Neuroradiological and neuropathological changes after 177Lu-DOTA-TATE for the treatment of refractory esthesioneuroblastoma

Julia Schneider; Deborah Shatzkes; Stephen Scharf; Tristan Tham; Kay Kulason; Shamik Chakraborty; Todd Anderson; Jean -Mathieu Beauregrard; David Langer; Peter Costantino; John Boockvar

Brain Tumor Center, Lenox Hill Hospital, Hofstra Northwell School of Medicine

CNS 2017 ANNUAL MEETING BOSTON, MASSACHUSETTS OCTOBER 7–11,2017

Introduction

Olfactory neuroblastoma, also known as esthesioneuroblastoma (ENB), is a malignant neoplasm with an unpredictable natural history of progression. Currently, the widely accepted treatment is inductive chemotherapy, with or without surgery followed by radiotherapy. Since data on genetics and molecular alterations of ENB are understudied, there is no standard of care on molecular targets. Neuroendocrine tumors commonly express a somatostatin receptor that is highly expressed by ENB. There have been promising results using peptide receptor radionuclide therapy (PRRT) known as 177Lu-DOTA-TATE for treatment of neuroendocrine tumors utilizing the somatostatin analogue, Octreotate, binding to these somatostatin receptors on the tumor. We present complex neuroradiological and neuropathological changes associated with 177Lu-DOTA-TATE treatment for a patient with a highly treatment resistant

Methods

After a history of 5 surgeries and many chemotherapy and immunotherapy attempts, a 60-year old patient with an ENB--Hyam's grade 3--was treated with 5 induction cycles (intravenous injections) of 177Lu-DOTA-TATE

Results

After 4 induction cycles, the patient underwent surgical resection of a recurring frontotemporal ENB in the anterior temporal lobe in April 2017. Thereafter, he underwent his fifth induction cycle. While post-operative MRI showed only a solitary focus of dural disease along the right parietal convexity, concurrent 68Ga-DOTATATE PET/CT showed evidence of multiple dural implants, but no evolution of ENB. Neuropathological evaluation confirmed radiation necrosis to the ENB after pathology specimens were obtained from his April 2017 surgery. There has been no further progression or exacerbation of the patient's disease.

Initial Presentation of ENB (MRI and 68Gallium-DOTATOC-PET/CT)

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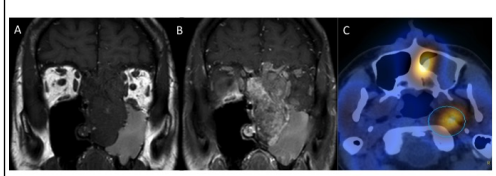

Conclusions

In this report we describe imaging changes associated with PRRT utilizing 177Lu-DOTA-TATE for recurring ENB. This is the first report describing neuropathological changes associated with this new treatment. With promising results of 177Lu-DOTA-TATE for systemic neuroendocrine tumors, we believe this novel treatment paradigm may improve the prognosis and control for patients with ENB.

Post 5 177Lu-DOTA-TATE Induction Cycles and Neuropathological effects

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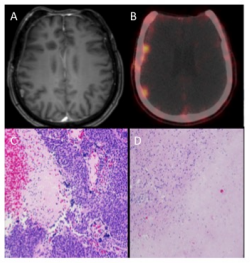

Enhanced T1-weighted MRI image (a) demonstrates a single metastasis along the right parietal dura. Ga-68-DOTATATE PET/CT (b), however, demonstrates multiple foci of increased activity along the right frontoparietal convexity. (c) Hematoxylin and eosin stained slide (20x power) showing numerous foci of tumor necrosis (d) Hematoxylin and eosin stained slides (10x power) demonstrating reactive brain tissue (green star) with radiation induced necrosis

Learning Objectives

1. To learn about the highly treatment resistant nature of esthesioneuroblastoma

2. To understand peptide receptor radionuclide therapy, specifically 177Lu-DOTA-TATE

3. To learn about the newfound neuropathological and radiological effects as a result of 177Lu-DOTA-TATE

4. Identify a new modality of imaging for ENB

References

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