

# Targeted Cancer Treatment with Nuclear Medicine Therapy

## What is Radioisotope Therapy?

Precision treatment in which a radioactive drug compound seeks and destroys cancer cells.

### Thyroid Cancer

- Approximately 52,070 new cases estimated in the US in 2019
- **Treatment:** iodine-131
- Cure rates in excess of 90%

### Non-Hodgkin's Lymphoma

- Approximately 74,200 new cases estimated in the US in 2019
- **Treatment:** yttrium-90 ibritumomab tiuxetan
- Effective in 75% of patients
- Equivalent efficacy to chemotherapy, but requires only one cycle, and with fewer side-effects

### Neuroblastoma

- Most common cancer in infants; Approximately 800 new cases diagnosed each year in the US
- **Treatment:** iodine-131 MIBG
- Reported response rates of up to 57% when used alone and up to 75% when used in combination with chemotherapy

## Benefits of Radioisotope Therapy

- Highly selective—kills cancer cells and spares healthy cells
- Can be tailored to the unique biologic characteristics of the patient and the molecular properties of the tumor
- Virtually all performed as outpatient procedures
- Side effect rates less than other treatments

### Neuroendocrine Tumors

- Approximately 17,000 new cases estimated in the US in 2019
- **Treatment:** lutetium-177 DOTATATE
- Median progression-free survival rate is 29 months

### Paraganglioma and Pheochromocytoma

- Approximately 1,000 new cases estimated each year
- **Treatment:** iodine-131 MIBG
- Median overall survival of 36.7 months, with sustained blood pressure control

### Liver Cancer (Hepatocellular Carcinoma) and Liver-Dominant Metastatic Disease

- Approximately 42,030 new cases of liver cancer and intrahepatic bile duct cancer estimated in the US in 2019
- **Treatment:** selective internal radiation therapy (SIRT) with yttrium-90 microspheres
- Median survival rate for liver cancer patients of 20.5 months vs. 17.4 months with SIRT as compared to chemoembolism, with less toxicity. In liver-dominant metastatic disease from colon cancer, partial response, stable disease, and progressive disease seen in 10.2, 60, and 30 percent of patients, respectively

### Bone Metastases from Castration-Resistant Prostate Cancer

- Approximately 174,650 new cases of prostate cancer estimated in the US in 2019
- **Treatments:** radium-223 dichloride, samarium-153 lexidronam, and strontium-89 chloride
- Nearly comparable adverse events and 3.6-month overall survival benefit and 5.6-month benefit in time to first skeletal-related event with radium-223 dichloride compared to placebo