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The dose distribution in lungs, during total body irradiation, based on the conformal treatment planning

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Introduction: TBI method is a complementary technique for chemotherapy applied in order to prepare a patient for accepting bone marrow transplant. The dose 12Gy is given for the whole body in 6 fractions 2Gy each, twice a day with 6-hour-break. The fractions called AP/PA are distributed from SSD=125cm, photon beams 6MV. 4 fractions from the left and the right side from SSD=450 cm photon beams 18 MV, field 180x180cm.

Objective: Assessment of the planned dose value in the lungs in the fractions conformal planned. Determination of amount of fractions with the use of side shields into the lungs.

Material and Method: Over the last year in Wroclaw - LSOC therapy technique performed in twenty 20 TBI patients The plan for AP/PA fractions is prepared in 3D system Eclips on the basis of CT image data from. The first pair of the fields AP/PA of the size 50x50cm includes the area of head and chest. Complementary dose for chest is made with the use of electron beams whose shape, energy and normalization is prepared according to 3D planning rules. The distances between successive pairs of the fields AP/PA are appointed on the basis of dose distribution in vertical reconstruction. For left and right fractions, the dose 1.0Gy (1/2 fraction) is specified at the depth of 26 cm, in the distance to the centre of the plexi box in which the patient is positioned. For lateral exposure the patient is positioned supine centrally in the plexi box filled with rise boluses.

Results: The volume of the lungs in 20 patients studied, were in the range (770-3830) ccm, Doses received in the lungs in the art AP/PA were: Min dose (0,5-1,3)Gy, max dose (3,9-5,3)Gy, mean dose (1,7-3)Gy, a dose of modal (0,5-4,2) Gy, a median dose (1,2-3,1)Gy. Dose covering 50% of lung V averaged 2.099 Gy for 30% of V, 2.89 Gy. The volume of lung receiving 50% dose (1Gy) averaged 53.55%, 20% of the average dose received 98% of lung volume. Dose in lung for a fraction of the side is estimated after measuring the thickness of the lung in the widest dimension on the basis determined taking into account the depth of the equivalent value of HU for the lung. Dose rate after passing through the lungs is approximately 0.2-0.3 Gy per fraction which gives a dose rate of 0,8-1, 2Gy, the faction of side. Dose in lung for a fraction of the side is estimated after measuring the thickness of the lung CT image and the depth of the equivalent fixed taking into account the density of the lung. Dose rate after passing through the lungs is approximately 0.2-0.3 Gy per fraction.

Conclusions: Because of the value above 2Gy, doses delivered in the lungs of fractions of the front: it was decided to reduce the dose in the lung fraction of 2Gy side, by the use of radiation shielding. On the basis of CT the patient was holding his hands behind his head designs in the SPL option Eclipce BEV shape of the lung shield. Radiation shielding is set on a shelf at the table to the TBI. Radiation shielding applies during the second fraction of radiotherapy.

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