ORGAN WALL AS A SUPERIOR VOLUME IN PRESENTING ABSORBED DOSE COMPARED TO WHOLE ORGAN VOLUME IN INTENSITY-MODULATED IRRADIATION THERAPY TREATED GYNECOLOGICAL MALIGNANCIES

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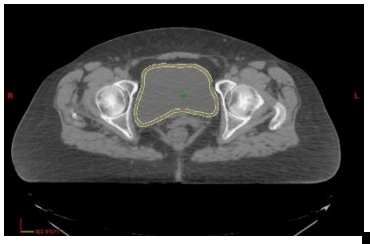
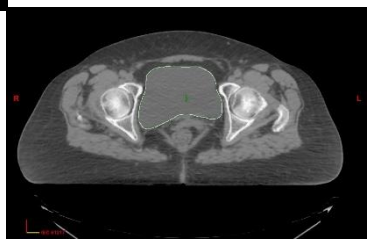
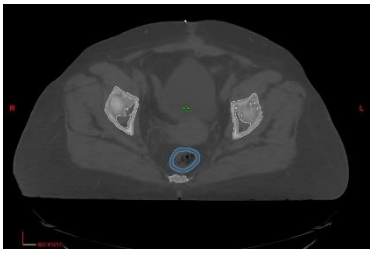
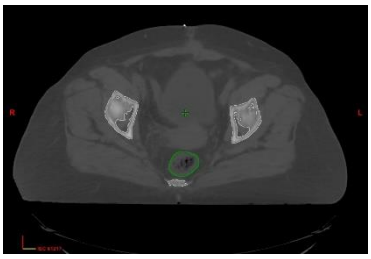




Introduction
As external beam radiation therapy (EBRT) evolved from three-dimensional conformal radiotherapy (3D-CRT) to more sophisticated techniques like the intensity-modulated radiation therapy (IMRT) a question arose about the quantity of absorbed dose in the organs at risk (OAR), especially after many observations that directly linked the absorbed dose with tissue reactivity and the onset of late toxicity. IMRT and other modern technique's steep gradient opens a new chapter in hollow and tube-like OAR dose distribution, emphasizing the need for different dose presentation – the organ wall.

Matherials and methods





All patient's primary targets received 30Gy in 15 daily fractions using IMRT technique.
IMRT was used as a part of standardized radiotherapy treatment for gynecological malignancies.
In focus were bladder, rectum volumes of 30ccm and sigmoid volume of 10ccm.

Results
Average bladder whole organ volume was 208.32ccm (55.90-444.50ccm) and average bladder organ wall volume was 47.56ccm (21.10-87.00ccm).
Average absorbed doses in 30ccm volume were 22.96Gy (12.16-27.89Gy) for the whole organ and 11.97Gy (10.37-12.98Gy) for the organ wall volume.
Two patients had non-available dose values due to organ wall volumes smaller than 30ccm.
Average rectal whole organ volume was 81.32ccm (41.10-159.90ccm) and average rectal organ wall volume was 39.94ccm (27.60-61.00ccm).
Average absorbed doses in 30ccm volume were 17.08Gy (9.95-20.19Gy) for the whole organ and 4.81Gy (0.37-10.97Gy) for the organ wall volume.
One patient had non-available dose values due to organ wall volumes smaller than 30ccm.
Average sigmoid whole organ volume was 48.20ccm (29.40-68.60ccm) and average sigmoid organ wall volume was 27.82ccm (13.70-39.10ccm).
Average absorbed doses in 10ccm volume were 26.67Gy (21.47-29.71Gy) for the whole organ and 22.33Gy (13.56-27.31Gy) for the organ wall volume.

Conclusion
Organ wall gives more precise and realistic view of different irradiated organ parts, it's absorbed dose and dose distribution. Above results showed that there is a great absorbed dose difference between whole organ and organ wall volumes, most visible in rectal and bladder volume – in average 12.27Gy and 10.99Gy respectively. In sigmoid volumes absorbed dose difference was less pronounced – it averaged 4.34Gy. Dose differences, especially the 10+Gy dose difference paves the way to higher treatment dose escalations, thus giving potential for greater radio-biological effect that will provide better disease control and longer remissions.

Key words
Intensity-modulated radiation therapy, gynecological malignancies, organ wall