C-11

Normal Organ Dosimetry to Guide Safe Re-treatment PRRT

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BACKGROUND

Re-treatment PRRT has become more common in routine clinical practice, but it remains unclear how many additional cycles are safe to deliver. At our institution, we use dosimetry to help guide this decision. Here, we present dosimetry results for management of re-treatment PRRT.

METHODS

11 well-differentiated NET patients received 4-timepoint dosimetry at 4-, 24-, 48-, and 72-hours post-administration, with their first (N = 9) or second (N = 2) cycle of re-treatment PRRT. Dosimetry was performed with MIM Software. Single-cycle dose was extrapolated over the total number of prior cycles to calculate the cumulative organ dose. The organ dose limits used were 30 Gy to the liver, 17.5 Gy to the lungs, and 2 Gy to the bone marrow. Kidney dose limits were based on biologically effective dose (BED) rather than absorbed dose, using 29 Gy for patients with comorbidities and 38 Gy for those without. The limiting organ was defined as the one which most restricted the number of cycles, assuming standard prescribed activity per cycle.

RESULTS

Of the 11 dosimetry patients studied, the kidneys were the limiting organ for 8 patients, while bone marrow was the limiting organ for 2 patients. One patient did not have any dose limitations. The following table displays the results (9 patients shown due to 10-row limit).

Patient	# of Re-treatment Cycles (200 mCi) Permitted by Kidney Dosimetry	# of Re-treatment Cycles (200 mCi) Permitted by Bone Marrow Dosimetry	Limiting Organ	# of Re-treatment cycles administered
1	3	0	Bone Marrow	2
2	2	3	Kidneys	1
3	1	2	Kidneys	4
4	1	2	Kidneys	3 cycles at 200 mCi, 1 cycle at 100 mCi during first treatment
5	4	4	Kidneys	4
6	1	1	Kidneys	2
7	4	4	Kidneys	4

8	0	0	Kidneys	4
9	4	4	-	4

Kidney absorbed dose was always equally or more limiting than BED, which emphasizes the importance of comparing renal BED and absorbed dose. Dosimetry information is always used in context with the overall clinical picture, not as an absolute limit, demonstrated by bone marrow dose where complete blood counts are used to monitor myelotoxicity rather than relying on bone marrow dose alone.

CONCLUSIONS

This work shows how dosimetry can help guide the number of re-treatment PRRT cycles that can safely be administered. There are several limitations/assumptions in this process, and additional patient numbers and correlation with toxicity is ongoing work.

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