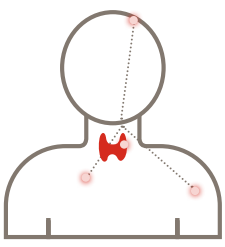
#RETHINKTESTING

UNDERSTANDING METASTATIC *RET*-DRIVEN THYROID CANCERS

ABOUT METASTATIC THYROID CANCER

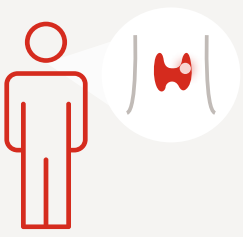


Thyroid cancer is a cancer that starts in a person's thyroid gland. Metastatic means cancer cells have spread to other parts of the body.

- 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]

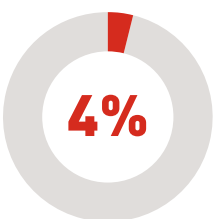
THE AMERICAN CANCER SOCIETY ESTIMATES THAT IN 2021, THERE WILL BE:[2]



About **44,280** **new cases** of thyroid cancer in the U.S.

About **2,200** **deaths** from thyroid cancer in the U.S.

ABOUT MEDULLARY THYROID CANCER

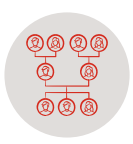


Medullary thyroid cancer (MTC) accounts for about **4% of thyroid cancers**.[3]

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 80% 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.

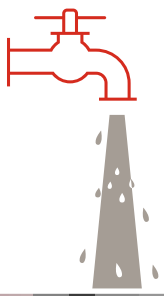
Thyroid cancer is usually diagnosed at a **younger age** than most other adult cancers.[2]

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

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, Pocock 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.

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