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Dosimetry-guided 131I-mIBG Therapy in a Hemodialysis-Dependent Paraganglioma Patient

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BACKGROUND

A 63 year old male patient with paraganglioma, type 2 diabetes mellitus, hypertension, and end stage renal disease requiring hemodialysis (HD) was referred to our clinic for radiopharmaceutical therapy which was indicated based on progressive disease by imaging, increasing pain, and increasing Chromogranin A levels. 123I-mIBG scintigraphy showed high mIBG uptake in the mass without any additional disease sites.

Because mIBG is not considered dialyzable, study of 131I-mIBG in patients undergoing hemodialysis is limited, and 2008 European Association of Nuclear Medicine (EANM) guidelines list renal insufficiency requiring dialysis as an absolute contraindication for 131I-mIBG treatment. Consequentially, extensive pre-treatment dosimetry was performed to calculate a safe reduced therapeutic activity for the patient. This abstract summarizes the successful administration of this therapy.

METHODS

Planar and SPECT/CT-based dosimetry was performed to calculate the absorbed dose to the lungs, liver, kidneys, bone marrow, and retroperitoneal mass.

The patient was admitted to the hospital to accommodate hemodialysis and radiation safety. 204.6 MBq 131I-iobenguane (high-specific activity mIBG) was administered for dosimetry. Whole-body planar images and single-bed SPECT/CT images of the upper abdomen were obtained at 1, 24, 72, and 168 hours post-administration. Images were acquired on a Philips Precedence SPECT/CT (Philips Healthcare, Milpitas, CA, USA), and an I-131 standard was used for quantitative calibration.

OLINDA/EXM 2.0 was used to calculate organ doses from the planar images using the Adult Male Model, and bone marrow and lesion doses were calculated from SPECT/CT using the Unit Density Sphere Model.

RESULTS

A total treatment activity of 6689 MBq was chosen to limit the bone marrow dose to 3 Gy. Ultimately, 6553 MBq of 131I-iobenguane was administered over two treatments, 4070 MBq and 2483 MBq 90 days apart, providing an estimated lesion dose of 38.5 Gy.

Despite treating with 17.7% of the maximum approved activity, the lesion responded to treatment based on CT volume measurements. Two months before the therapy, the lesion was 165 ml. At dosimetry and treatment 1, the volume increased to 203 ml. Three months later at treatment 2, the volume decreased to 153 ml, and another 3 months later, a follow-up CT showed a volume of 132 ml. Importantly, the

patient did not experience any hematologic or other toxicity. Additionally, the radiation safety precautions to the staff were manageable with appropriate education facilitating limited exposure.

CONCLUSIONS

Dosimetry-guided treatment with 131I-mIBG in patients requiring hemodialysis is feasible. With appropriate activity reduction, the treatment can be effective with limited side effects.

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