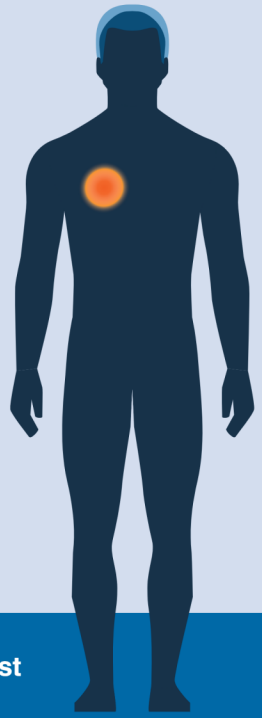
Biomarker Testing

Biomarker testing can identify germline and/or somatic variants. It is the use of laboratory tests to measure genes, proteins, and other substances (biomarkers) found in tissue, blood, or other body fluids.

SOMATIC VARIANT

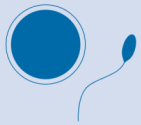
A somatic cell is any cell of the body except sperm and egg cells. Somatic variants can affect the individual but are not passed on to offspring. For example, a somatic driver variant in lung cancer.

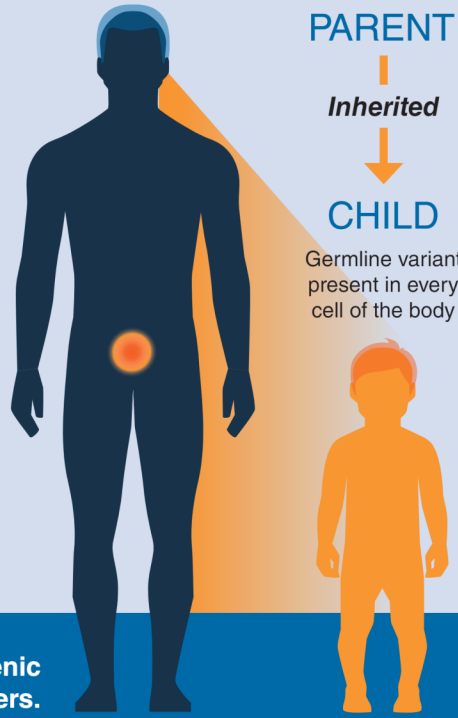


Somatic driver variants are the most common cause of cancer.

GERMLINE VARIANT

A germline variant (alteration) occurs in a sperm cell or an egg cell. Germline variants can be passed on to offspring.





Germline pathogenic variants or likely pathogenic variants account for about 5%–10% of all cancers.

What Does Biomarker Testing Tell Us?

Biomarker testing for a patient with a diagnosis of cancer can provide information that might identify individuals with hereditary risk, facilitate cancer diagnosis, provide prognostic information, and facilitate selection of treatments that are most likely to be effective by identifying germline and/or somatic variants that are driving the cancer to grow (driver variants). Findings offer patient-specific treatment options and management when certain biomarkers are present. Biomarker-directed application of targeted therapies and/or immunotherapies offers a precision approach for improved efficacy and reduced side effects that differs from traditional systemic chemotherapy.

	Somatic Biomarker Testing	Germline Biomarker Testing
Purpose and Implications	The main purpose for somatic testing is to determine the driver variants of the tumor, which provide a growth advantage to the cell and are involved in oncogenesis. • Diagnosis • Prognosis • Informing treatment decisions • Monitoring the disease and its response to treatment	• Determining risk for developing disease • Informing treatment decisions • Long-term risk management, including primary prevention and screening • Informing predisposition to disease in relatives by cascade testing, which is testing at-risk family members for a pathogenic variant previously identified in a biologic relative
Indications*	• Testing may occur at different times during the care continuum, including at diagnosis, during therapy, at recurrence, or when metastatic/advanced disease occurs, to determine appropriate therapy. • Testing occurs to assess for clinical trial eligibility based on different variants. When to test and frequency of testing differs by disease type.	Family and personal histories suggestive of germline variants include the following**: • Early-onset cancer (e.g., breast, colon, or endometrial cancer under age 50 years) • Rare cancers (e.g., male breast cancer) • Certain pathologies (e.g., triple-negative breast cancer) • More cancers in a family than would be expected by chance
Testing Sample	Tumor tissue; blood (liquid biopsy)	Buccal cells in a saliva sample; blood; fibroblasts from a skin sample for patients with hematologic malignancy
Actionable Finding Outcomes	Identify actionable biomarkers to inform prognosis, diagnosis, monitoring, therapy selection, or clinical trial eligibility. Somatic testing may identify possible germline variants associated with hereditary cancer. If this occurs, refer to a genetics healthcare professional.	Identify pathogenic (contributes to the development of disease) and/or likely pathogenic (very likely to contribute to the development of disease) variants for risk identification, disease management, and ongoing surveillance and prevention. Identify risk for family members to inform recommendations for preventive interventions and intensive screening for malignancy.

*Refer to NCCN.org.

**Patients and families should be referred to a credentialed genetics healthcare professional if the criteria applies to them or if they have a personal or family history suggestive of hereditary risk, the tumor has microsatellite instability, the gene in the tumor is a cancer susceptibility gene, a family member has a variant that is considered pathogenic, or the likely pathogenic or the variant allele frequency approaches 50% on somatic testing.

References

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