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Role of Functional Imaging for Response Assessment of Lu177-Dotatate Therapy

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BACKGROUND: Since the approval of Lu177-DOTATATE, many patients with progressive neuroendocrine tumor (NET) have now been treated. But, the role of functional imaging for response assessment is not well established and is the goal of this study.

METHODS: This is an IRB-approved, prospective study of 45 patients (20 women, 25 men, age range: 33-82) who had Lu177-DOTATATE therapy for NETs at our institution. All patients had a baseline Ga68-DOTATATE PET/CT. To date, 17 patients have completed 4 cycles, 10 patients 3 cycles, 8 patients 2 cycles, and 10 patients 1 cycle of therapy. All patients received a whole-body planar gamma scan 3-4 hours after their therapy, as well as a repeat Ga68-DOTATATE PET/CT 3 months after completion of all 4 cycles. We evaluated the relative uptake on the scans in comparison to each other as well as to clinical outcomes.

RESULTS: The distribution of Lu177 on the planar scans were highly concordant with the baseline Ga68-DOTATATE PET/CT, accounting for differential resolution. Each of the successive post-therapy Lu177 whole-body scans were usually similar to each other (stable disease) per patient, with some showing reduction in number or degree of uptake (partial response). None showed worsening disease. Seven patients have received a post-therapy Ga68-DOTATATE PET/CT scan to date. In comparison to the baseline PET, the findings are variable, with some showing mild improvement, others with stable disease, and others with mild increase in size and/or uptake of lesions.

CONCLUSION: The post-therapy Lu177 whole-body scan can be used to confirm biodistribution of the therapeutic isotope to the same sites of disease seen on the pre-therapy Ga68-DOTATATE PET/CT and as a quick assessment of disease status between cycles of therapy. The post-therapy Ga68-DOTATATE PET/CT shows variable changes in comparison to the baseline scan and does not necessarily correlate to clinical response in the same time-frame, but may to longer-term outcomes.