

GTV-BASED PRESCRIPTION IN SBRT FOR LUNG LESIONS USING ADVANCED DOSE CALCULATION ALGORITHMS

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Exercise

- ✓ 3 cases with lesions of different sizes
 - <1 cm , ~2 cm, ~4 cm
- ✓ 3 different platforms (linac & TPS), for every case dose calculation using type A algorithm and type B algorithm :
 - Clinac (Pencil Beam et Collapsed Cone)
 - Novalis (Pencil Beam et Monte-Carlo)
 - Cyberknife (Ray-Tracing et Monte-Carlo)



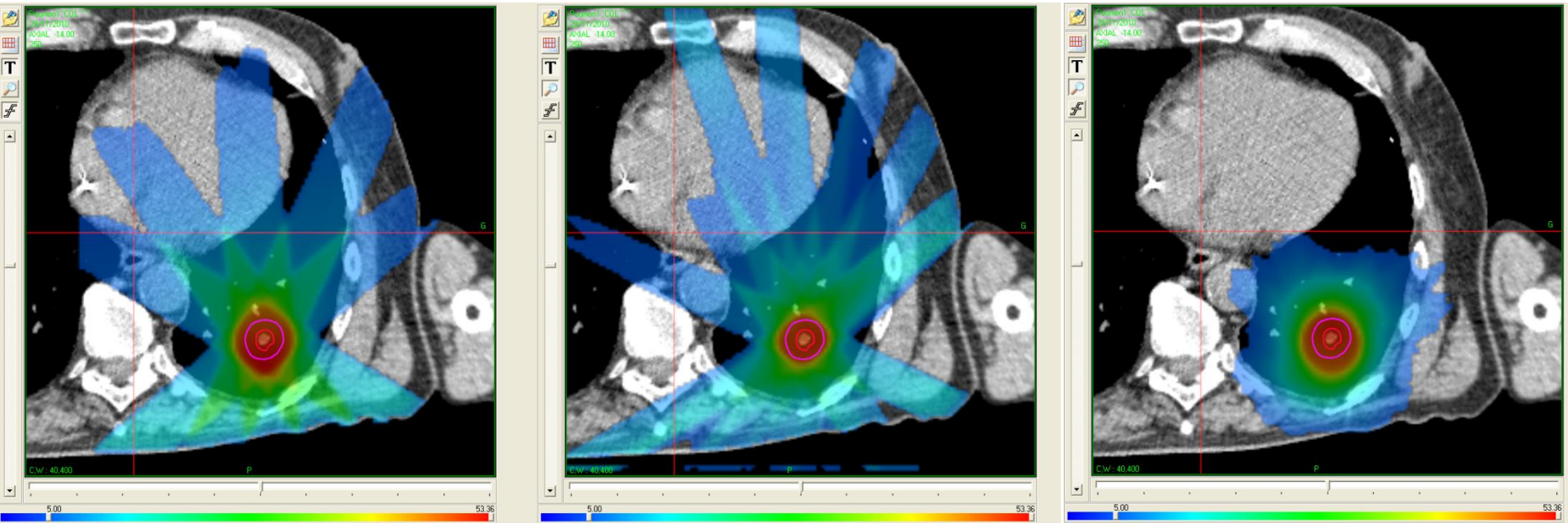
PTV (=GTV+5mm) D95% = 48 Gy

Case 1 lesion < 1 cm

Clinac

Novalis

Cyberknife



type A algorithms

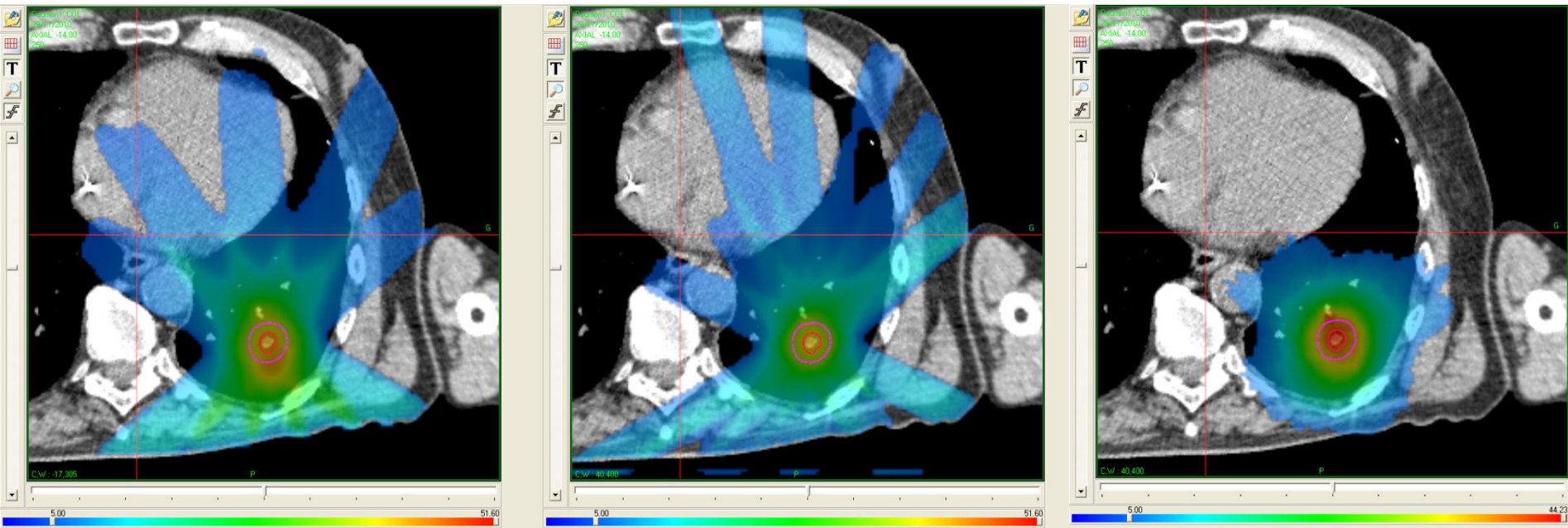
doses > 5 Gy

Case 1 lesion < 1 cm

Clinac

Novalis

Cyberknife

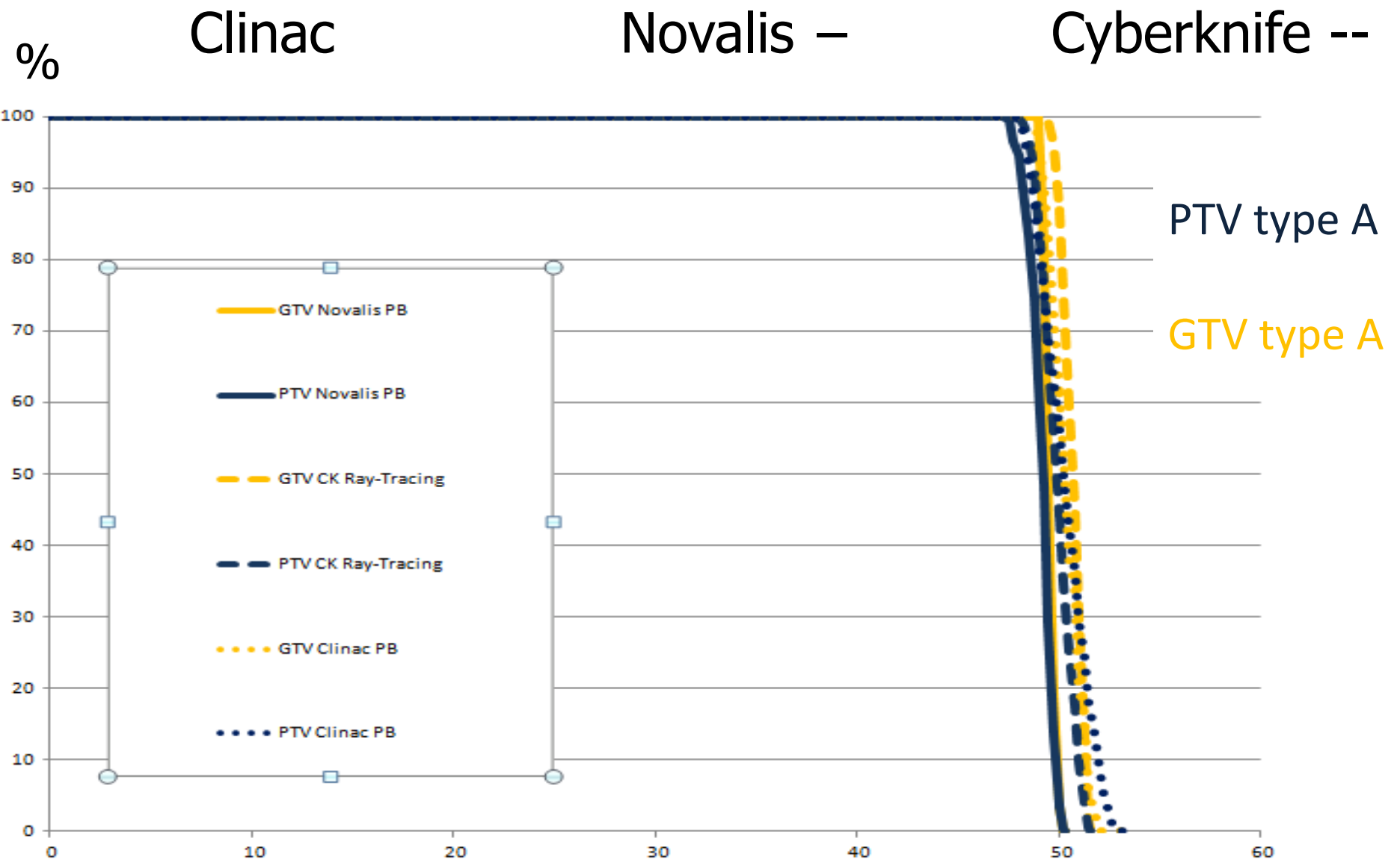


type B algorithms

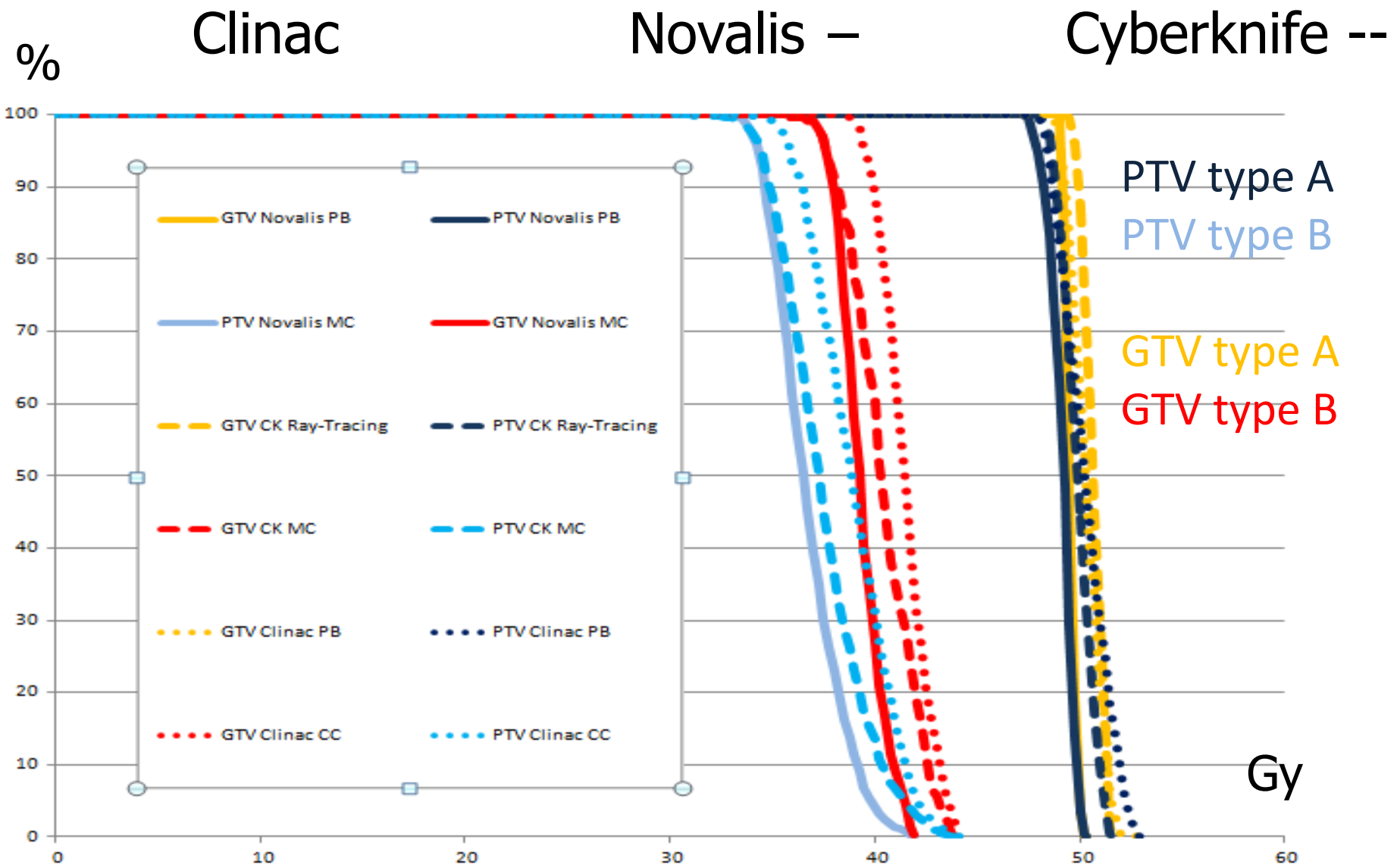
same plans i.e. same m.u./beam

doses > 5 Gy

Case 1 lesion < 1 cm



Case 1 lesion < 1 cm



Algorithms type A & B

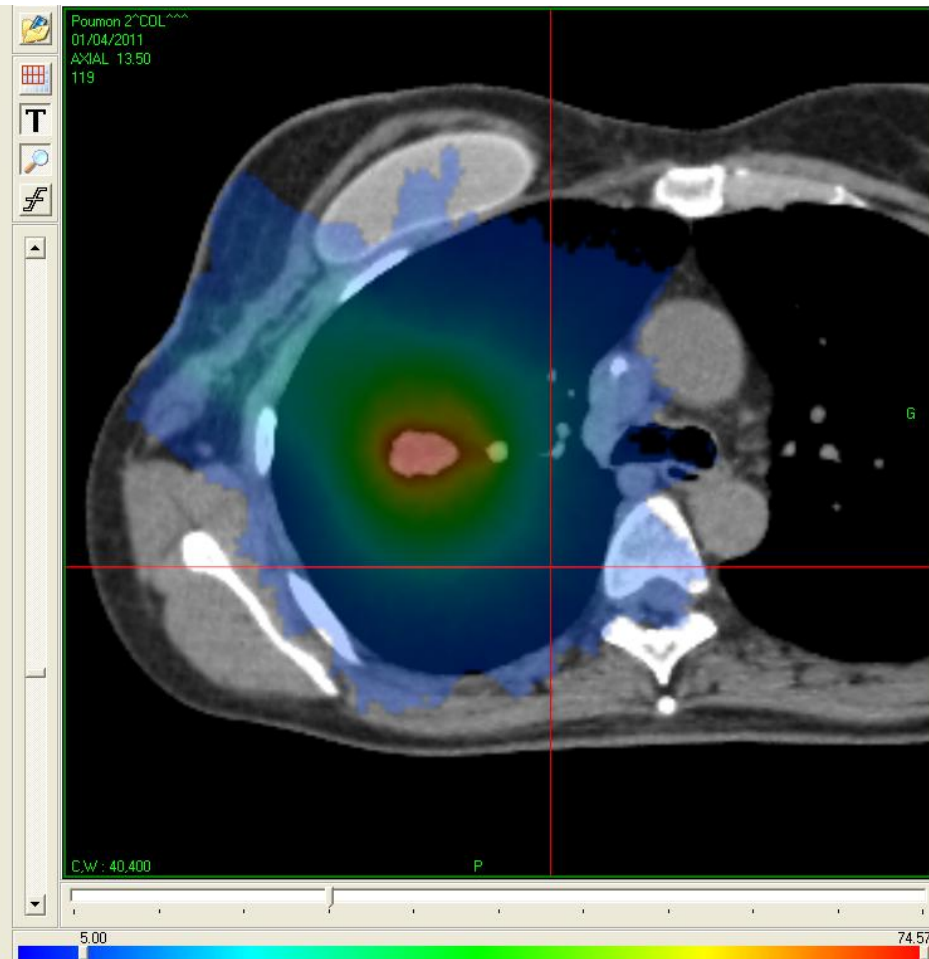
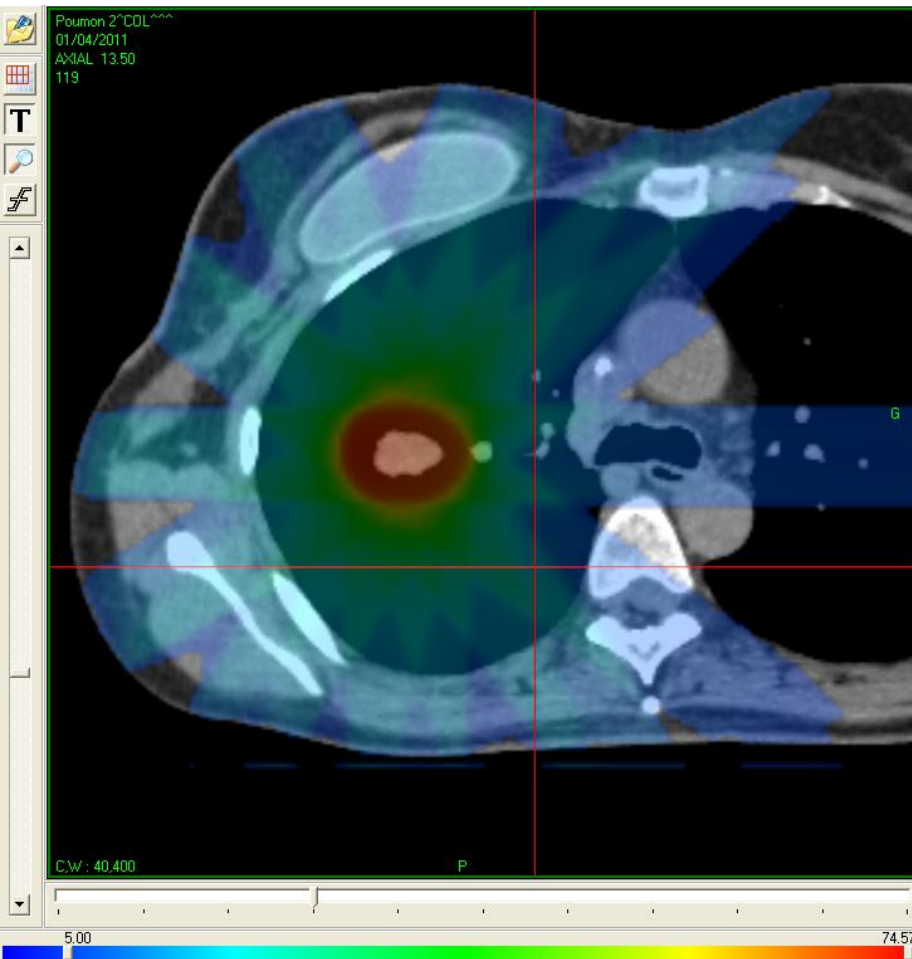
- ✓ Type A algorithms overestimate dose because they don't take into account modification of lateral electron transport
- ✓ We have to use type B algorithms or Monte-Carlo which have demonstrated their consistency with measurements

- ✓ Proceed the exercise prescribing 48 Gy to 95% of PTV (=GTV+5 mm) using type B algorithms

Case 2 (lesion ~2cm)

Novalis

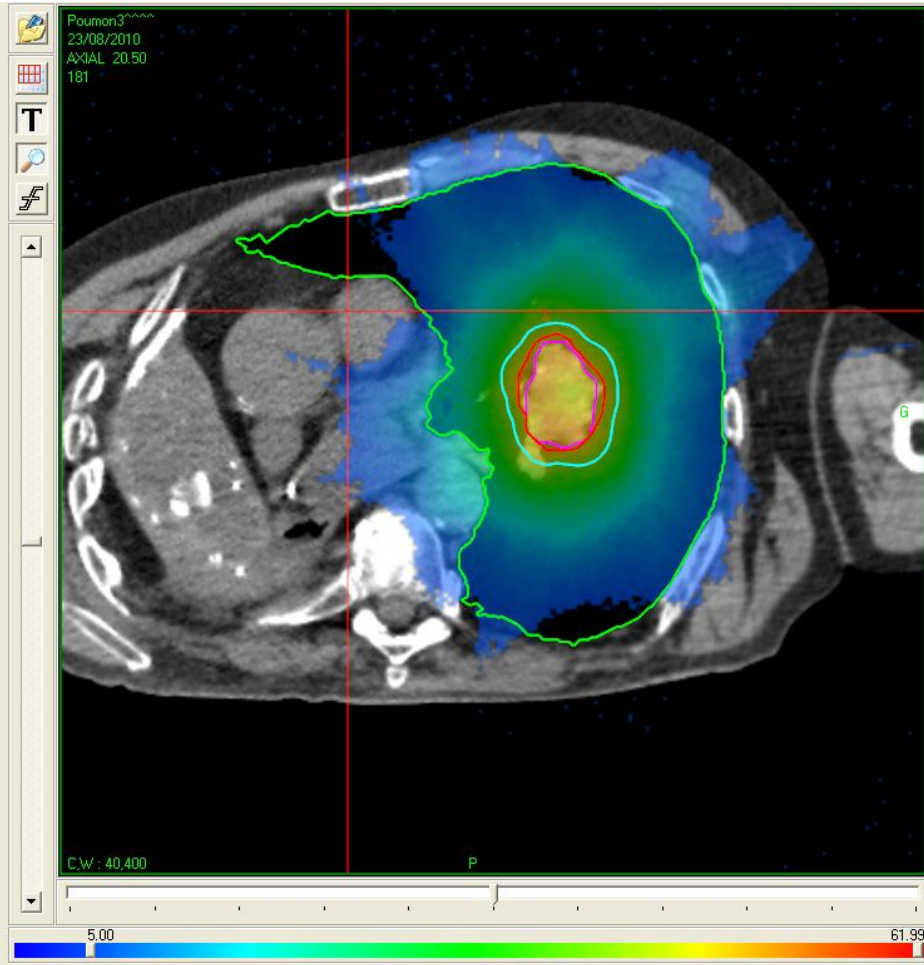
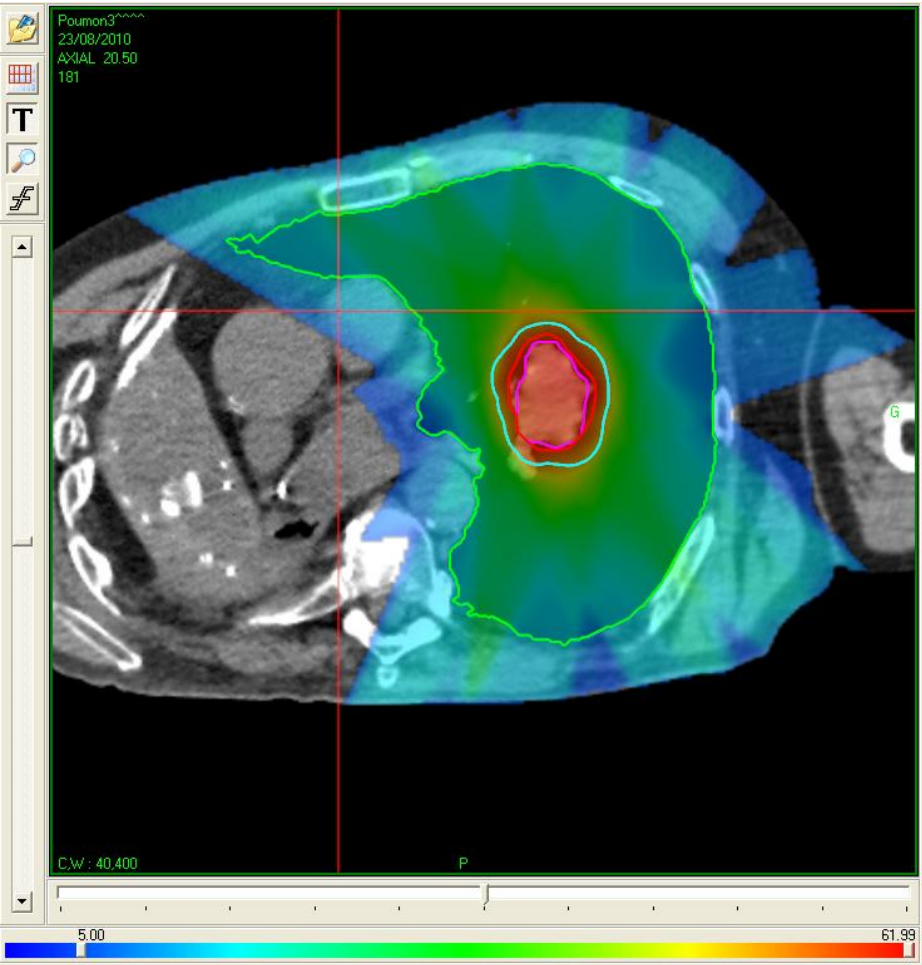
Cyberknife



Case 3 (lesion ~ 4 cm)

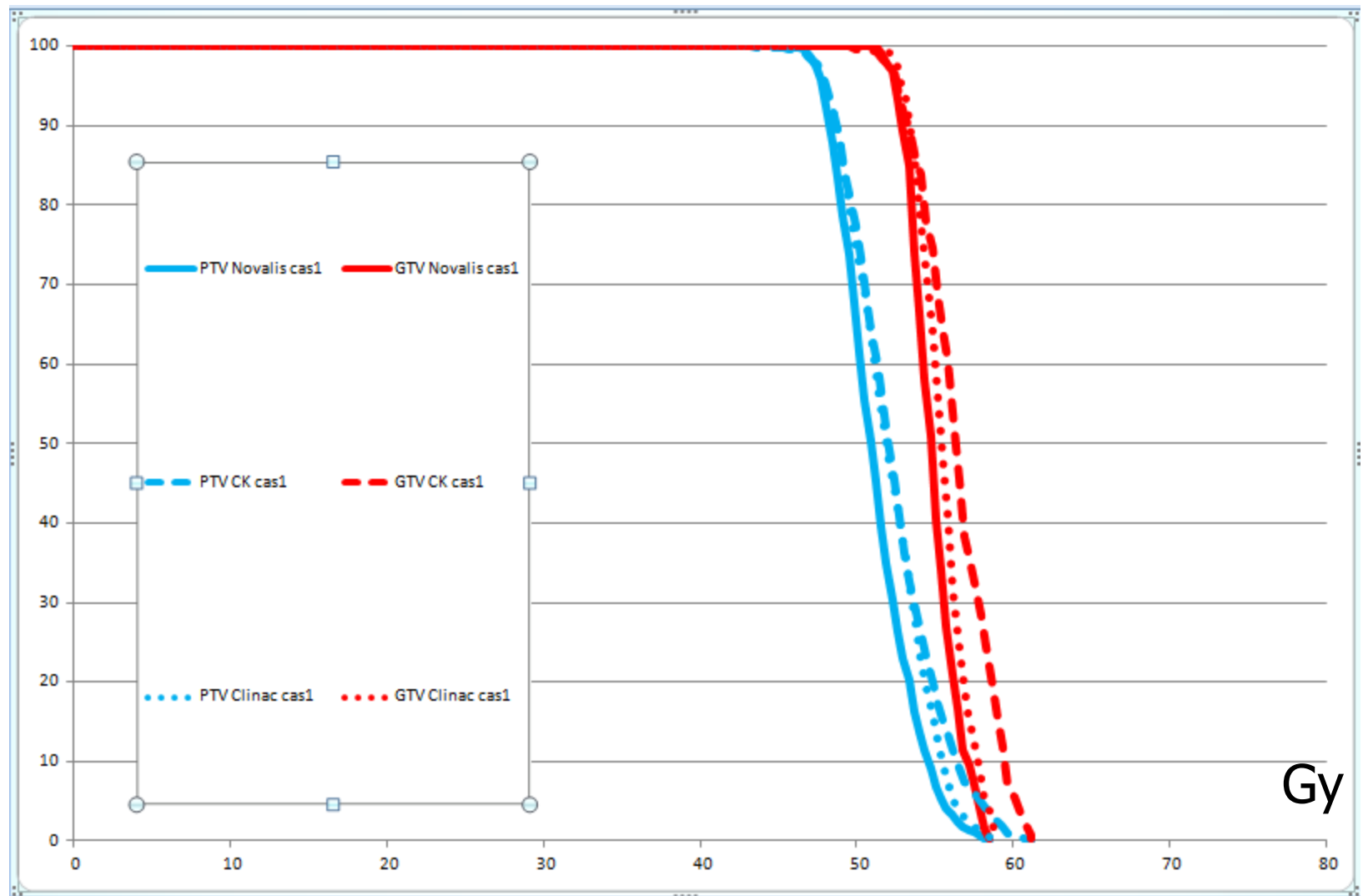
Novalis

Cyberknife



Case 1

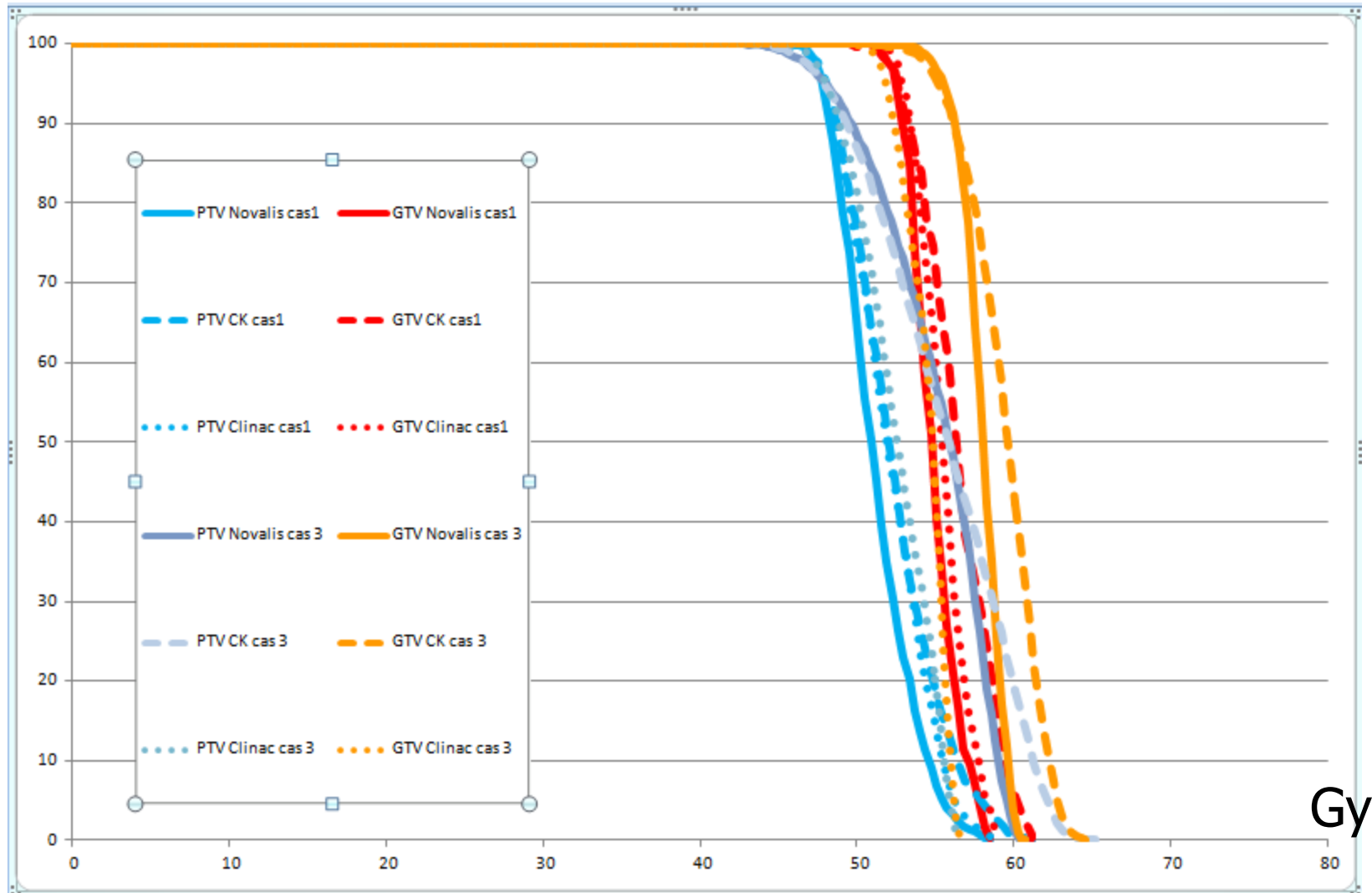
%



Gy

Case 1 & 3

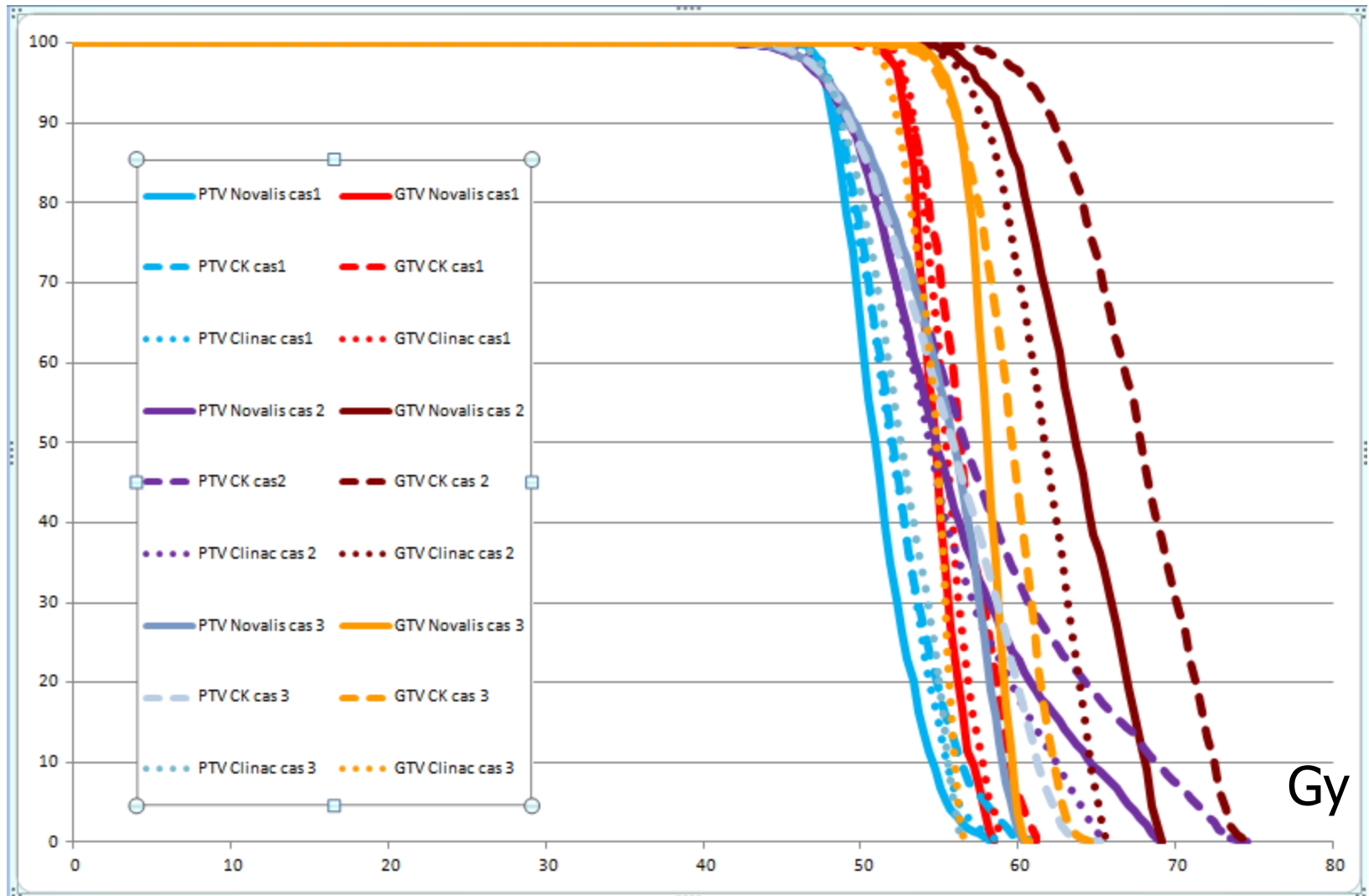
%



Gy

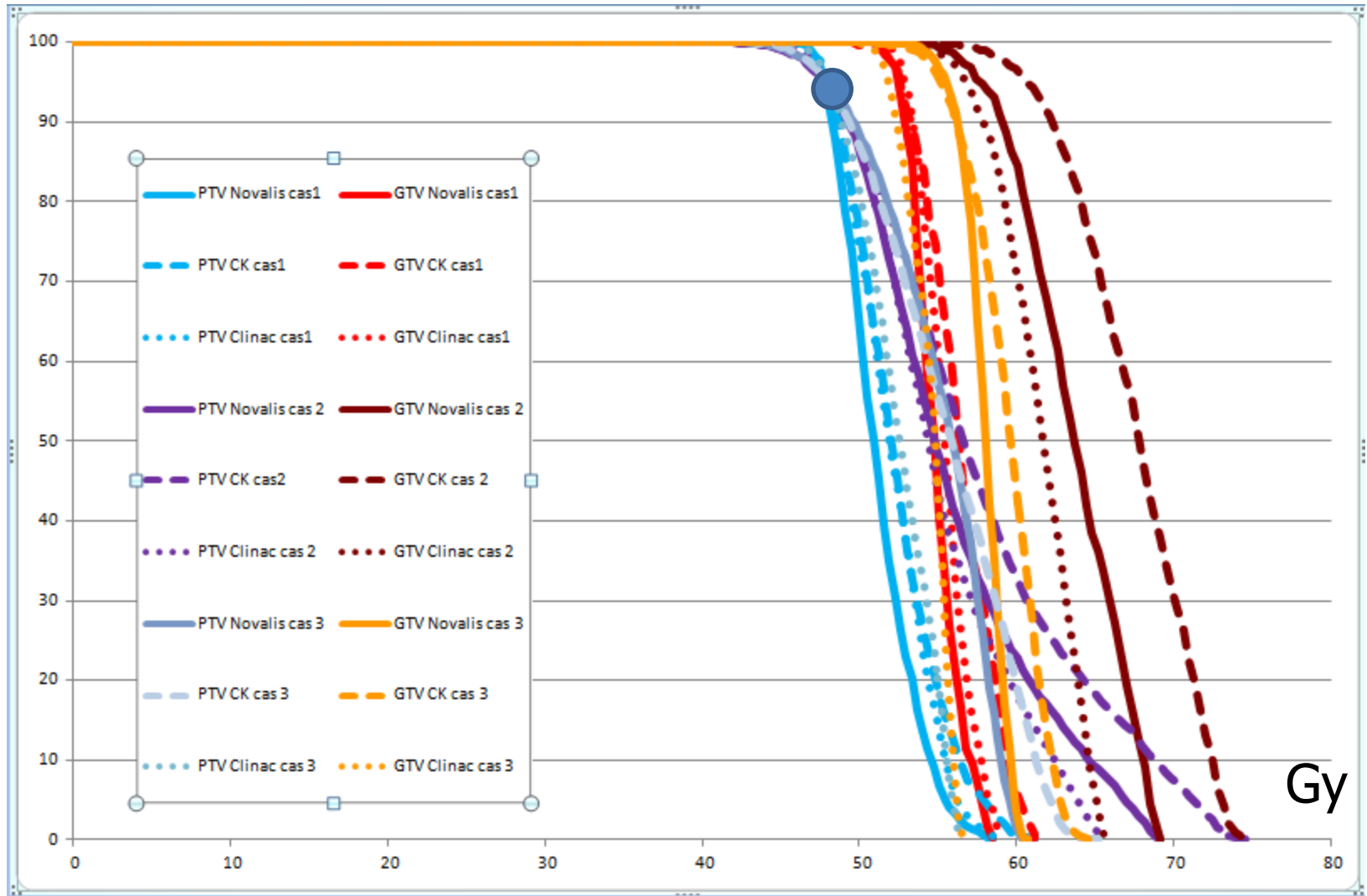
Case 1, 2 & 3

%



Case 1, 2 & 3

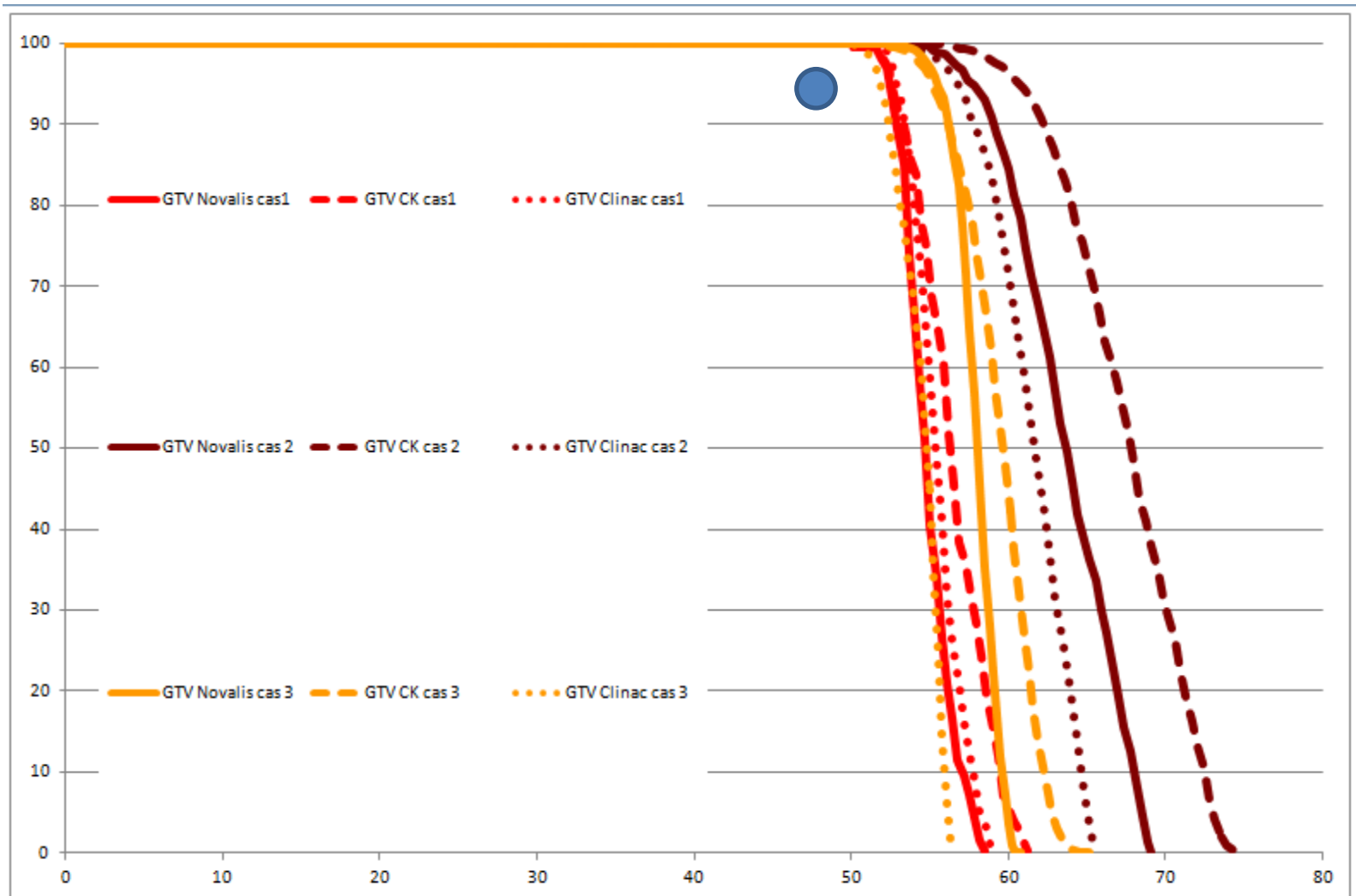
%



Gy

Case 1, 2 & 3

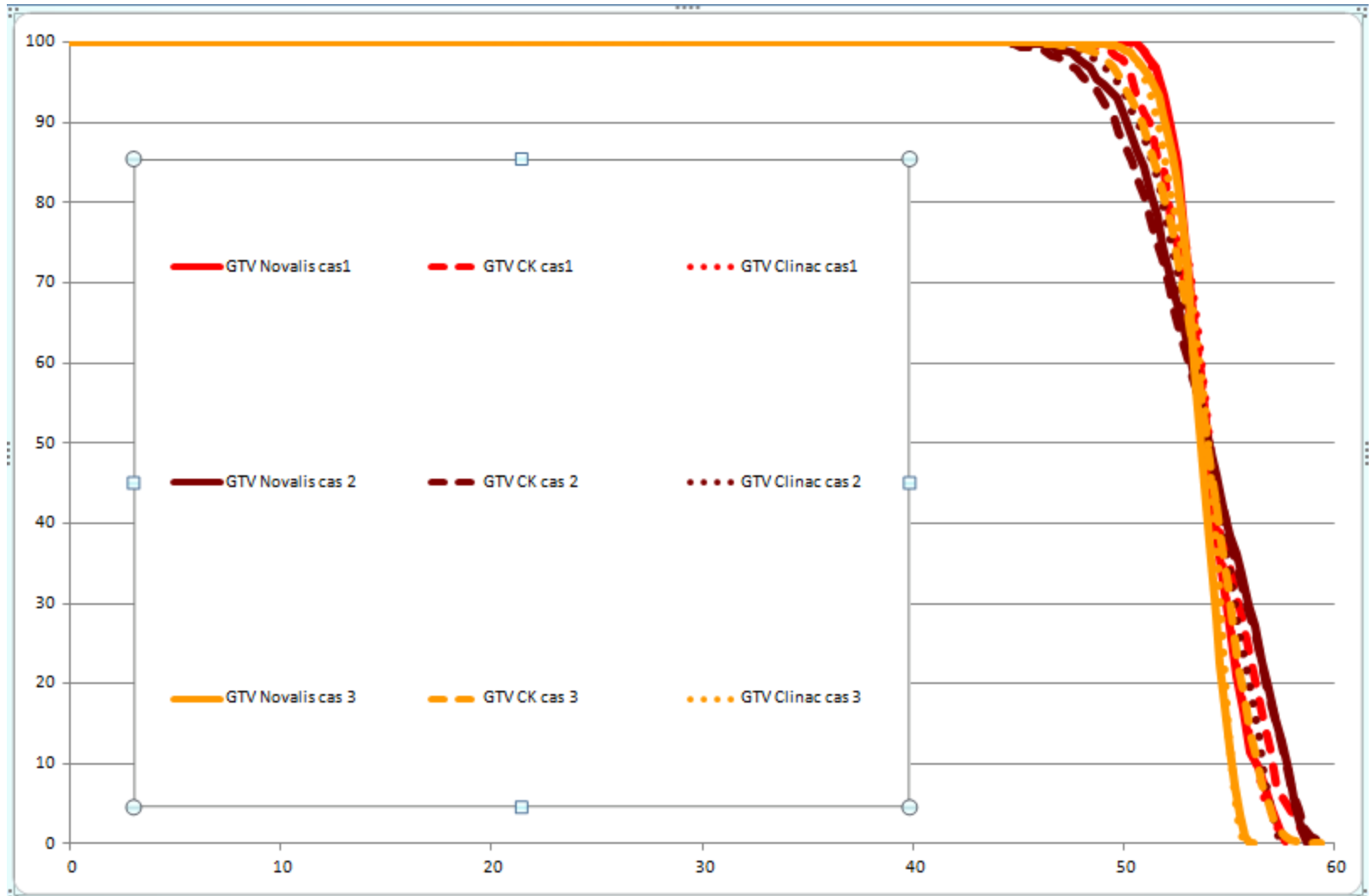
%



With a criteria on PTV

- ✓ doses to GTV are variables :
 - Among cases
 - For one case, among platforms

If we prescribe on GTV median dose (D50%)



Conclusion

- ✓ Use type B algorithms
- ✓ At least report GTV D50%, D98%
- ✓ We suggest to prescribe on GTV D50%