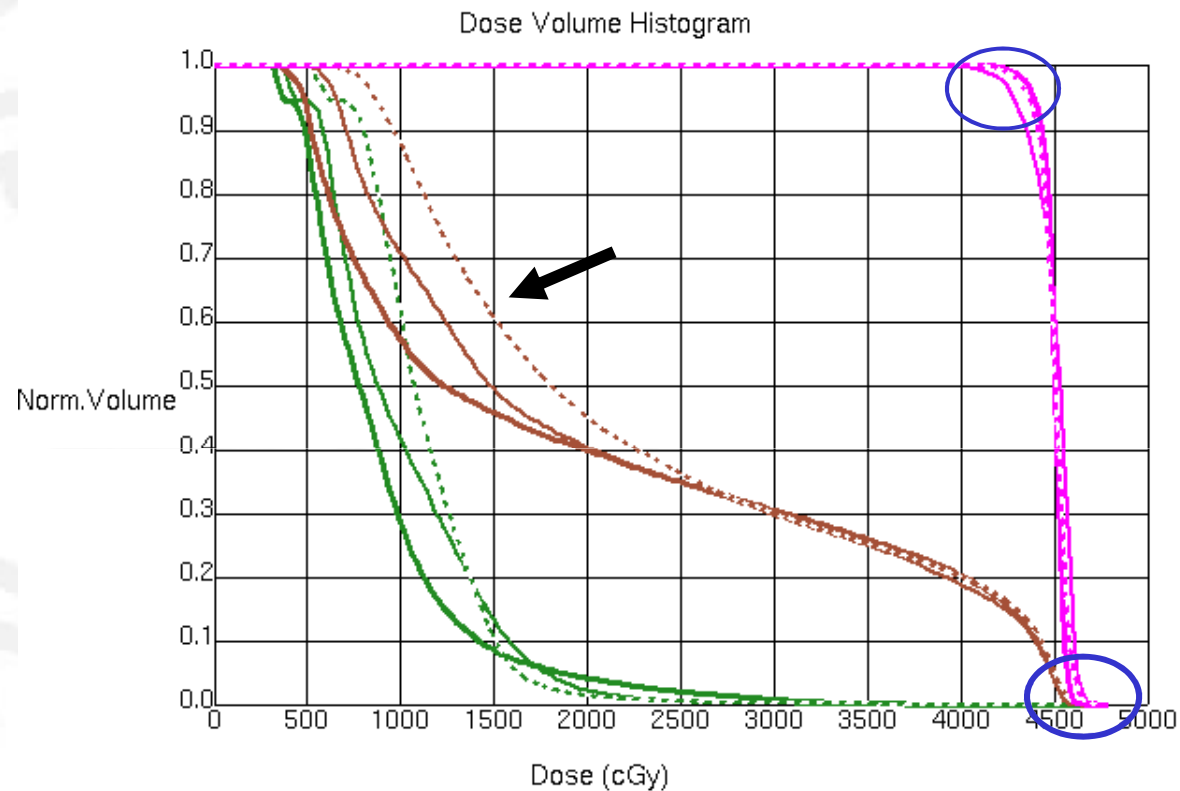


9-field



7-field

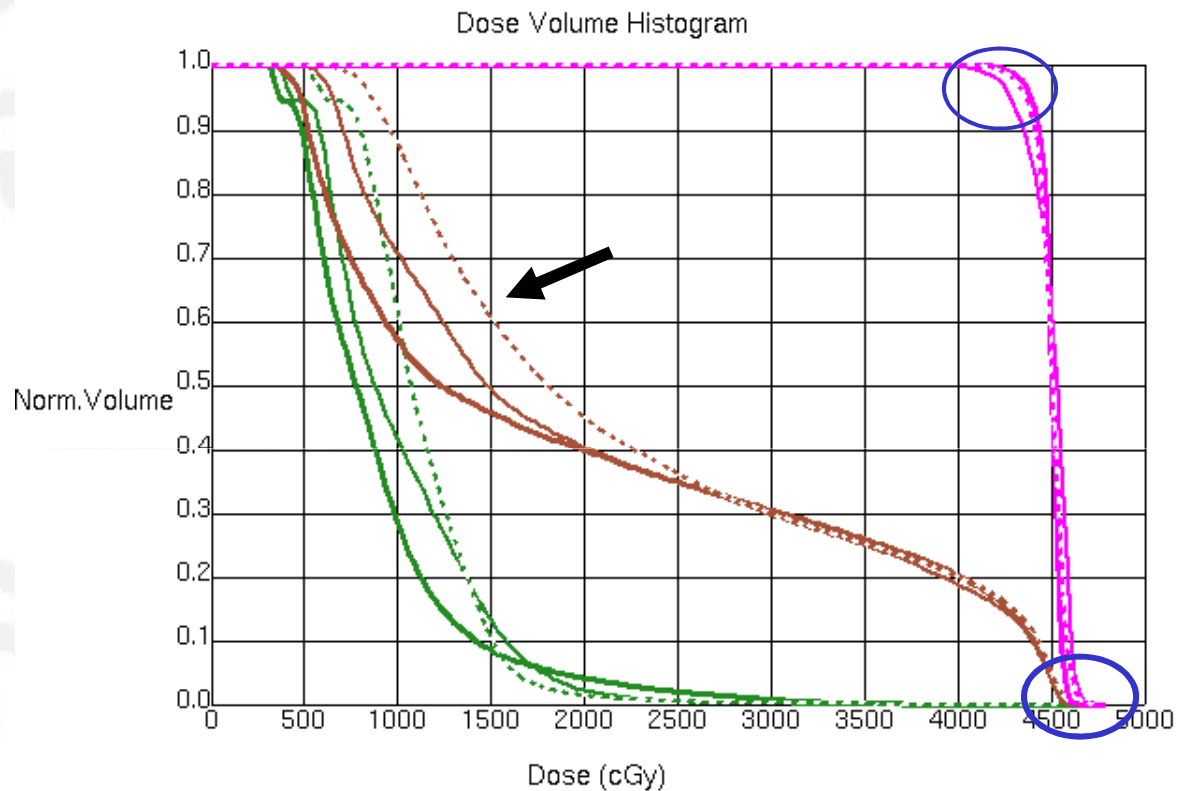
Dose-volume histograms



Line Type	ROI	Min.	Max.	Mean
—	Kidney_R	362.2	3129.5	885.7
—	Kidney_R	309.7	3712.1	792.2
...	Kidney_R	489.2	3539.6	998.0
—	Liver	348.4	4678.9	2112.1
—	Liver	254.0	4640.0	1993.0
...	Liver	566.8	4695.0	2301.0
—	PTV	3570.4	4743.4	4501.9
—	PTV	3857.3	4666.9	4497.0
...	PTV	3900.8	4725.9	4498.6

— = 5-f
 — = 7-f
 - - - = 9-f

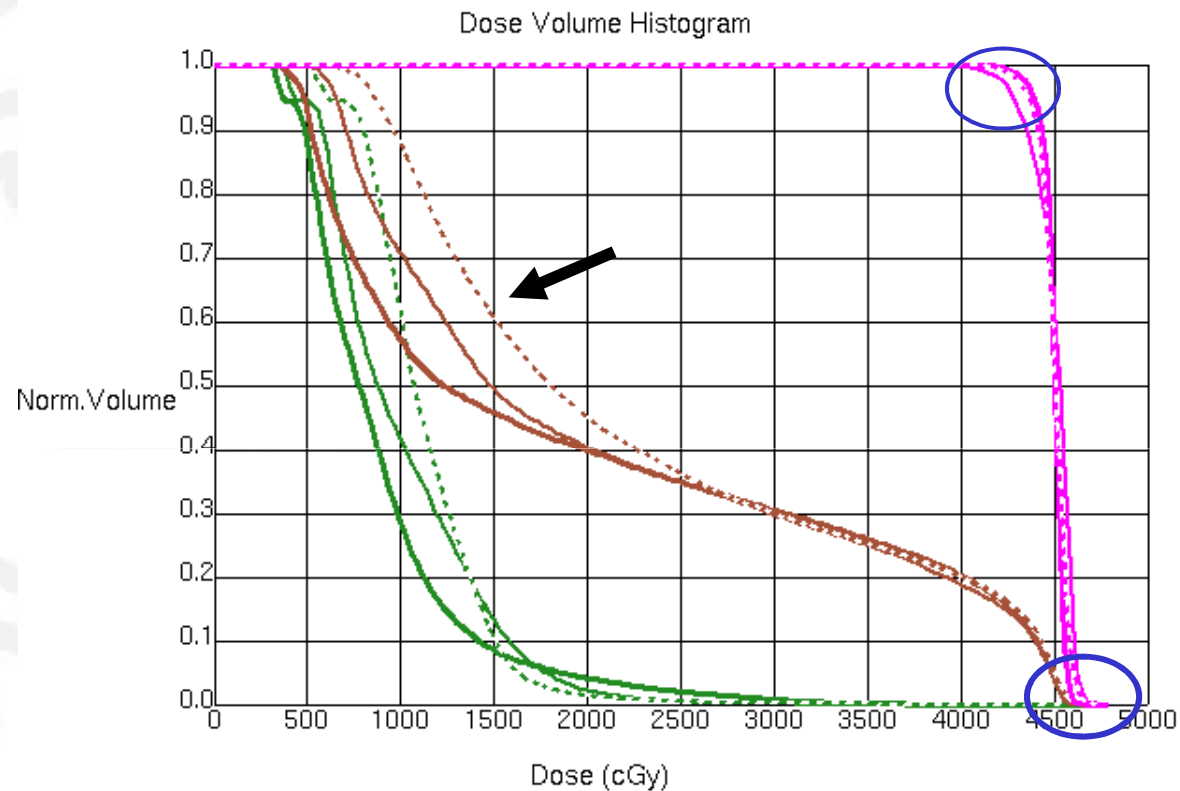
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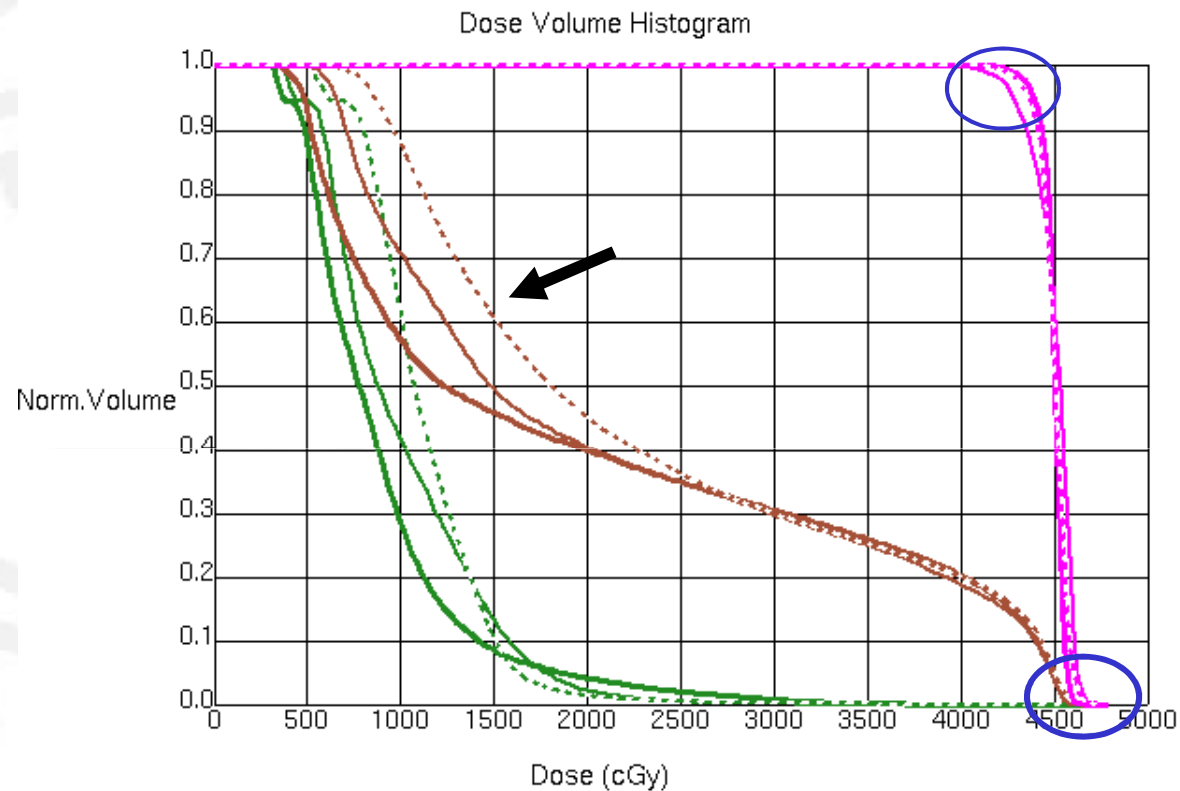
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Result: 7-f best option

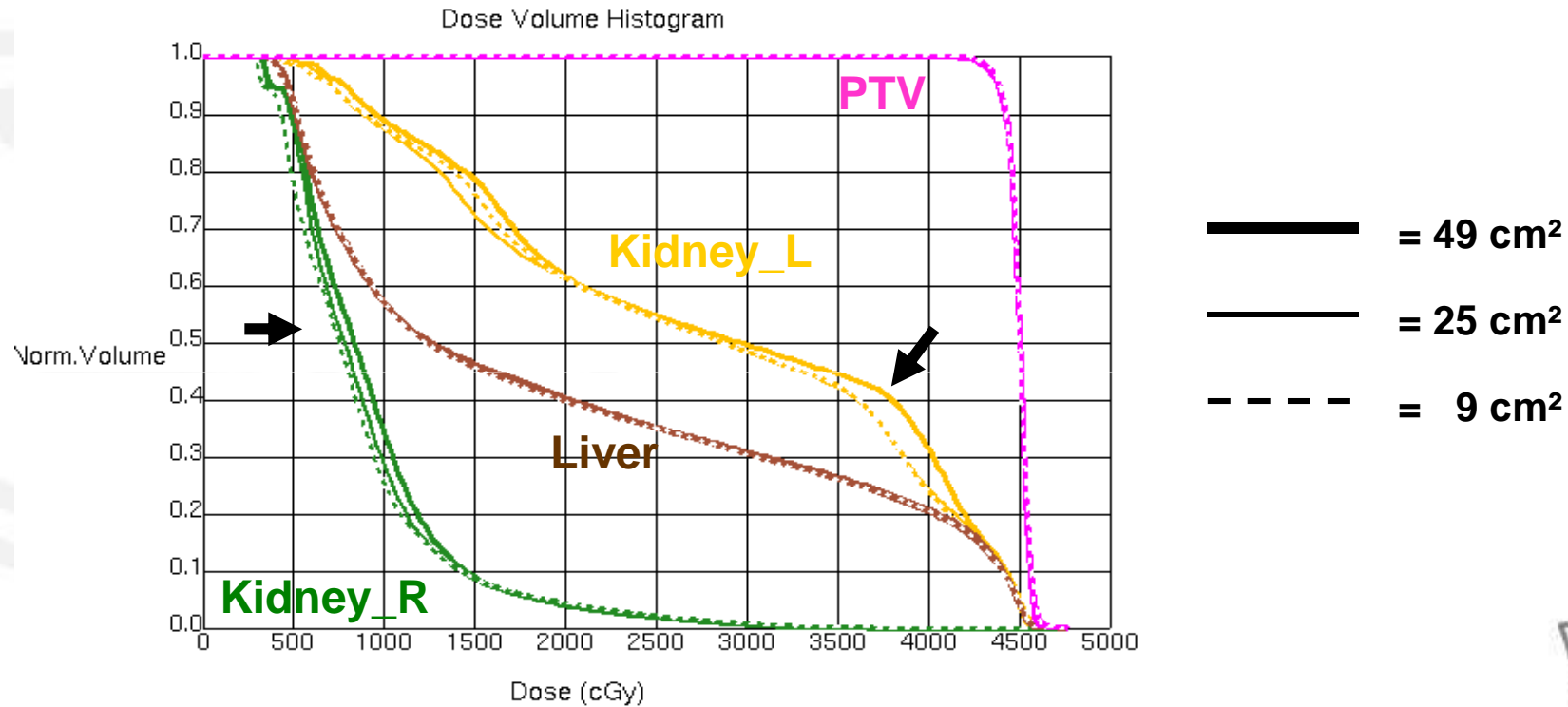
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Step 2: IMRT parameters

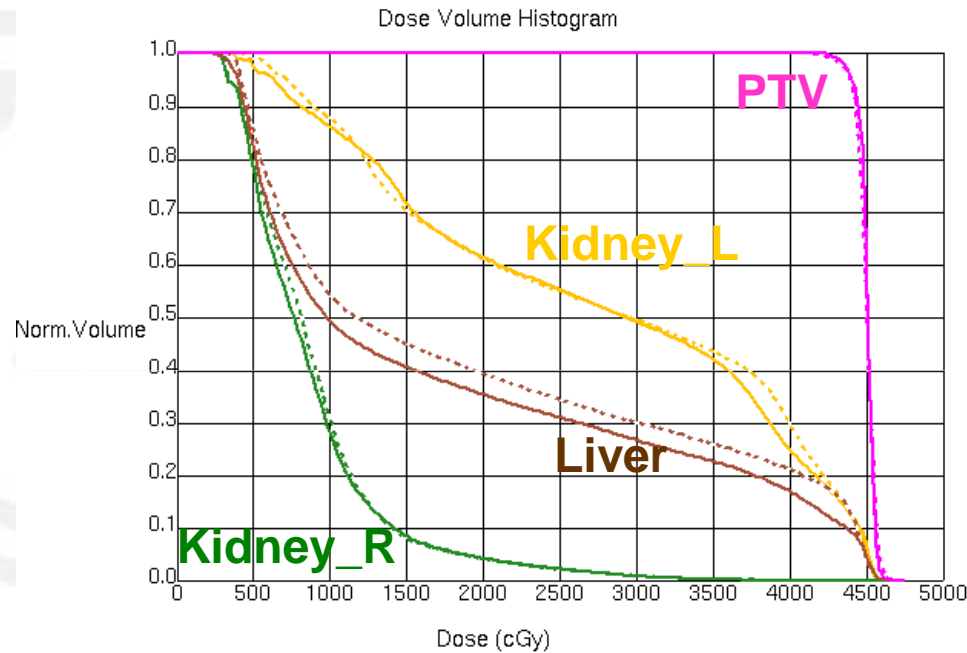
Minimum equivalent square: 9 cm², 25 cm², 49 cm²



Result: small difference between 9 and 25 cm²; 25 cm² preferable choice

Step 2: IMRT parameters

Maximum # of segments: 25 vs 50 segments



Line Type	ROI	Min.	Max.	Mean
◇ - - - - -	Kidney_L	422.4	4584.8	2746.9
◇ - - - - -	Kidney_L	344.4	4623.8	2713.3
◇ - - - - -	Liver	259.3	4651.8	1960.3
◇ - - - - -	Liver	167.4	4640.0	1794.6
◇ - - - - -	PTV	3773.6	4676.8	4496.3
◇ - - - - -	PTV	3956.0	4677.1	4502.1

— = 50 segments

- - - = 25 segments

Result: 50 segments best option

Step 3: Objectives

Structure	Objectivetype	Dose	%	weight
PTV	Uniform dose	4500		100
<i>EXT-PTV7*</i>	<i>Max dose</i>	3600		10
Liver***	Max EUD	2500		50
Liver	Max DVH	3000	40	20
Kidney_R	Max DVH	1500	8-12	50
Kidney_L	Max DVH	2000	60	20
Ring7	Max Dose	4300		70
<i>PTV*</i>	<i>Min Dose</i>	4300		100
Spinal_cord+15	Max dose	4000		30
Heart	Max DVH	4300	10	20
Heart	Max DVH	3300	10	20

**PTV and EXT-PTV7 are optional*

****Liver in most cases below 20 Gy*

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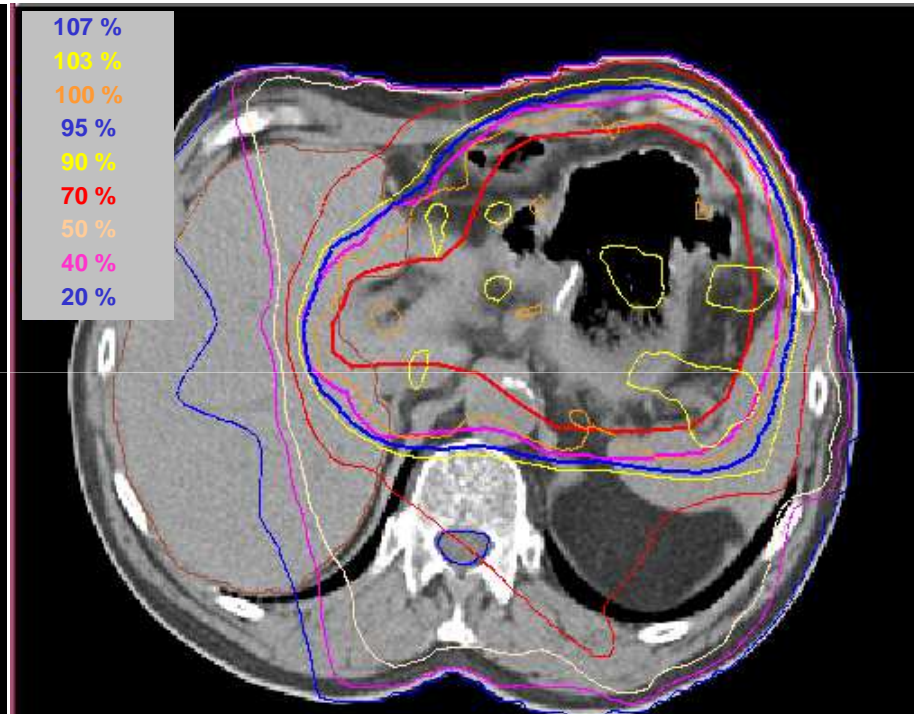
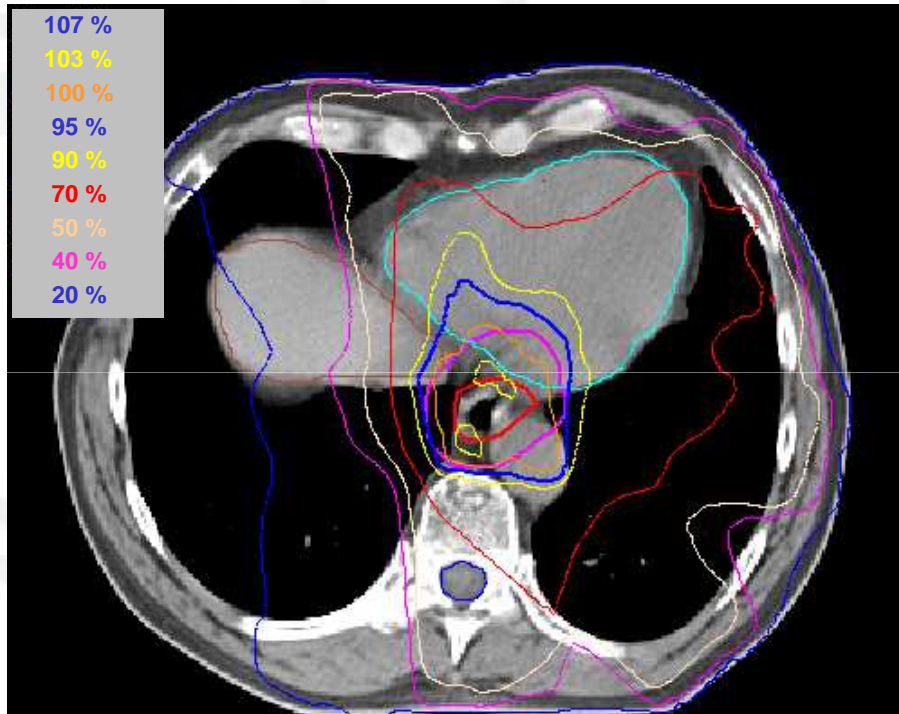
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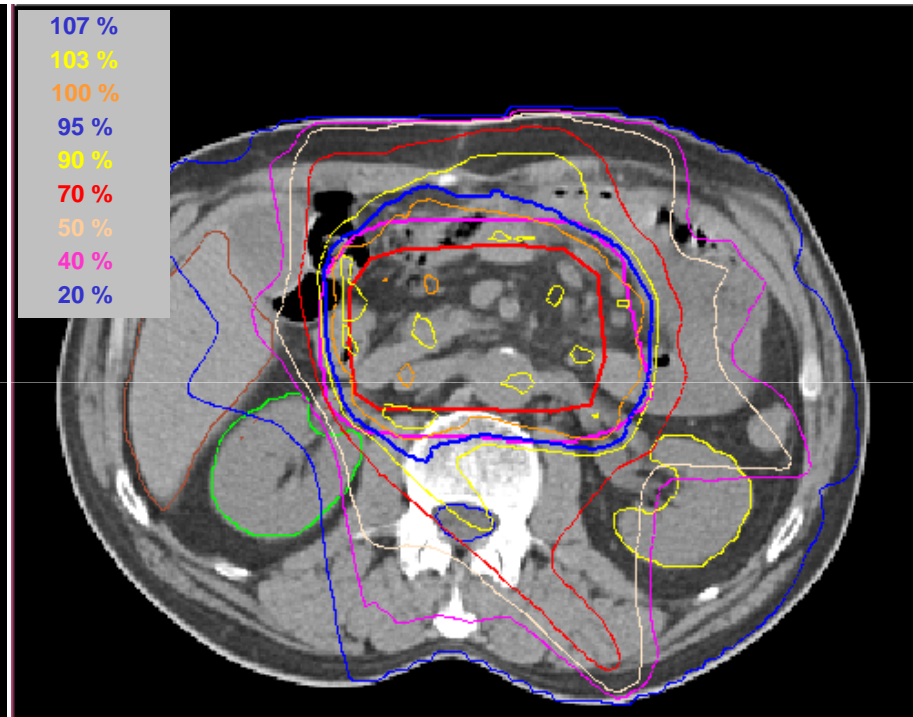
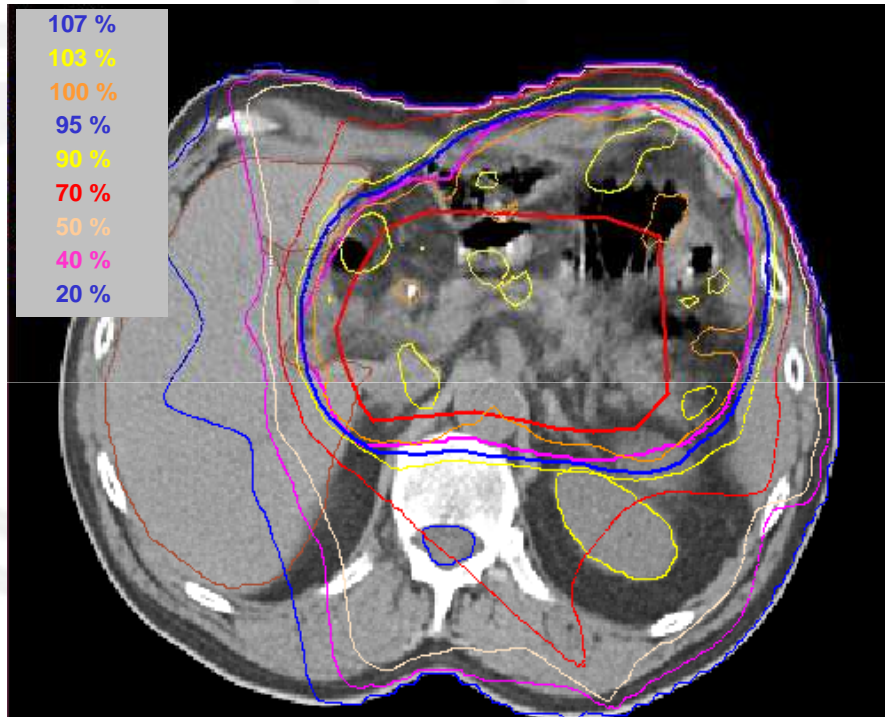
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Isodose distribution of a gastric cancer case



Isodose distribution of a gastric cancer case



Average results for 5 patients

	PTV	Liver	Kidney_R	Kidney_L
% volume ≥ 95 % dose	98.6 %			
Dmax (%)	108 %			
Dmean (Gy)		19.2 Gy		
V20			7.8 %	67.0 %
V25			4.6 %	56.4 %
V30			2.4 %	46.9 %
V40			0.5 %	20.2 %

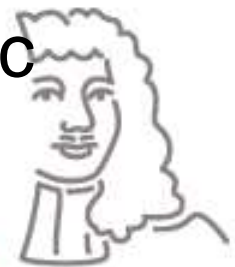


Conclusions

- A structured approach to develop new IMRT-techniques might be useful
- A new IMRT technique for gastric cancer was developed that leads to:
 - Acceptable dose distributions in OARs
 - Adequate coverage of the planning target volume
- The technique is now in use for all gastric cancer patients at the NKI-AVL.

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Thank you for your attention.

