^{64}Cu-DOTATATE PET/MRI for Radiosurgery Planning in Head and Neck Paragangliomas

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INTRODUCTION

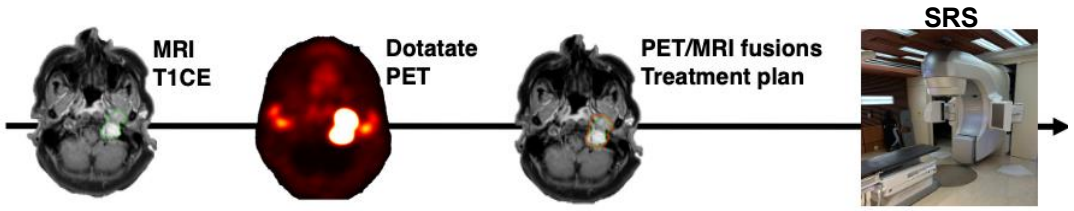
Paragangliomas are rare neuroendocrine tumors located near critical neurovascular structures in the head and neck.
Stereotactic radiosurgery (SRS) is an established, safe and effective treatment for patients with paragangliomas. Precise tumor delineation can be challenging but necessary to avoid off-target toxicity and achieve tumor control. Radiolabeled somatostatin analogs, such as ^{64}Cu-DOTATATE, have demonstrated excellent sensitivity for identifying paragangliomas because these tumors commonly overexpress somatostatin receptors (SSTR), particularly SSTR2.
^{64}Cu-DOTATATE PET combined with MRI may improve visualization of disease extent, facilitate detection of additional tumor sites, and provide clinically useful information to guide treatment planning for head and neck paragangliomas.

OBJECTIVE

This study aimed to to investigate the impact of ^{64}Cu-DOTATATE PET/MRI fusion imaging on radiotherapy planning.

Method

A retrospective chart review was conducted for patients with non-metastatic head and neck paragangliomas treated, over a 20-month period, with SRS using ^{64}Cu-DOTATATE PET/MRI fusion imaging. Demographic, clinical, radiographic, and treatment data were collected at baseline and follow-up. Tumor volumes based on MRI alone were compared with those derived from PET/MRI fusion using the Wilcoxon signed-rank test, with statistical significance defined as $p < 0.05$.

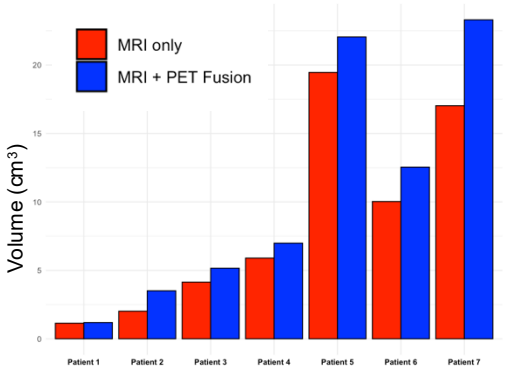


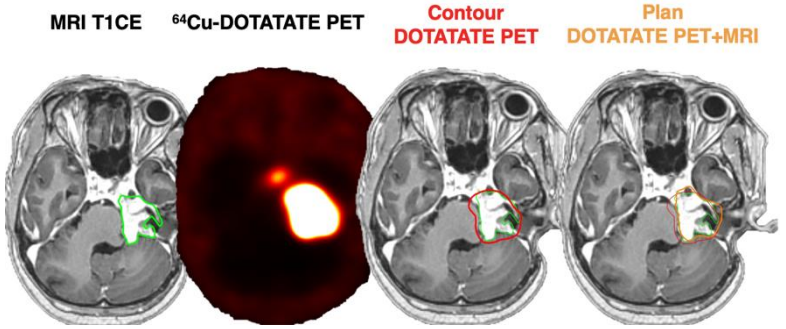
Results

Five patients were treated with Gamma Knife RS, and two with LINAC RS.
Mean follow up: 13 + 2 months, and all patients demonstrated stable or improved disease.

Patient	Age	Sex	Symptoms	SRS modality	Dose/ fractions
1	72	M	Hearing loss, tinnitus, vertigo	GK, Frame	12 Gy, 1
2	86	F	CSF otorrhea	GK, Mask	25 Gy, 5
3	41	F	Tongue weakness	GK, Mask	18 Gy, 3
4	55	F	Hearing loss, tremor, dysarthria, dysphagia	GK, Mask	12 Gy, 1
5	51	F	Facial twitching, dysphagia	GK, Mask	25 Gy, 5
6	56	M	Right facial palsy, hearing loss, headache	LINAC	12 Gy, 1
7	60	F	Left tongue weakness	LINAC	25 Gy, 5

Mean tumor volume delineated on **MRI alone was 8.5 ± 2.7 cm³** and increased to **10.7 ± 3.4 cm³ after PET/MRI fusion** (**p = 0.016**).





Highlighted Case

Conclusion

^{64}Cu-DOTATATE-PET/MRI fusion imaging improves, tumor delineation in head and neck paragangliomas.

Follow-up is ongoing to validate these findings and confirm clinical benefit in these patients.