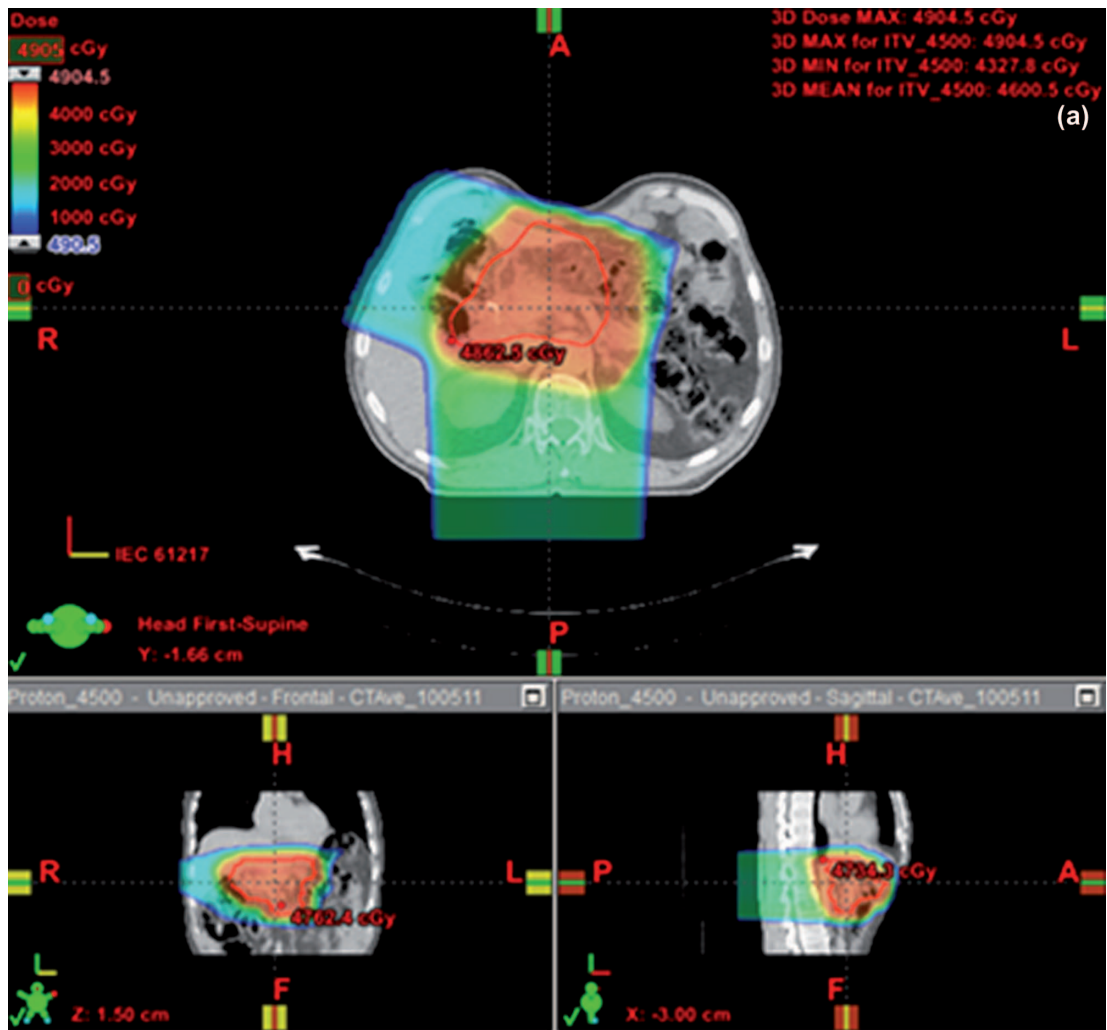
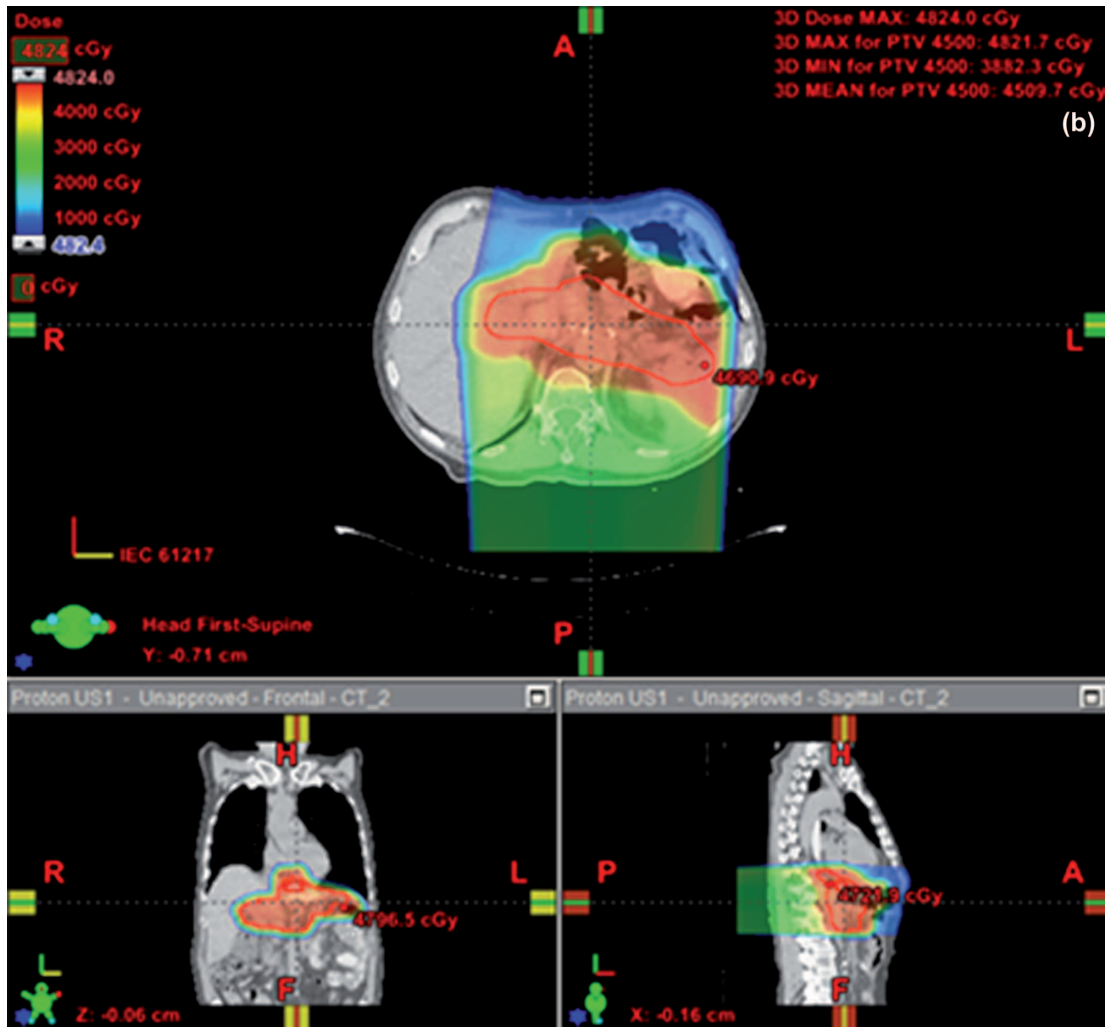


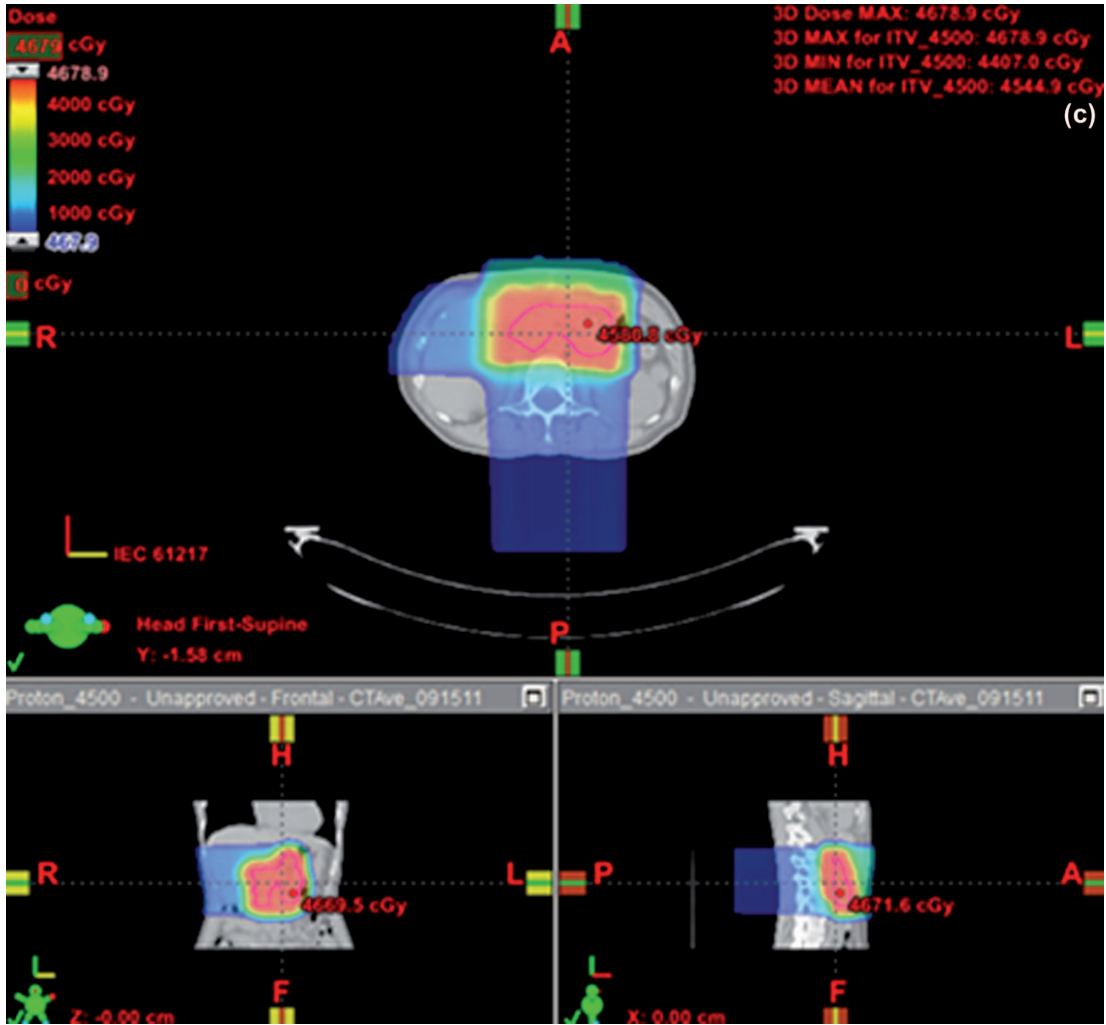
Supplementary material for Dionisi F. et al. Proton therapy in adjuvant treatment of gastric cancer: Planning comparison with advanced x-ray therapy and feasibility report. Acta Oncol. 2014;53:1312–20.



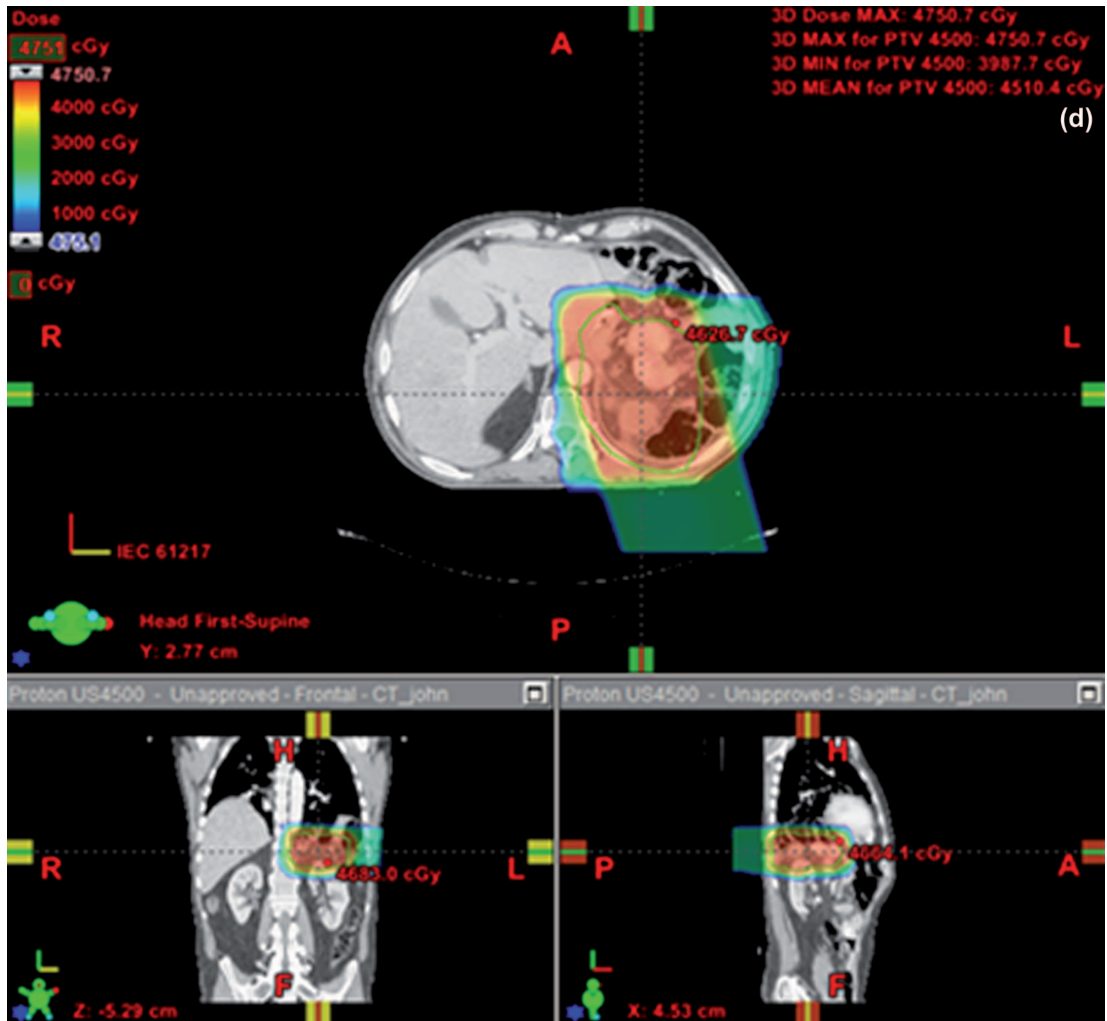
Supplementary Figure 1. Proton beam arrangements: a) posterior-anterior + right lateral-oblique, b) posterior-anterior + anterior-oblique, c) posterior-anterior + anterior-posterior + right lateral, d) posterior-anterior + left lateral.



Supplementary Figure 1. (Continued)



Supplementary Figure 1. (Continued)



Supplementary Figure 1. (Continued)

Supplementary Table I. Patient characteristics.

Patient no.	Localization of primary tumor	Extent of surgery	TNM stage	PTV (IV/CD, ml)	Prescription dose	Technique*
1	Antrum	Partial gastrectomy + d2	PT3N2 IIIA	680	45 Gy	PT (US) 2 fields
2	Antrum	Partial gastrectomy + d1	PT2NO IB	198	45 Gy	PT (DS) 3 fields
3	Cardia	Total gastrectomy + d2	PT1BN1 IB	850	45 Gy	PT (DS) 2 fields
4	Mid stomach	Partial gastrectomy + d2	PT2N1 IIA	823	45 Gy	PT (DS) 2 fields
5	Proximal	Total gastrectomy + d2	PT4BN1 IIIB	623/241	45 Gy + boost 9 Gy	3DCXT 4 + 3 fields (IV + CD)
6	Antrum	Hemi-gastrectomy + d2	PT1BN2 IIA	933/159	45 Gy + boost 9 Gy	3DCXT 3 + 4 fields (IV + CD)
7	Body	Subtotal gastrectomy + d1	PT3N3A IIIB	474	45 Gy	3DCXT 4 fields
8	Antrum	Distal gastrectomy + d2	PT3N2 IIIA	562	45 Gy	3DCXT 4 fields
9	Antrum	Completion gastrectomy + d1	PT3N2 IIIA	865	45 Gy	3DCXT 4 fields
10	Antrum	Partial gastrectomy + d2	PT2N2 IIB	963	45 Gy	3DCXT 4 fields
11	Antrum	Partial gastrectomy + d2	PT3N1 IIB	754	45 Gy	3DCXT 4 fields
12	Diffuse	Total gastrectomy + d1	PT3PN1 IIB	607/37	45 Gy + boost 9 Gy	3DCXT 4 + 4 fields (IV + CD)
13	Body	Distal gastrectomy + d2	PT2PN0 IB	752	45 Gy	IMXT 5 fields

CD, cone down; DS, double scattering; IMXT, intensity modulated x-ray therapy; IV, initial volume; PT, proton therapy; 3DCXT, three dimensional conformal x-ray radiotherapy; US, uniform scanning.

*Referring to the actual treatment received.

Supplementary Table II. Dose constraints for critical structures.

Structure	Dose (GyRBE)	Volume
Small bowel	59.4	Point dose
	45	15%
	25	50%
	40	30%
Large bowel	50	5%
	40	35%
	35	50%
Stomach	59.4	Point dose
	45	100%
Liver	28	50%
Lung	20	25%
Heart	40	50%
Kidney (2 present)	18	50%
	24	Point dose
Single remaining kidney	18	15%
	14	30%
	45	Point dose
Spinal cord	45	Point dose

Supplementary Table III. OAR parameters evaluated for PT/IMXT comparison.

OAR	Parameter
Small bowel	D1, D50, V15, V25, D150 ml
Large bowel	D1, D5, D35, D50
Liver	mean dose, D50, V30
Kidneys (left, right and sum)	mean dose, D50, V20, D1
Heart	mean dose
Spinal cord	D1
Lungs (combined)	mean dose, V5, V20

Dx refers to the dose delivered to the % volume of target, except D150 ml, which is the dose delivered to an absolute volume. Vx refers to the % volume of target receiving greater than or equal to x dose.

Supplementary Table IV. Comparison of plan quality and OAR sparing between the plans prescribed to a dose of 54 Gy (n = 3).

Parameter	IMXT	PT
HI	0.05	0.06
Small bowel D1	51.7	52.1
Small bowel V15	152.2	106.9
Large bowel D1	47.6	49
Large bowel D50	23.3	14.7
Liver mean dose	16.7	10.2
LK mean dose	12.5	11.3
LK V20	22.3	26.5
LK D1	46.3	49.3
RK mean dose	6.4	3.7
RK V20	7.9	11.9
RK D1	21.4	17.6
Heart mean dose	13.3	6.7
Spinal cord D1	31.5	29.3
ID	149.3	87.5

Numbers are given as mean values. HI, homogeneity index; ID, integral dose. See text for other abbreviations.

Supplementary Table V. Small bowel median dose values.

Parameter	IMXT	PT	p
D1	45.3 (44.1–46.4)	46 (44.9–47.4)	0.003
D50	19.2 (3.8–29)	5 (0–39.2)	0.01
V15 (ml)	133 (42.3–312)	82 (11.6–172)	0.002
V25 (ml)	67.9 (11.9–221)	57.1 (11–151)	0.007
D150 ml	12.3 (0–29.6)	0 (0–25.8)	0.003

Numbers are given as median values (range). See text for abbreviations.

Supplementary Table VI. Median dose values for left and right kidneys.

Parameter	IMXT (range)	PT (range)	p
LK D50	3.8 (1.9–14.6)	0 (0–13.6)	0.001
LK mean dose	7.8 (4.3–16.8)	5 (0.5–16.2)	0.001
LK V20	8.4 (0–35.8)	13.4 (0.6–43.4)	NS
LK D1	33.4 (16.4–46)	44.3 (14.8–46.2)	0.02
RK D50	1.7 (0.7–11.2)	0 (0–0)	0.001
RK mean dose	3.1 (1–11.7)	0.9 (0–8.5)	0.001
RK V20	0 (0–19.9)	0 (0–31)	NS
RK D1	14.5 (4.7–34.2)	15.3 (0–37.3)	NS

Numbers are given as median values (range). LK, left kidney; NS, not significant; RK, right kidney. See text for other abbreviations.

Supplementary Table VII. Robustness analysis of plans delivered with PT.

Patient no.	D98% ITV		
	Initial CT	Verification CT 1	Verification CT 2
1	100.3	100.2	99.6
2	99	98.8	99
3	99	97	NA
4	96.3	96.5	95.5

D98% ITV refers to the percentage of prescription dose received by the 98% of ITV. NA, not available.