



Particle therapy masterclass

THERAPY PLANING OF LIVER


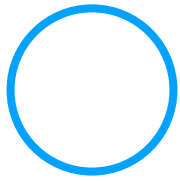
UNIVERSITY OF SARAJEVO

BENJAMIN DEDIĆ





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ABSTRACT

Loading in matRad, and loading the Liver phantom in matRad

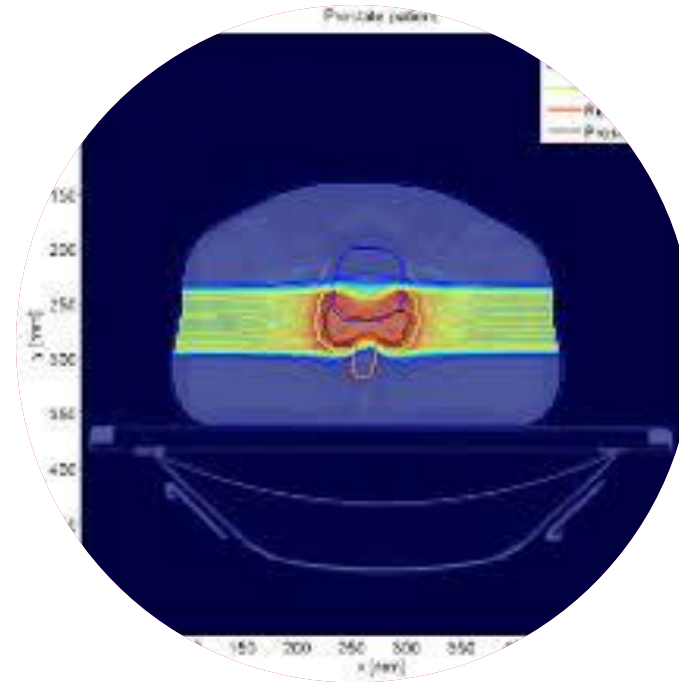
Setting up bixels for our case, setting up angles of beams, in our case for photons they were 0, 180, 225, 270 and 315 degrees

After setting the angles we pressed calculate and following that we started optimizing

Every of those cases we have saved via the option Save to GUI

After the optimization we have saved the CT image and the DVH

We have repeated the above steps for proton and carbon beams but we only had one angle for them which was 315 degrees

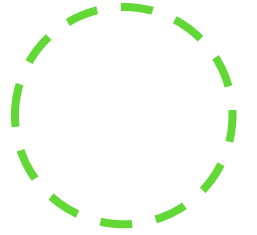




C PHANTOM

Here you will present the short introduction to C phantom and what are your conclusions on

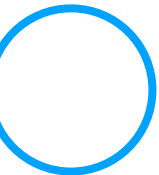
- Here paste your C phantom CT scan with all beams that are applied



Here paste and resize the setup of objectives and constraints



Here paste the DVH of the C phantom





LIVER

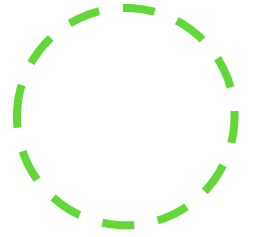


Liver organs at risk and targets	
Spinal cord	OAR
Skin	OAR
Stomach	OAR
Liver	Target
Kidney_R	OAR
Kidney_L	OAR
Heart	OAR

Spinal cord	OAR
Skin	OAR
Stomach	OAR
Liver	Target
Kidney_R	OAR
Kidney_L	OAR
Heart	OAR

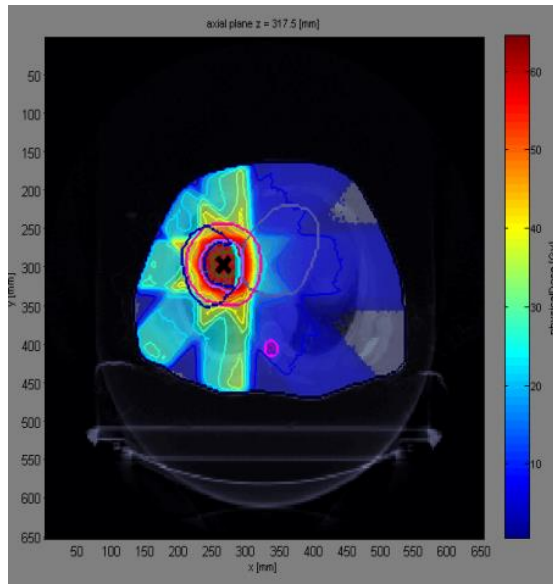


COMPARISON FOR PHOTON AND PROTON THERAPY FOR LIVER



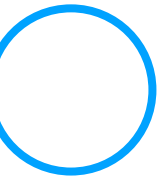
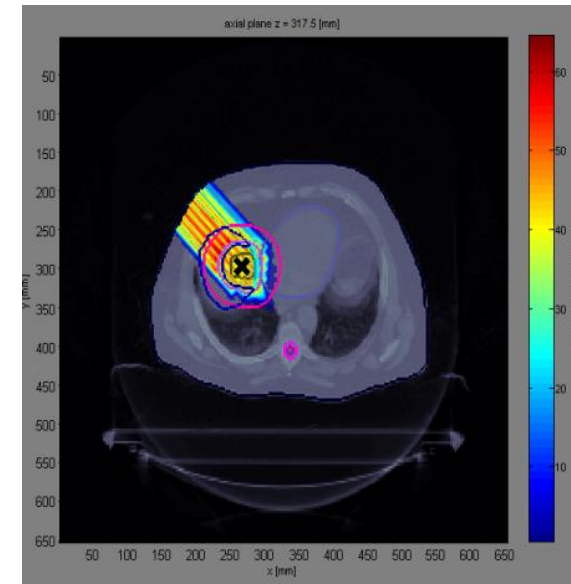
PHOTON THERAPY

As of using 5 beams uniformity of the dose distribution is equal to all of the beams but the intensity of the beam is not minimal in areas before and after the target



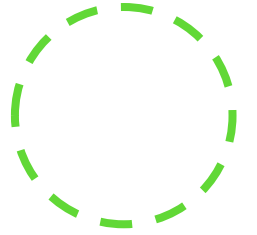
PROTON THERAPY

Beacuse of using only 1 beam dose distribution is high before and in the target volume but in the space after the target there is no dose



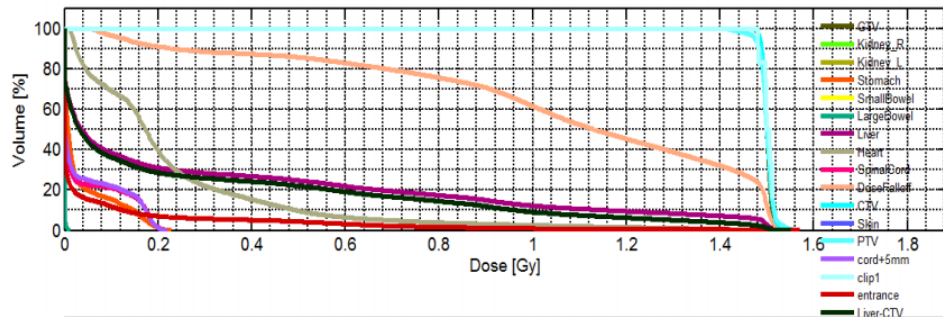


COMPARISON FOR PHOTON AND PROTON THERAPY FOR LIVER



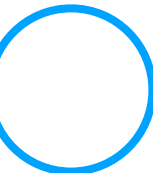
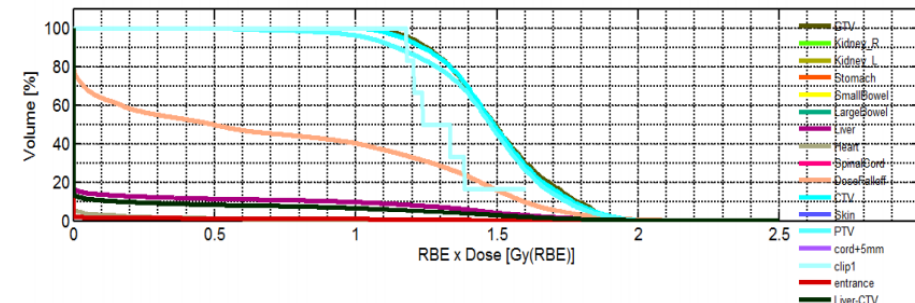
PHOTON THERAPY

Dose in the target volume has reached its required high but the dose in other organs which are not marked as a target is higher for photons than for protons

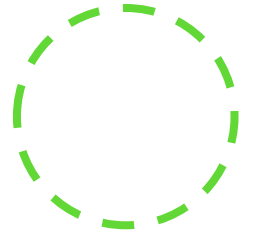


PROTON THERAPY

Dose for the target volume in this case is higher than photon beams and the dose has fallen off much faster. Other organs which are not marked as targets have received much lower doses than with photons

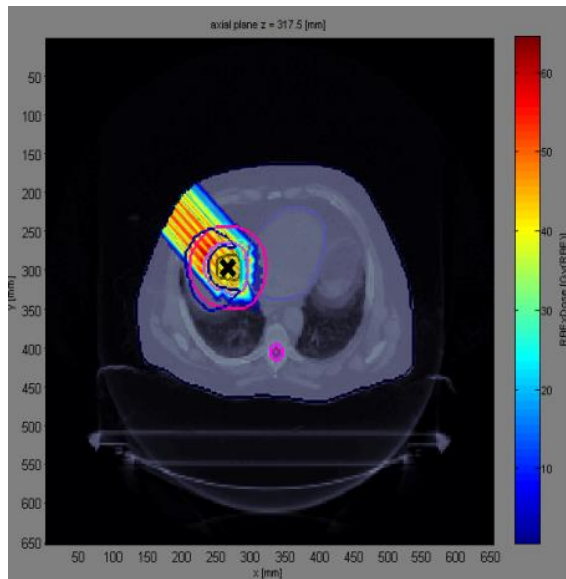


COMPARISON FOR PROTON AND CARBON ION THERAPY FOR LIVER



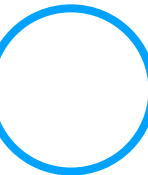
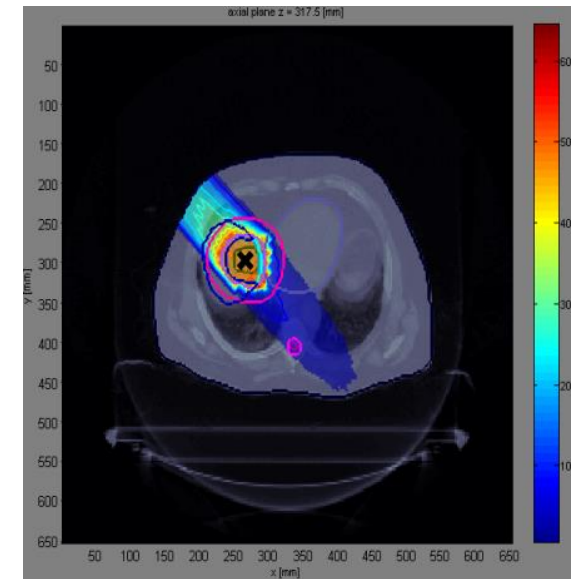
PROTON THERAPY

Beacuse of using only 1 beam dose distribution is high before and in the target volume but in the space after the target there is no dose.

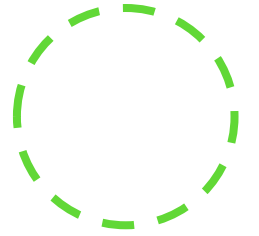


CARBON ION THERAPY

The dose is much lower in the area before the target volume, while in the target volume it reaches it's maximum. Area after the target volume has received a small amount of dose.

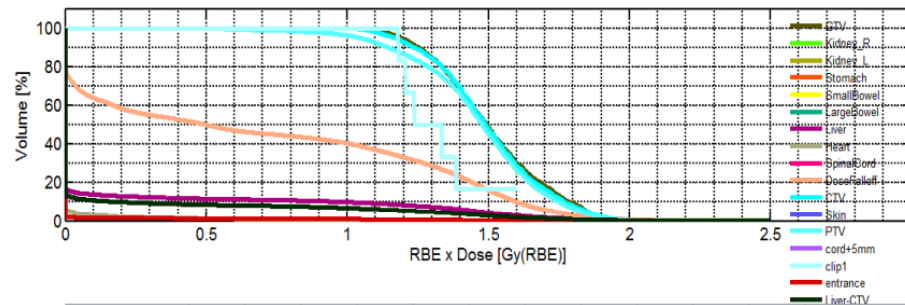


COMPARISON FOR PROTON AND CARBON ION THERAPY FOR LIVER



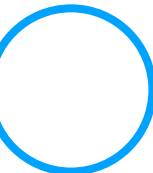
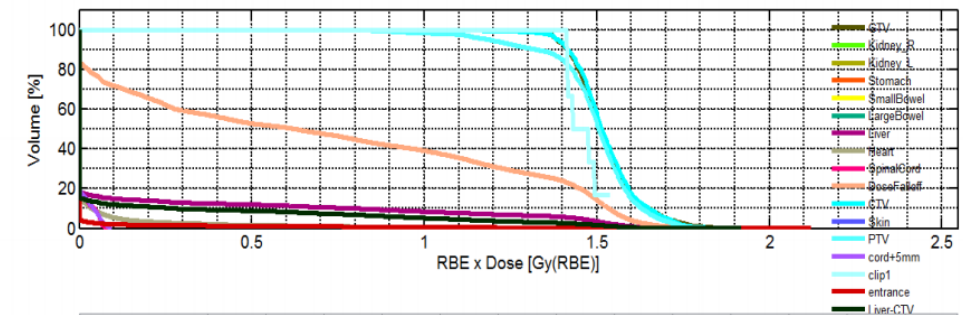
PROTON THERAPY

Target volume has received the maximum dose but it does not have a sharp dropoff in dose where the non target volumes have received a small amount of dose



CARBON ION THERAPY

Target volume has received the maximum dose but in the case for carbon ion therapy we can see that the dose dropoff is sharper than in the case for protons. Non targets have received the similar doses as with protons





CONCLUSION

As stated before, we will discuss here the differences amongst photon, proton and carbon ion therapy

For photon therapy we have seen that even when using multiple beams we have still had results which are not as good as the results for proton therapy because of the dose falloff and the dose on surrounding organs

Regarding the differences between the carbon ion therapy and proton therapy we can see that the carbon ion therapy has a much sharper dropoff in doses for target organs, but for the case of one beam the results are very similar



In the conclusion we can say that the carbon ion therapy has the best results while the proton therapy follows closely behind and the photon therapy can be graded as the third best of the presented ones



A decorative graphic featuring two large, overlapping pink arcs that frame the central text. On the left, a dashed orange circle is partially visible. On the right, a dashed green circle is partially visible. A solid cyan circle is positioned on the right pink arc, and a solid yellow circle is on the left pink arc. At the bottom right, a solid blue circle overlaps the pink arc.

Thank you
for your
attention