

Supplementary Material

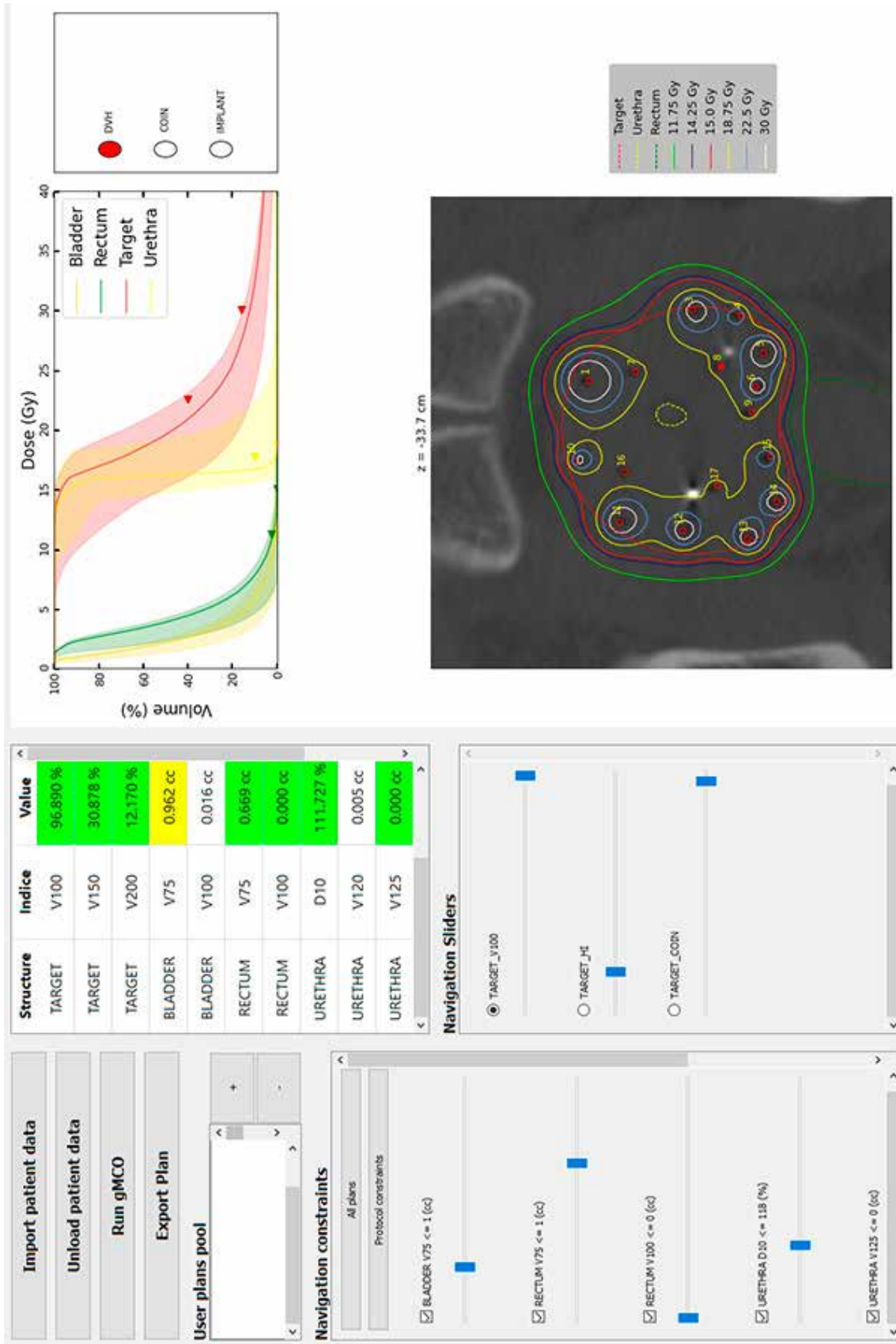


Fig. 51. gMCO graphical user interface (gMCO-GUI) for one CT cases. Dose-volume histogram (table and curves), navigation constraints, and navigation sliders can be edited via configuration file to any dosimetric protocol or prescription dose

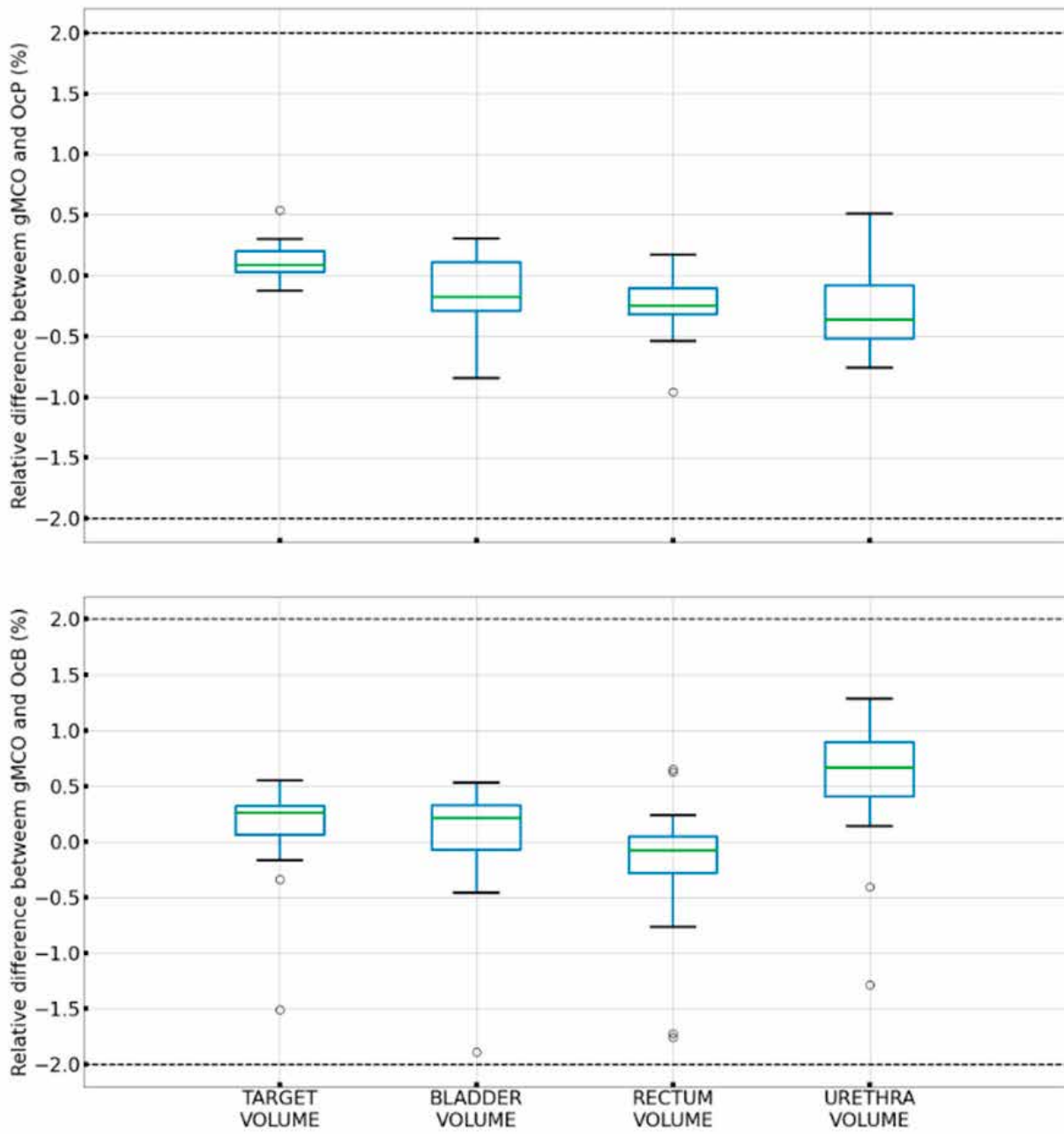


Fig. S2. Relative difference between gMCO and (top) OcP and (bottom) OcB calculated structures' volumes (cc)

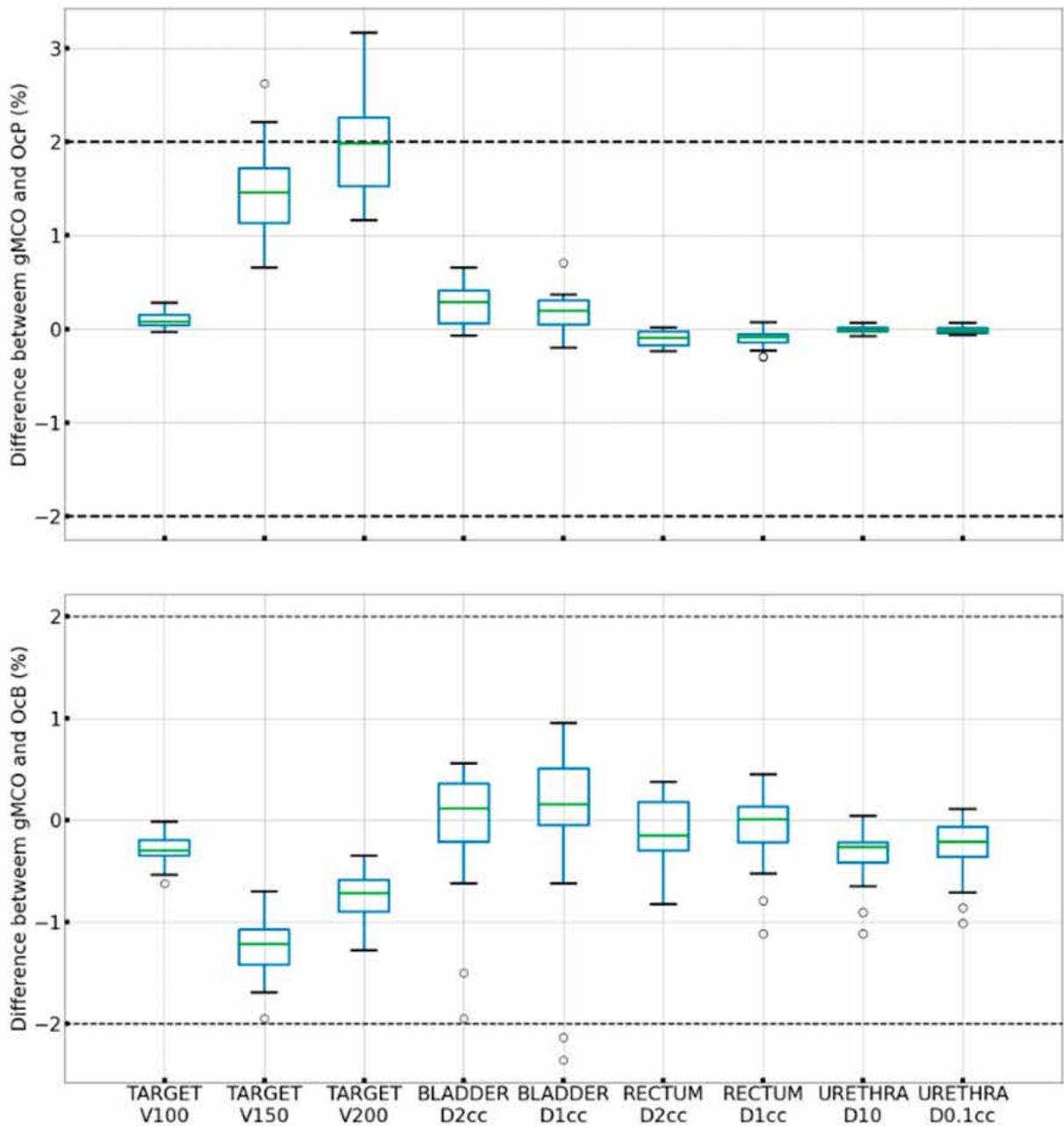


Fig. S3. Difference between gMCO and (top) OCP and (bottom) OCB calculated dosimetric indices. Values of volume dosimetric indices (V) were calculated in fraction (%) of structure volume. Values of dose dosimetric indices (D) were calculated in fraction (%) of prescribed dose. Mimic parameters were turned OFF with gMCO

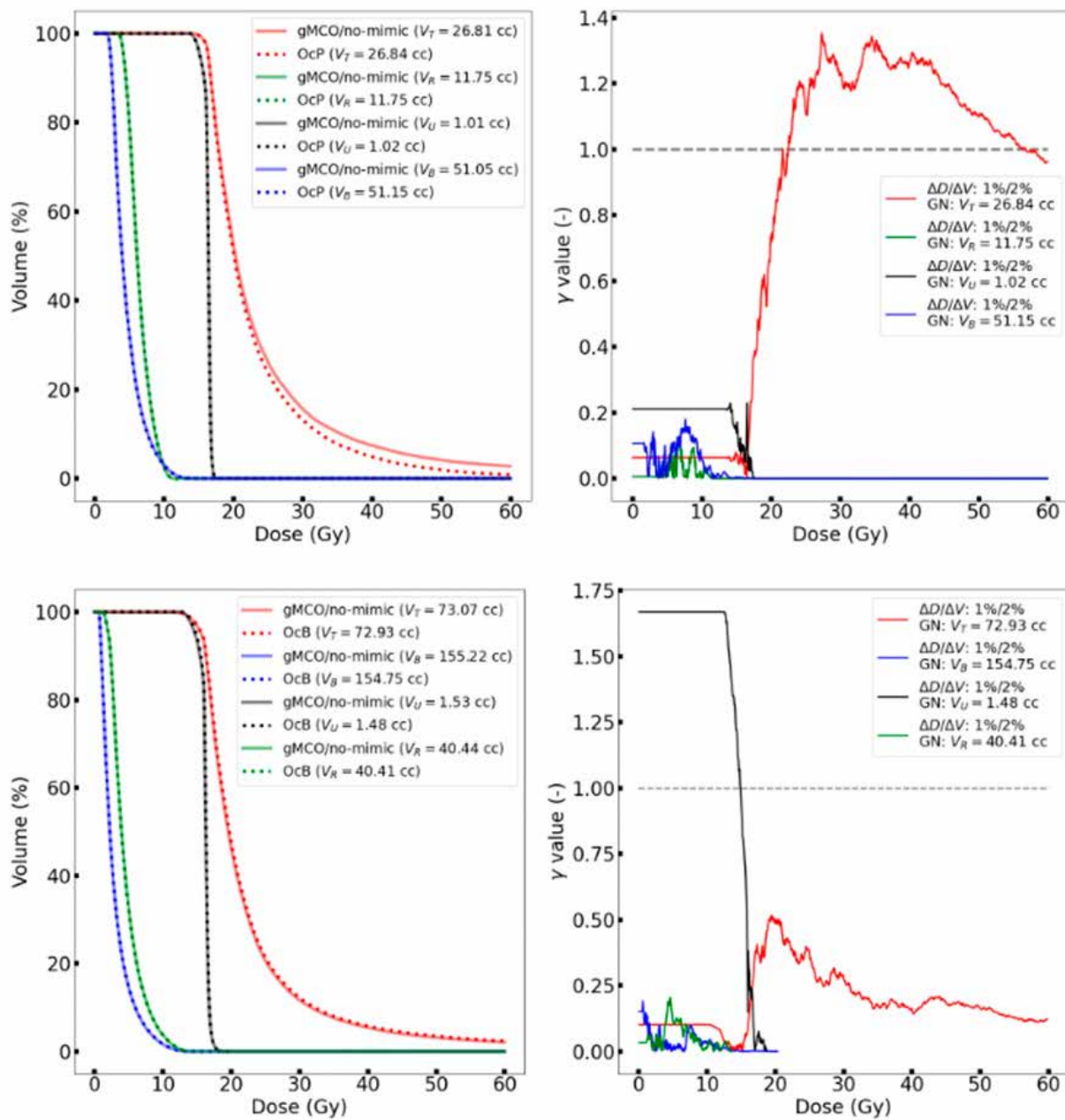


Fig. S4. Comparison of DVH curves (left panels) calculated with gMCO compared with OcP (top) and OcB (bottom) DVH curves for one random case. Right panels illustrate corresponding γ values with 2%/1% thresholds when comparing DVH curves (volumes in cc). Global normalization (GN) for γ test was set to structures' volume calculated by OcP/OcB. Mimic parameters were turned OFF in gMCO. T - target, U - urethra, B - bladder, R - rectum

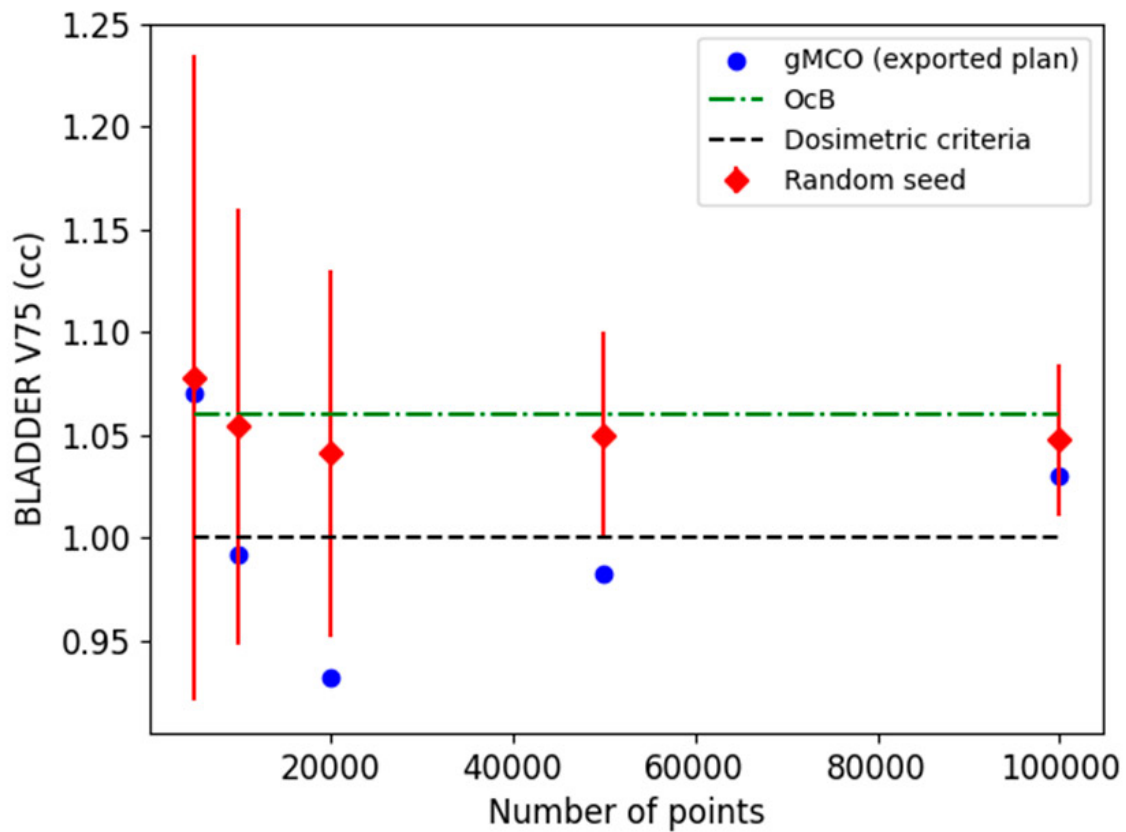


Fig. S5. Effect of the number of dose points (5,000, 10,000, 20,000, 50,000, and 100,000) on the bladder V_{75} for one example case. Seed used in random sequence to randomly sample dose points was changed 20 times for each number with gMCO. Red error bars (random seed label) show standard deviation (1σ) and marker shows mean value. Blue circle marker displays value calculated by gMCO for exported plan (seed fixed). Green dashed dotted line shows value calculated by OcB (with 200,000 points) using plan created with gMCO using 50,000 points. Black dashed line represents dosimetric criteria (bladder $V_{75} < 1$ cc).

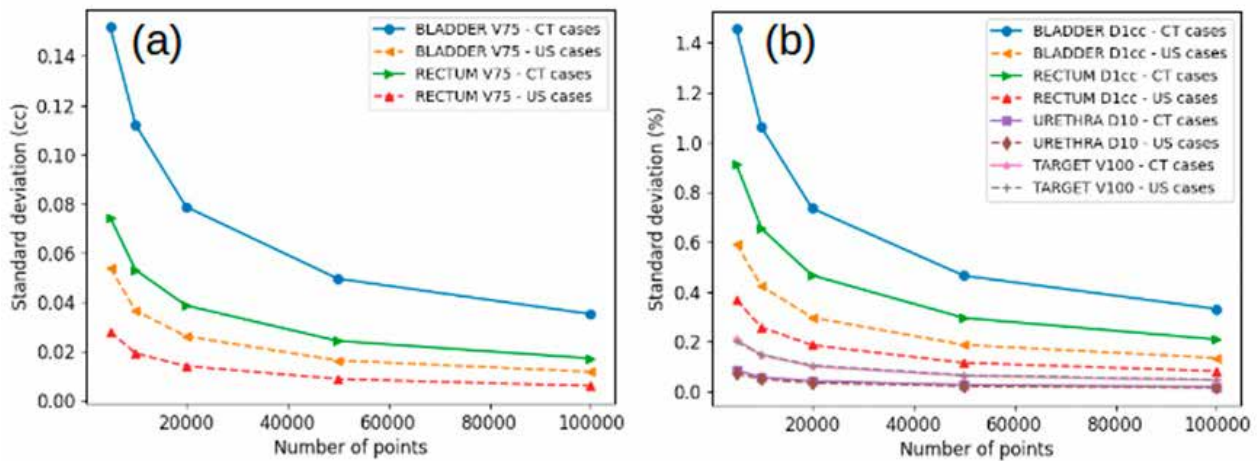


Fig. S6. Effect of the number of dose calculation points on calculated DVH indices. Standard deviation was obtained from 100 trials for each number of points and averaged over 20 (CT and US) cases. Panel (a) shows standard deviation for the bladder and rectum V_{75} (expressed in cc), and panel (b) shows standard deviation for the bladder D_{1cc} , rectum D_{1cc} , urethra D_{10} (expressed in % of prescribed dose), and target V_{100} (expressed in % of total volume)

Table S1. Dose-rate per unit air-kerma strength (cGy/hU) calculated by gMCO around flexisource

z/y (cm)	0	0.25	0.5	0.75	1	1.5	2	3	4	5	6	7
7	0.01640	0.01670	0.01700	0.01729	0.01757	0.01787	0.01785	0.01705	0.01559	0.01386	0.01205	0.01042
6	0.02206	0.02258	0.02308	0.02361	0.02409	0.02442	0.02423	0.02249	0.01994	0.01713	0.01452	0.01226
5	0.03126	0.03221	0.03320	0.03421	0.03486	0.03516	0.03435	0.03051	0.02581	0.02129	0.01750	0.01432
4	0.04745	0.04958	0.05179	0.05365	0.05450	0.05410	0.05114	0.04259	0.03380	0.02649	0.02080	0.01655
3	0.08150	0.08703	0.09274	0.09572	0.09613	0.09075	0.08118	0.06057	0.04409	0.03243	0.02438	0.01875
2	0.17802	0.19736	0.21228	0.21305	0.20310	0.17025	0.13621	0.08543	0.05586	0.03846	0.02767	0.02067
1.5	0.31546	0.35895	0.37944	0.36014	0.32299	0.24150	0.17666	0.09951	0.06151	0.04107	0.02904	0.02146
1	0.71559	0.84810	0.81270	0.68028	0.54228	0.34028	0.22325	0.11252	0.06622	0.04317	0.03012	0.02204
0.5	3.34162	3.44816	2.19604	1.35502	0.88607	0.44716	0.26429	0.12201	0.06938	0.04450	0.03075	0.02237
0	–	15.55300	4.31289	1.95964	1.11300	0.49842	0.28148	0.12540	0.07043	0.04491	0.03094	0.02247
–0.5	2.30950	3.45413	2.19794	1.35768	0.88562	0.44662	0.26418	0.12205	0.06958	0.04458	0.03077	0.02236
–1	0.54858	0.85025	0.81555	0.68203	0.54318	0.34036	0.22297	0.11226	0.06628	0.04322	0.03010	0.02200
–1.5	0.25049	0.35728	0.38008	0.36101	0.32369	0.24175	0.17675	0.09939	0.06137	0.04110	0.02908	0.02144
–2	0.14617	0.19464	0.21265	0.21346	0.20349	0.17049	0.13635	0.08545	0.05588	0.03843	0.02766	0.02069
–3	0.06991	0.08415	0.09222	0.09593	0.09622	0.09092	0.08130	0.06056	0.04407	0.03242	0.02434	0.01872
–4	0.04173	0.04726	0.05111	0.05353	0.05464	0.05415	0.05121	0.04266	0.03376	0.02648	0.02079	0.01652
–5	0.02811	0.03054	0.03255	0.03393	0.03482	0.03518	0.03437	0.03055	0.02587	0.02127	0.01750	0.01431
–6	0.02004	0.02129	0.02252	0.02336	0.02396	0.02443	0.02425	0.02252	0.01990	0.01718	0.01451	0.01226
–7	0.01504	0.01577	0.01650	0.01705	0.01744	0.01785	0.01786	0.01707	0.01560	0.01383	0.01208	0.01042

Table S2. Dose-rate per unit air-kerma strength (cGy/hU) around flexisource (consensus data)

z/y (cm)	0	0.25	0.5	0.75	1	1.5	2	3	4	5	6	7
7	0.01642	0.01672	0.01701	0.01730	0.01758	0.01788	0.01786	0.01705	0.01559	0.01380	0.01204	0.01042
6	0.02210	0.02260	0.02310	0.02360	0.02410	0.02440	0.02420	0.02250	0.02000	0.01713	0.01451	0.01226
5	0.03120	0.03220	0.03320	0.03420	0.03480	0.03510	0.03430	0.03050	0.02580	0.02130	0.01750	0.01432
4	0.04740	0.04960	0.05180	0.05370	0.05450	0.05410	0.05110	0.04260	0.03380	0.02650	0.02080	0.01654
3	0.08150	0.08700	0.09270	0.09570	0.09610	0.09070	0.08120	0.06050	0.04410	0.03240	0.02440	0.01875
2	0.17780	0.19700	0.21200	0.21300	0.20300	0.17020	0.13610	0.08540	0.05580	0.03840	0.02770	0.02070
1.5	0.31500	0.35900	0.37900	0.36000	0.32300	0.24100	0.17650	0.09950	0.06150	0.04100	0.02900	0.02150
1	0.71500	0.84800	0.81200	0.68000	0.54200	0.34000	0.22300	0.11250	0.06620	0.04310	0.03010	0.02210
0.5	3.34000	3.45000	2.20000	1.35400	0.88600	0.44700	0.26400	0.12190	0.06940	0.04450	0.03070	0.02240
0	–	15.55000	4.31000	1.95900	1.11300	0.49800	0.28100	0.12540	0.07040	0.04490	0.03090	0.02250
–0.5	2.31000	3.45000	2.20000	1.35700	0.88500	0.44600	0.26400	0.12200	0.06960	0.04450	0.03080	0.02240
–1	0.54800	0.85000	0.81500	0.68200	0.54300	0.34000	0.22300	0.11230	0.06630	0.04320	0.03010	0.02200
–1.5	0.25000	0.35700	0.38000	0.36100	0.32300	0.24200	0.17660	0.09940	0.06130	0.04110	0.02910	0.02140
–2	0.14600	0.19400	0.21200	0.21300	0.20300	0.17040	0.13630	0.08540	0.05590	0.03840	0.02770	0.02070
–3	0.06990	0.08420	0.09210	0.09590	0.09620	0.09090	0.08130	0.06050	0.04400	0.03240	0.02440	0.01872
–4	0.04180	0.04730	0.05110	0.05350	0.05460	0.05410	0.05120	0.04260	0.03370	0.02650	0.02080	0.01651
–5	0.02810	0.03050	0.03250	0.03390	0.03480	0.03520	0.03430	0.03050	0.02590	0.02130	0.01748	0.01431
–6	0.02000	0.02130	0.02250	0.02330	0.02400	0.02440	0.02420	0.02250	0.01990	0.01717	0.01450	0.01225
–7	0.01506	0.01578	0.01651	0.01706	0.01745	0.01786	0.01787	0.01707	0.01559	0.01382	0.01207	0.01041

Table S3. Relative difference (in %) between gMCO calculated dose-rate and consensus data dose-rate

z/y (cm)	0	0.25	0.5	0.75	1	1.5	2	3	4	5	6	7
7	-0.105	-0.147	-0.031	-0.051	-0.080	-0.076	-0.044	-0.006	0.010	0.403	0.100	0.028
6	-0.179	-0.105	-0.087	0.062	-0.061	0.091	0.144	-0.034	-0.284	0.026	0.037	0.034
5	0.198	0.042	-0.014	0.024	0.177	0.161	0.145	0.019	0.040	-0.056	-0.014	-0.002
4	0.109	-0.041	-0.015	-0.091	0.006	0.003	0.072	-0.015	-0.006	-0.029	0.003	0.036
3	0.005	0.037	0.047	0.025	0.035	0.056	-0.020	0.116	-0.032	0.103	-0.072	0.016
2	0.121	0.182	0.132	0.023	0.049	0.028	0.077	0.037	0.111	0.160	-0.117	-0.139
1.5	0.147	-0.015	0.115	0.038	-0.003	0.207	0.093	0.013	0.022	0.182	0.154	-0.196
1	0.083	0.012	0.086	0.041	0.052	0.083	0.110	0.019	0.026	0.165	0.058	-0.292
0.5	0.049	-0.053	-0.180	0.075	0.008	0.036	0.111	0.089	-0.022	-0.001	0.159	-0.139
0	0.000	0.019	0.067	0.033	0.000	0.085	0.169	0.001	0.047	0.017	0.129	-0.136
-0.5	-0.022	0.120	-0.094	0.050	0.070	0.138	0.069	0.043	-0.029	0.181	-0.093	-0.173
-1	0.106	0.030	0.067	0.005	0.033	0.107	-0.015	-0.037	-0.035	0.047	0.001	-0.002
-1.5	0.197	0.077	0.022	0.004	0.215	-0.103	0.087	-0.015	0.115	0.002	-0.085	0.175
-2	0.114	0.330	0.306	0.217	0.240	0.050	0.034	0.058	-0.032	0.065	-0.136	-0.054
-3	0.021	-0.060	0.128	0.031	0.018	0.018	0.006	0.091	0.157	0.048	-0.234	-0.008
-4	-0.162	-0.076	0.028	0.047	0.081	0.089	0.019	0.143	0.187	-0.062	-0.044	0.036
-5	0.047	0.131	0.153	0.080	0.045	-0.049	0.197	0.172	-0.131	-0.160	0.088	0.023
-6	0.204	-0.026	0.097	0.238	-0.148	0.115	0.203	0.074	0.019	0.070	0.043	0.050
-7	-0.103	-0.047	-0.056	-0.079	-0.070	-0.064	-0.071	-0.022	0.036	0.046	0.059	0.120