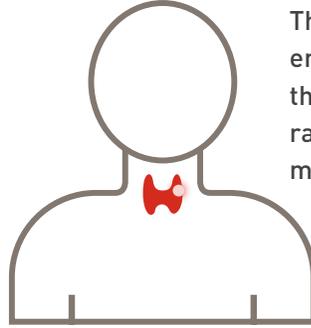


Metastatic *RET*-Driven Thyroid Cancers

About Metastatic Thyroid Cancer

Thyroid cancer is a cancer that starts in a person's thyroid gland. Metastatic means cancer cells have spread to other parts of the body.

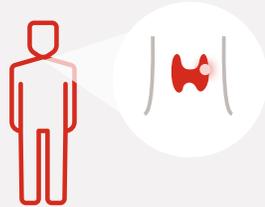
- The most common types of thyroid cancer are papillary and follicular. Other types include Hurthle cell, medullary, and anaplastic.
- Thyroid cancer may spread to other parts of the body, including lungs, bones, and occasionally the brain.



Thyroid cancer is the **most common** endocrine cancer.¹ Until recently, thyroid cancer was also the most rapidly increasing cancer in the U.S., mainly due to increased detection.²

The American Cancer Society estimates that in 2020, there will be:²

About
52,890
new cases of thyroid cancer in the U.S.



About
2,180
deaths from thyroid cancer in the U.S.



Thyroid cancer is usually diagnosed at a **younger age** than most other adult cancers.²

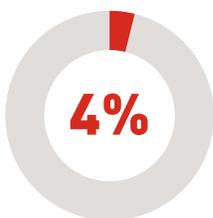


Women are 3 times more likely to develop thyroid cancer than men.²



About Medullary Thyroid Cancer

Medullary thyroid cancer (MTC) accounts for about **4% of thyroid cancers**.³



MTC develops from the C cells of the thyroid gland, which produce calcitonin, a hormone that helps control the amount of calcium in blood.³

There are two types of MTC:³



Sporadic MTC accounts for about 75% of MTC and is not inherited (does not run in families). This cancer occurs mostly in older adults and usually affects only one thyroid lobe.



Familial MTC accounts for about 25% of MTC and is inherited (runs in families). This cancer often develops during childhood or early adulthood and affects several areas of both thyroid lobes.

What are Metastatic *RET*-Driven Thyroid Cancers?

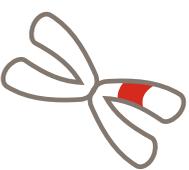
Metastatic thyroid cancer can be driven by a gene in a person's body. One of those genes is *RET* (rearranged during transfection).⁴

We all have something called *RET* in our bodies, similar to how we have faucets in our homes. When a person has a *RET* alteration, it's like that faucet gets stuck in the "on" position, allowing water to spread, just as *RET* alterations allow cancer to grow.^{4,5}



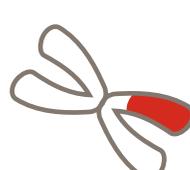
The two main types of these cancer-promoting *RET* gene alterations are mutations and fusions.^{4,7}

RET mutations



RET mutations are found in about **60% of sporadic MTC**⁴ and **over 90% of familial MTC**.⁶

RET fusions



RET fusions can occur in thyroid cancers such as papillary thyroid cancer (PTC), follicular thyroid cancer (FTC), and anaplastic (undifferentiated) thyroid cancer (ATC).^{4,7}

RET fusions are found in approximately **10%-20% of PTC**.^{8,9}

How Are Genetic Alterations in Cancer Identified?

The best way to know if a cancer has an alteration that can be treated is to talk to a doctor about getting tested for all treatable biomarkers.¹⁰



A biomarker test is a type of genetic test that can tell the doctor a lot about the cancer's DNA.¹¹ Certain biomarker tests require a doctor to biopsy the tumor, which means removing some tissue or blood for testing.*^{12,13}

These tests help oncologists develop a treatment plan for their patients. Knowing what is driving the cancer can help the patient and his or her doctor choose the right treatment.¹⁰

*If a tumor has been biopsied previously, some tissue may already be available for testing.

1. Hormone Health Network. Thyroid Cancer. Available at: <https://www.hormone.org/diseases-and-conditions/thyroid-cancer>. Accessed February 28, 2020. 2. American Cancer Society. Key Statistics for Thyroid Cancer. Available at: <https://www.cancer.org/cancer/thyroid-cancer/about/key-statistics.html>. 3. American Cancer Society. What is Thyroid Cancer? Available at: <https://www.cancer.org/cancer/thyroid-cancer/about/what-is-thyroid-cancer.html>. Accessed February 28, 2020. 4. Drilon A, Hu ZI, Lai GGY, Tan DSW. Targeting *RET*-driven cancers: lessons from evolving preclinical and clinical landscapes. *Nat Rev Clin Oncol*. 2018;15(3):150. 5. Pinheiro APM, Pockock RH, Dixon MD, et al. Using metaphors to explain molecular testing to cancer patients. *Oncologist*. 2017;22:445-449. 6. Elisei R, Tactio A, Ramone T, et al. Twenty-five years experience on *RET* genetic screening in hereditary MTC: an update on the prevalence of germline *RET* mutations. *Genes (Basel)*. 2019;10(9). doi:10.3390/genes10090698. 7. Mulligan LM. *RET* revisited: expanding the oncogenic portfolio. *Nat Cancer Rev*. 2014;14(3):173-186. 8. Lee MY, Ku BM, Kim HS, et al. Genetic alterations and their clinical implications in high-recurrence risk papillary thyroid cancer. *Cancer Res Treat*. 2017;49(4):906-914. 9. Prescott JD, Zeiger MA. The *RET* oncogene in papillary thyroid carcinoma. *Cancer*. 2015;121(13):2137-2146. 10. Gregg JP, Li T, Yoneda KY. Molecular testing strategies in non-small cell lung cancer: optimizing the diagnostic journey. *Transl Lung Cancer Res*. 2019;8(3):286-301. 11. Committee on Policy Issues in the Clinical Development and Use of Biomarkers for Molecularly Targeted Therapies; Board on Health Care Services; Institute of Medicine; National Academies of Sciences, Engineering, and Medicine; Graig LA, Phillips JK, Moses HL, eds. *Biomarker Tests for Molecularly Targeted Therapies: Key to Unlocking Precision Medicine*. Washington, DC: National Academies Press (US); 2016: 1-21. 12. Biopsy: what you need to know. Medical News Today. https://www.medicalnewstoday.com/articles/174043.php#what_is_a_biopsy. Accessed February 6, 2020. 13. Cheung AHK, Chow C, To KF. Latest development of liquid biopsy. *J Thorac Dis*. 2018;10:S1645-S1651.