Paragangliomas, or glomus tumors, are rare neoplasms of the head and neck. The carotid body tumor is the most common paraganglioma and is derived from neural crest. The most common tumors of the paragangliomas arise from specific chemoreceptor sites, such as the carotid body tumors at the carotid bifurcation, jugular paragangliomas, and tympanic paragangliomas. The term carotid body tumor as well as the carotid body tumor syndrome is sometimes used interchangeably to refer to each specific tumor as well as to the syndrome of chemoreceptor dysfunction caused by the eponymous paragangliomas. The true incidence of the tumor remains unclear, but has been estimated at 1/30,000 in the Caucasian population.

There is limited data pertaining to the treatment of CBTs with radiation. For those patients with non-operable disease, radiation therapy is a viable treatment option for patients with carotid body tumors, especially in cases where anatomic limitations or comorbidities make the decision for surgery less clear. A recent study by Lim et al. considering the use of CyberKnife for CBTs reported their experience with 20 patients and demonstrated a significant decrease in tumor size compared with their pre-treatment imaging. For the other four patients, the period of follow-up after CyberKnife therapy ranged from 3 months to 26 months, with a mean follow-up of 17.8 months. One of these patients was no longer being followed after CyberKnife therapy; the four remaining patients were available for serial follow-up in size compared with their pre-treatment imaging. The percent change in size varied between the patients, with one patient demonstrating a (-)28% Reduction in size and another (-)33% Reduction in size. Two of the patients were asymptomatic. These two CBTs were incidental findings on CT scans performed for other reasons.

METHODS AND MATERIALS
Over a 30-month period from February 2005 to August 2007, five patients with at least one CBT received stereotactic radiosurgery delivered by the CyberKnife system (Memorial Hermann Medical Center, Houston, TX; Huntsville, AL at Georgetown University Hospital [GUMH]). [See Table 1.] The age of these patients ranged from 21 to 65 years of age. The five patients, all of whom were female, were recommended for CyberKnife treatment for varying reasons, including a history of significant comorbidities, repeated disease following previous surgery and external beam radiation therapy, and patient preference.

All five of these patients were treated by the CyberKnife protocol established by GUMH. For each CBT, two 1500 cGy fractions were prescribed, 1 week apart. The planning target volume (PTV) was defined as the gross tumor volume (GTV) and a 5-mm expansion. The PTV was defined as the GTV and a 3-mm margin. Measurements of efficacy and safety of CyberKnife therapy were defined by local control, distant metastasis, and complication rates. Complications were evaluated by the patient’s own account and recorded as radiation-related. The CyberKnife is a robotic, image-guided radiosurgery system that is able to deliver treatment without external fixation. Real-time image guidance allows the CyberKnife to be brachytherapy compliant for patients during treatment. In comparison to other techniques of SBRT such as Gamma Knife Therapy, the CyberKnife allows for treatment with multiple sessions, taking advantage of the radiobiological principles of fractionation.

CONCLUSIONS
CBTs are rare tumors of the head and neck. While the majority of them present as a neck mass, only a fraction of patients with CBTs have prior surgery or radiation treatment. The use of CyberKnife for CBTs has demonstrated a significant decrease in tumor size compared with pre-treatment imaging. The percent change in tumor size ranged from a (-)16% Reduction in size to a (-)35% Reduction in pre-treatment size. Three of these patients reported several treatment-related complaints, but none of these were severe enough to require intervention (See Table 3). One patient reported no complications throughout her 23 months of follow-up. The other two patients were treated with pain medications or dexamethasone in three cases; cranial sensory symptoms, including numbness, paresthesias, and otalgia in two cases; and neck discomfort in two cases. Other complications included mild pain in one patient.

REFERENCES