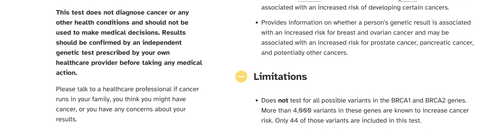
BRCA1/BRCA2 (Selected Variants)

Specific genetic variants in the BRCA1 and BRCA2 genes are associated with an increased risk of developing breast cancer (in females and males) and ovarian cancer. These variants may also be associated with an increased risk for prostate cancer, pancreatic cancer, and potentially other cancers. This test includes 44 out of more than 4,999 variants in the BRCA1 and BRCA2 genes that are known to increase cancer risk.

Overview Scientific Details Frequently Asked Questions

Jamie, you do not have the genetic variants we tested.

However, **this test only includes 44 out of more than 4,999 variants** in the BRCA1 and BRCA2 genes that are known to increase cancer risk. This means **you could still have a variant not included in this test**. In addition, most cases of breast and ovarian cancer are not caused by inherited variants, so females without a variant can still develop these cancers and other cancers. It's important to continue with any cancer screenings your healthcare provider recommends.



If you have a personal or family history of cancer, you should talk to a healthcare professional about other testing options.

How To Use This Test

This test does not diagnose cancer or any other health conditions and should not be used to make medical decisions. Results should be confirmed by an independent genetic test prescribed by your own healthcare provider before taking any medical action.

Please talk to a healthcare professional if cancer runs in your family, you think you might have cancer, or you have any concerns about your results.

Review the BRCA1/BRCA2 (Selected Variants) tutorial

See Frequently Asked Questions

See Scientific Details for complete Indications for Use statement and full list of Warnings, Precautions, and Limitations

Intended Uses

- Tests for 44 variants in the BRCA1 and BRCA2 genes. These variants are associated with an increased risk of developing certain cancers.
- Provides information on whether a person's genetic result is associated with an increased risk for breast and ovarian cancer and may be associated with an increased risk for prostate cancer, pancreatic cancer, and potentially other cancers.

Limitations

- Does **not** test for all possible variants in the BRCA1 and BRCA2 genes. More than 4,999 variants in these genes are known to increase cancer risk. Only 44 of those variants are included in this test.
- Does **not** test for variants in other genes linked to hereditary cancers.
- Does **not** account for non-genetic factors, like environment and lifestyle, that influence overall cancer risk.
- Does **not** report if someone has two BRCA1 or two BRCA2 variants (due to technical limitations).
- The interpretation of your genetic result depends on the birth sex you reported in your account settings.

Ethnicity Considerations

- This test does **not** include the majority of BRCA1 and BRCA2 variants found in people of most ethnicities. People who receive a "variants not detected" result could still have a variant not included in this test, which could impact their cancer risk.
- Of the variants included in this test, the majority are most commonly found in people of Ashkenazi Jewish, African American, European, and Hispanic/Latino descent.

You do not have the variants we tested linked to hereditary breast and ovarian cancer.

Females without these variants are still at risk for breast and ovarian cancer, because most cases of breast and ovarian cancer are caused by other factors.

You could still have a variant not included in this test.

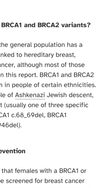
More than 4,999 variants in the BRCA1 and BRCA2 genes are known to increase cancer risk. This test only includes 44 of those variants. The variants in this report do not account for the majority of BRCA1 and BRCA2 variants in people of most ethnicities.

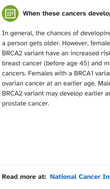
See Scientific Details

In the general population, about **1 in 8** females develops breast cancer during their lifetime, and about **1 in 80** develops ovarian cancer.

Only a small percentage of these cancers are caused by the genetic variants in this report. Your risk is influenced by many other factors, including lifestyle, family history, and other genetic factors.

See Scientific Details





If you have a personal or family history of cancer, talk to a healthcare professional about other testing options.

A genetic counselor can help you assess your overall cancer risk. **Learn more about genetic counseling.**

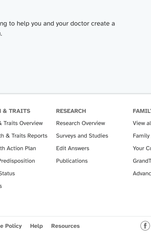
Lifestyle, family history, and other factors can also influence the chances of developing breast and ovarian cancer.

Consult with a healthcare professional before making any major lifestyle changes.

Age

In general, the chances of developing breast and ovarian cancer increase with age. Most cases of breast and ovarian cancer are diagnosed after the age of 55.

See Scientific Details for more information



About BRCA1/BRCA2-Related Cancers

BRCA1 and BRCA2 variants are associated with an increased risk for several different cancers, including breast cancer (in females and males) and ovarian cancer. Variants in these genes may also be associated with an increased risk for prostate cancer, pancreatic cancer, and potentially other cancers.

Lifetime cancer risks

- Females with a **BRCA1** variant have a 45-85% chance of developing breast cancer by age 79 and a 39-46% chance of developing ovarian cancer. They may also have an increased risk for pancreatic cancer.
- Females with a **BRCA2** variant have a 45-85% chance of developing breast cancer by 79 and a 16-27% chance of developing ovarian cancer. They also have an increased risk for pancreatic cancer.
- Males with a BRCA1 or BRCA2 variant have an increased risk for male breast cancer and may have an increased risk for prostate cancer and pancreatic cancer.
- **See Scientific Details to learn more about these risks**

When these cancers develop

In general, the chances of developing cancer increase as a person gets older. However, females with a BRCA1 or BRCA2 variant have an increased risk for early-onset breast cancer (before age 45) and multiple breast cancers. Females with a BRCA1 variant may also develop ovarian cancer at an earlier age. Males with a BRCA1 or BRCA2 variant may develop earlier and more aggressive prostate cancer.

How common are BRCA1 and BRCA2 variants?

About 1 in 299 people in the general population has a BRCA1 or BRCA2 variant linked to hereditary breast, ovarian, and pancreatic cancer, although most of those variants are not included in this report. BRCA1 and BRCA2 variants are more common in people of certain ethnicities. For example, among people of Ashkenazi Jewish descent, about 1 in 49 has a variant (usually one of three specific variants in this report: BRCA1 c.68_69del, BRCA1 c.5266dup, or BRCA2 c.5946del).

Screening and prevention

- Guidelines recommend that females with a BRCA1 or BRCA2 variant should be screened for breast cancer earlier and more often. However, there are currently no ovarian cancer screening tests that have been proven safe and effective. For females with a BRCA1 or BRCA2 variant, surgery and medication have been shown to be effective in reducing the risk of developing breast and ovarian cancer.
- Males with a BRCA1 or BRCA2 variant should be screened for male breast cancer. They should discuss their result with a doctor to determine whether prostate cancer screening is appropriate.
- People with a BRCA1 or BRCA2 variant and a family history of pancreatic cancer may also be offered pancreatic cancer screening.
- Always consult with a healthcare professional before taking any medical action.

Read more at: National Cancer Institute* GeneReviews*

Learn more about BRCA1/BRCA2-related cancers.

See our Frequently Asked Questions for more information.

FAQs

If you have a personal or family history of cancer, consult with a healthcare professional.

Print report

Learn more about cancer screening to help you and your doctor create a screening plan that's right for you.

Learn more

BRCA1/BRCA2 (Selected Variants)

Specific genetic variants in the BRCA1 and BRCA2 genes are associated with an increased risk of developing breast cancer (in females and males) and ovarian cancer. These variants may also be associated with an increased risk for prostate cancer, pancreatic cancer, and potentially other cancers. This test includes 44 out of more than 4,000 variants in the BRCA1 and BRCA2 genes that are known to increase cancer risk.

Overview | Scientific Details | Frequently Asked Questions

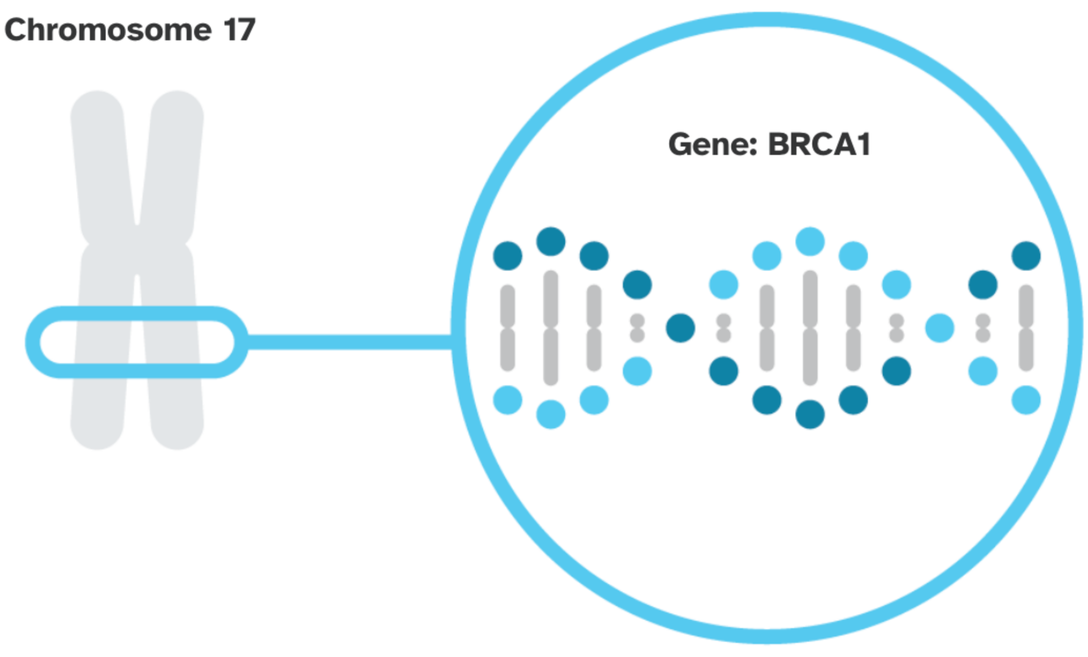
Genetic variants in the BRCA1 and BRCA2 genes are associated with an increased risk for certain hereditary cancers.

This report includes 24 variants in the BRCA1 gene and 20 variants in the BRCA2 gene. These variants do not account for the majority of the BRCA1 and BRCA2 variants in people of most ethnicities. More than 4,000 variants in these genes are known to increase cancer risk.

BRCA1 | BRCA2

The BRCA1 gene contains instructions for making a protein that helps repair damaged DNA. The BRCA1 protein also helps control the process of cell division. Through both of these functions, the BRCA1 protein acts as a tumor suppressor, preventing cells from growing and dividing too rapidly. Certain variants in the BRCA1 gene disrupt the protein's function. This can lead to a buildup of DNA errors, and can cause normal cells to become cancer cells.

Read more at MedlinePlus



You do not have the genetic variants we tested.

Variants Detected | View All Tested Markers

Marker Tested	Your Genotype*		Additional Information
c.68_69del **Gene:** BRCA1 **Marker:** rs80357914	**CT** Typical copy from one of your parents	**CT** Typical copy from your other parent	**Biological explanation** **Typical vs. variant DNA sequence(s)** **Percent of 23andMe customers with variant** **References [9, 34, 39, 43, 77, 102]** | ClinVar

c.213-11T>G

Gene: BRCA1

Marker: rs80358061

A

Typical copy from one of your parents

A

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [29, 30, 34, 77]** | **ClinVar**

c.427G>T

Gene: BRCA1

Marker: rs80356991

C

Typical copy from one of your parents

C

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [14, 39, 77]** | **ClinVar**

c.815_824dup

Gene: BRCA1

Marker: rs387906563

(—)

Typical copy from one of your parents

(—)

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [28, 34, 55, 77]** | **ClinVar**

c.1556del

Gene: BRCA1

Marker: rs80357662

T

Typical copy from one of your parents

T

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [24, 39, 77]** | **ClinVar**

c.1687C>T

Gene: BRCA1

Marker: rs80356898

G

Typical copy from one of your parents

G

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [34, 39, 77, 90]** | **ClinVar**

c.1960A>T

Gene: BRCA1

Marker: rs80357355

T

Typical copy from one of your parents

T

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [57, 77, 103]** | **ClinVar**

c.1961del

Gene: BRCA1

Marker: rs80357522

T

Typical copy from one of your parents

T

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [22, 65, 77]** | **ClinVar**

c.2681_2682del

Gene: BRCA1

Marker: rs80357971

TT

Typical copy from one of your parents

TT

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [39, 77, 86]** | **ClinVar**

c.2864C>A

Gene: BRCA1

Marker: rs80357295

G

Typical copy from one of your parents

G

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [65, 77, 103]** | **ClinVar**

c.3481_3491del

Gene: BRCA1

Marker: rs80357877

CTAGTATCTTC

Typical copy from one of your parents

CTAGTATCTTC

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [25, 39, 77]** | **ClinVar**

c.3598C>T

Gene: BRCA1

Marker: rs62625307

G

Typical copy from one of your parents

G

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [40, 76, 77]** | **ClinVar**

c.3627dup

Gene: BRCA1

Marker: rs80357729

(—)

Typical copy from one of your parents

(—)

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [69, 77, 89]** | **ClinVar**

c.3756_3759del

Gene: BRCA1

Marker: rs80357868

AGAC

Typical copy from one of your parents

AGAC

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [31, 39, 77]** | **ClinVar**

c.3770_3771del

Gene: BRCA1

Marker: rs80357579

CT

Typical copy from one of your parents

CT

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [22, 76, 77]** | **ClinVar**

c.4035del

Gene: BRCA1

Marker: rs80357711

T

Typical copy from one of your parents

T

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [39, 73, 77]** | **ClinVar**

c.4065_4068del

Gene: BRCA1

Marker: rs80357508

TTGA

Typical copy from one of your parents

TTGA

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [26, 34, 39, 77]** | **ClinVar**

c.4327C>T

Gene: BRCA1

Marker: rs41293455

G

Typical copy from one of your parents

G

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [39, 77, 97]** | ClinVar

c.4357+1G>A

Gene: BRCA1

Marker: rs80358027

C

Typical copy from one of your parents

C

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [23, 28, 34, 77, 94]** | ClinVar

c.4964_4982del

Gene: BRCA1

Marker: rs80359876

TCTTCTGGGGTCAGGCCAG

Typical copy from one of your parents

TCTTCTGGGGTCAGGCCAG

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [10, 39, 77]** | ClinVar

c.4986+6T>G

Gene: BRCA1

Marker: rs80358086

A

Typical copy from one of your parents

A

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [16, 44, 77, 78, 84]** | ClinVar

c.5123C>A

Gene: BRCA1

Marker: rs28897696

G

Typical copy from one of your parents

G

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [34, 58, 65, 77, 98]** | ClinVar

c.5177_5180del

Gene: BRCA1

Marker: rs80357867

TTTC

Typical copy from one of your parents

TTTC

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [17, 28, 34, 66, 77]** | ClinVar

c.5266dup

Gene: BRCA1

Marker: rs80357906

(—)

Typical copy from one of your parents

(—)

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [9, 34, 39, 43, 77, 102]** | ClinVar

c.658_659del

Gene: BRCA2

Marker: rs80359604

GT

Typical copy from one of your parents

GT

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**

References [11, 21, 77] | ClinVar

---

c.771_775del
Gene: BRCA2
Marker: rs80359671

TCAAA
Typical copy from one of your parents

TCAAA
Typical copy from your other parent

- Biological explanation
- Typical vs. variant DNA sequence(s)
- Percent of 23andMe customers with variant
- References [39, 77, 95] | ClinVar

---

c.1929del
Gene: BRCA2
Marker: rs80359316

G
Typical copy from one of your parents

G
Typical copy from your other parent

- Biological explanation
- Typical vs. variant DNA sequence(s)
- Percent of 23andMe customers with variant
- References [26, 39, 77] | ClinVar

---

c.2808_2811del
Gene: BRCA2
Marker: rs80359351

ACAA
Typical copy from one of your parents

ACAA
Typical copy from your other parent

- Biological explanation
- Typical vs. variant DNA sequence(s)
- Percent of 23andMe customers with variant
- References [38, 77, 98] | ClinVar

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c.2957_2958insG
Gene: BRCA2
Marker: rs1555282969

(—)
Typical copy from one of your parents

(—)
Typical copy from your other parent

- Biological explanation
- Typical vs. variant DNA sequence(s)
- Percent of 23andMe customers with variant
- References [32, 36, 77] | ClinVar

---

c.3170_3174del
Gene: BRCA2
Marker: rs80359373

AGAAA
Typical copy from one of your parents

AGAAA
Typical copy from your other parent

- Biological explanation
- Typical vs. variant DNA sequence(s)
- Percent of 23andMe customers with variant
- References [39, 64, 77] | ClinVar

---

c.3264dup
Gene: BRCA2
Marker: rs80359380

(—)
Typical copy from one of your parents

(—)
Typical copy from your other parent

- Biological explanation
- Typical vs. variant DNA sequence(s)
- Percent of 23andMe customers with variant
- References [21, 34, 77, 103] | ClinVar

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c.3545_3546del
Gene: BRCA2
Marker: rs80359388

TT
Typical copy from one of your parents

TT
Typical copy from your other parent

- Biological explanation
- Typical vs. variant DNA sequence(s)
- Percent of 23andMe customers with variant
- References [29, 48, 77] | ClinVar

c.3847_3848del

Gene: BRCA2

Marker: rs80359405

GT

Typical copy from one of your parents

GT

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [39, 77, 104]** | ClinVar

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c.4471_4474del

Gene: BRCA2

Marker: rs80359451

CTGA

Typical copy from one of your parents

CTGA

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [66, 70, 81]** | ClinVar

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c.5542del

Gene: BRCA2

Marker: rs80359519

A

Typical copy from one of your parents

A

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [77, 99, 100]** | ClinVar

---

c.5576_5579del

Gene: BRCA2

Marker: rs80359520

TTAA

Typical copy from one of your parents

TTAA

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [41, 42, 77]** | ClinVar

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c.5682C>G

Gene: BRCA2

Marker: rs41293497

C

Typical copy from one of your parents

C

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [67, 77, 91]** | ClinVar

---

c.5946del

Gene: BRCA2

Marker: rs80359550

T

Typical copy from one of your parents

T

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [9, 34, 39, 43, 77, 102]** | ClinVar

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c.6037A>T

Gene: BRCA2

Marker: rs80358840

A

Typical copy from one of your parents

A

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [48, 77, 82]** | ClinVar

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c.6275_6276del

Gene: BRCA2

Marker: rs11571658

TT

Typical copy from one of your parents

TT

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [39, 77, 86]** | ClinVar

c.7024C>T

Gene: BRCA2

Marker: rs80358928

C

Typical copy from one of your parents

C

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [20, 33, 68, 77]** | **ClinVar**

c.7480C>T

Gene: BRCA2

Marker: rs80358972

C

Typical copy from one of your parents

C

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [34, 39, 77, 83, 89]** | **ClinVar**

c.7934del

Gene: BRCA2

Marker: rs80359688

G

Typical copy from one of your parents

G

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [77, 85, 87]** | **ClinVar**

c.8904del

Gene: BRCA2

Marker: rs80359730

C

Typical copy from one of your parents

C

Typical copy from your other parent

- **Biological explanation**
- **Typical vs. variant DNA sequence(s)**
- **Percent of 23andMe customers with variant**
- **References [18, 39, 77]** | **ClinVar**

*** The percent of 23andMe customers with a variant may not be representative of the general population.**

This test cannot distinguish which copy you received from which parent. This test also cannot determine whether multiple variants, if detected, were inherited from only one parent or from both parents. This may impact how these variants are passed down.

23andMe always reports genotypes based on the 'positive' strand of the human genome reference sequence (build 37). Other sources sometimes report genotypes using the opposite strand.

Test Interpretation

This report provides risk estimates for several cancers associated with BRCA1 and BRCA2 variants. This test does not take into account non-genetic factors that influence a person's overall risk for these cancers.

Health Risk Estimates

Risk estimates are based on clinical studies that identify an association between a genotype and a health condition.

Numerical risk estimates are not available for people who have both a BRCA1 and a BRCA2 variant. An interpretation of "increased risk" is provided to people with this result. It is likely that their risk is at least as high as the risk for people with just one variant. More research is needed to understand the risk for people with this result.

For some cancers, numerical risk estimates are not available.

Consider talking to a healthcare professional if you have any concerns about your results.

References [19, 27, 46, 92, 93]

Lifetime risk | Risk by age

The risk estimates shown below represent the proportion of people expected to develop a given cancer during their lifetime. Estimates for the general population are based on observed cancers among people in the United States. Estimates for people with a BRCA1 or BRCA2 variant are based primarily on studies of people of European and Ashkenazi Jewish descent. Estimates for people with a BRCA1 or BRCA2 variant represent the risk of developing cancer by the age of 70 (for females) or during their lifetime (for males).

Cancer type	General population	BRCA1 variant	BRCA2 variant
Breast (female)	12.9%	45-85%	45-85%
Ovarian	1.1%	39-46%	10-27%
Breast (male)	0.1%	1-2%	7-8%
Prostate	12.6%	May have an increased risk	Increased risk
Pancreatic	1.7%	May have an increased risk	Increased risk
Melanoma	2.1%	Research ongoing	Research ongoing

See risk estimates by race and ethnicity for the general population

Other Factors

The genetic variants in this report are associated with a greatly increased risk for breast and ovarian cancer. They may also be associated with an increased risk for pancreatic cancer. However, other factors besides the genetic variants in this report can influence your chances of developing these cancers.

This is not a complete list of other factors.

People with multiple risk factors may have a higher risk of developing cancer.

Consult with a healthcare professional before making any major lifestyle changes.

Other Factors	References
Age Like most cancers, the risk of developing breast and ovarian cancer generally increases with age. In the general U.S. population, the risk of developing breast cancer by age 40 is about 1 in 200. That number rises to about 1 in 8 by age 80. For ovarian cancer, the risk is about 1 in 1,000 by age 40 and about 1 in 80 by age 80. In general, the risk for pancreatic cancer also increases with age.	[88, 92]
Family history Most people who develop breast and ovarian cancer don't have a family history of these cancers. However, people whose mothers or sisters have had breast or ovarian cancer are more likely to develop these cancers themselves. For both cancers, the risk is even greater in families with more than one affected family member. The risk is also greater when family members were diagnosed with cancer at an earlier age. This increased risk is likely due to shared genetic and non-genetic factors. A family history of pancreatic cancer also increases a person's risk for that cancer.	[3, 4, 5]

Weight [3, 4, 5, 49]

After menopause, being overweight increases the chances of developing breast cancer. Weight gain during adulthood is also associated with an increased risk. In addition, obesity is associated with a higher risk for pancreatic cancer and may be associated with a higher risk for ovarian cancer. These increased risks may be due to differences in estrogen levels, insulin signaling, and inflammation in females who are overweight.

Reproductive history [3, 4]

Females who started menstruating at a young age or who experience menopause at an older age have a higher risk of developing breast and ovarian cancer. Conversely, having children and breastfeeding are associated with a lower risk for these cancers. Scientists think that reproductive history affects breast and ovarian cancer risk by altering estrogen levels in the body. Factors that increase the amount of time a person is exposed to estrogen are often associated with an increased risk for these cancers.

Alcohol consumption [1, 3, 5]

Drinking alcohol increases the chances of developing breast cancer. The risk increases with greater alcohol consumption, but even one drink per day may increase risk. Risk does not seem to vary by type of alcohol consumed. Scientists think this increased risk may be due to changes in hormone levels caused by drinking alcohol. Alcohol consumption may also increase risk for pancreatic cancer. It has not been associated with an increased risk for ovarian cancer.

The American Cancer Society states that it's best not to drink alcohol at all. For those who choose to drink, experts recommend limiting alcohol consumption to ≤1 drink per day for females and ≤2 drinks per day for males.

Other genetic variants [13, 60, 61]

More than 4,000 variants in the BRCA1 and BRCA2 genes have been linked to hereditary breast, ovarian, and pancreatic cancer. Variants in other genes can also increase the risk for these cancers. In some cases, risk is increased to levels similar to the risk conferred by BRCA1 and BRCA2 variants.

Hormone exposure [3, 4]

Exposure to external sources of the hormones estrogen and progesterone affect the chances of developing breast and ovarian cancer. For example, certain types of menopausal hormone therapy are associated with an increased risk for breast cancer. Current or recent use of menopausal hormone therapy has also been associated with an increased risk for ovarian cancer. The use of oral contraceptives is linked to a decreased risk for ovarian cancer and may be associated with a slightly increased risk for breast cancer in people who are currently taking them.

Breast density [3]

Having dense breast tissue increases the risk of developing breast cancer. Dense breast tissue also makes cancers harder to detect with a mammogram. For some people with dense breast tissue, a healthcare professional may recommend additional imaging tests to screen for breast cancer.

Physical activity [3]

Engaging in regular physical activity is associated with a lower risk of developing breast cancer, and higher levels of activity are associated with bigger reductions in risk. The links between physical activity and ovarian cancer risk are not yet well understood.

Smoking [3, 4, 5]

Smoking may be associated with an increased risk of developing breast cancer and certain types of ovarian tumors. The strongest effect is observed in people who have smoked heavily for many years. Smoking is also a strong risk factor for pancreatic cancer, accounting for about 25% of all cases.

Cancer Screening Guidelines

Cancer screening can help detect certain cancers at an earlier stage, when they may be more treatable. The guidelines below apply to people with an average risk of developing cancer. These guidelines may help you and your doctor create a screening plan that's right for you.

Breast cancer

Females should receive regular mammograms depending on their age and other factors. They are also encouraged to become familiar with how their breasts normally feel and talk to a doctor if they notice any changes. Learn more from the **American Cancer Society**.

Prostate cancer

Males should talk with their doctor about the benefits and risks of prostate cancer screening. Learn more from the **American Cancer Society**.

There are currently no specific screening guidelines for ovarian cancer, male breast cancer, or pancreatic cancer. If you have a personal or family history of one of these cancers, please talk with a healthcare professional.

The guidelines above cover the cancers associated with the variants in this report. You can find information about screening for other cancers from the **American Cancer Society**. Note that guidelines from different healthcare professional organizations may differ in their recommendations.

Keep in mind that you could still have a BRCA1 or BRCA2 variant not included in this report, or a variant in another gene, that could affect your cancer risk. In that case, different screening and prevention actions may be recommended. Consult with a healthcare professional to learn more.

Test Details

Indications for Use

The 23andMe Personal Genome Service (PGS) uses qualitative genotyping to detect select clinically relevant variants in genomic DNA isolated from human saliva collected from individuals ≥18 years with the Oragene Dx model OGD500.001 for the purpose of reporting and interpreting genetic health risks, including the 23andMe PGS Genetic Health Risk Report for BRCA1/BRCA2 (Selected Variants). The 23andMe PGS Genetic Health Risk Report for BRCA1/BRCA2 (Selected Variants) is indicated for reporting of 44 variants in the BRCA1 and BRCA2 genes. The report describes if a person's genetic result is associated with an increased risk of developing breast cancer and ovarian cancer and may be associated with an increased risk for prostate cancer, pancreatic cancer, and potentially other cancers. The variants included in this report do not represent the majority of the BRCA1/BRCA2 variants in people of most ethnicities. The test report does not describe a person's overall risk of developing any type of cancer, and the absence of a variant tested does not rule out the presence of other variants that may be cancer-related. This report is for over-the-counter use by adults over the age of 18, and provides genetic information to inform discussions with a healthcare professional. This test is not a substitute for visits to a healthcare provider for recommended screenings or appropriate follow-up and should not be used to determine any treatments. The full list of variants included in this report is: BRCA1: c.68_69del, c.213-11T>G, c.427G>T, c.815_824dup, c.1556del, c.1687C>T, c.1960A>T, c.1961del, c.2681_2682del, c.2864C>A, c.3481_3491del, c.3598C>T, c.3627dup, c.3756_3759del, c.3770_3771del, c.4035del, c.4065_4068del, c.4327C>T, c.4357+1G>A, c.4964_4982del, c.4986+6T>G, c.5123C>A, c.5177_5180del, c.5266dup. BRCA2: c.658_659del, c.771_775del, c.1929del, c.2808_2811del, c.2957_2958insG, c.3170_3174del, c.3264dup, c.3545_3546del, c.3847_3848del, c.4471_4474del, c.5542del, c.5576_5579del, c.5682C>G, c.5946del, c.6037A>T, c.6275_6276del, c.7024C>T, c.7480C>T, c.7934del, c.8904del.

Special Considerations

- Genetic testing for BRCA1 and BRCA2 variants in the general population is not currently recommended by any healthcare professional organizations.
- Cancer risk associated with a BRCA1 or BRCA2 variant varies from person to person. Exact risk depends on family history and other factors. In addition, new research in the future may determine that other cancers — besides those mentioned in this report — may be associated with BRCA1 and BRCA2 variants. Please talk to a healthcare professional if you have questions about new research related to BRCA-associated cancers.

Test Performance Summary

Clinical Performance [12, 15, 34, 35, 37, 39, 40, 47, 51, 52, 62, 72, 74, 75, 77, 79, 80, 96, 101, 102]

The variants included in this report represent a very small subset of all those associated with breast, ovarian, prostate, and pancreatic cancer. The variants tested are associated with an increased risk of developing these cancers. However, not everyone with these variants will develop cancer. In addition, most cases of these cancers are not caused by inherited genetic variants.

- Inherited variants in the BRCA1 and BRCA2 genes account for approximately 5-10% of breast cancers, 10-15% of ovarian cancers, 15-20% of male breast cancers, 1-6% of prostate cancers, and 1-10% of pancreatic cancers. Among people with a family history, these percentages are expected to be higher.
- The variants in this report account for more than 90% of cancer-related BRCA1 and BRCA2 variants among people of Ashkenazi Jewish descent. These variants account for a much smaller proportion of cancer-related BRCA1 and BRCA2 variants found in people of other ethnicities, including about 30-40% among African Americans, people of European descent, and people of Hispanic or Latino descent; about 5-25% among people of East Asian descent; and up to 35% among people of South Asian descent.
- About 1 in 40 people of Ashkenazi Jewish descent is expected to have one of three specific variants in this report (BRCA1 c.68_69del, BRCA1 c.5266dup, or BRCA2 c.5946del). Among people of other ethnicities, about 1 in 200 has a BRCA1 or BRCA2 variant, but most of those variants are not included in this report.

Analytical Performance

Accuracy was determined by comparing results from this test with results from sequencing. Greater than 99% of test results were correct. The widest 95% confidence interval was 47.3% to 100% for the heterozygous BRCA1 c.2864C>A genotype. While unlikely, this test may provide false positive or false negative results. It is possible that the presence of certain mutations in your sample may interfere with the performance of this test. The effects of the interfering mutations on the

Warnings, Precautions, and Limitations

- This test does not diagnose cancer or any other health conditions and cannot determine your overall risk of developing cancer in the future.
- This test should not be used to make medical decisions. Results should be confirmed by an independent genetic test prescribed by your own healthcare provider before taking any medical action.
- This test does not cover all variants that could increase risk for cancer.* The absence of a variant tested does not rule out the presence of other genetic variants that may impact cancer risk.
- Other factors, such as environmental and lifestyle risk factors, may affect your risk of developing cancer. This test does not account for those factors, and does not test for variants in other genes linked to hereditary cancers.
- Your ethnicity may affect how relevant this test is for you.
- This test is intended to provide you with genetic information to inform conversations with your doctor or other healthcare professional.
- This device is not intended for prenatal testing.
- This test should not be used to assess the presence of genetic variants that may impact response to medications.
- This test is not intended to detect the presence of deterministic variants in autosomal dominant diseases or conditions.
- This test is not a substitute for visits to a healthcare professional for recommended screenings. Consult with a healthcare professional if you have any questions or concerns about your results or your current state of health.
- Some people feel a little anxious after getting genetic health risk results. This is normal. If you feel very anxious, you should speak to your doctor or a genetic counselor.

See the **Package Insert** for more details on use and performance of this test.

* Variants not included in this test may be rare, may not be available on our genotyping platform, or may not pass our testing standards.

performance of this test have not been studied. For more details on the analytical performance of this test, refer to the package insert.

References

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10. Baudi F et al. (2001). "Evidence of a founder mutation of BRCA1 in a highly homogeneous population from southern Italy with breast/ovarian cancer." Hum Mutat. 18(2):163-4.

See all references

Change Log

Your report may occasionally be updated based on new information. This Change Log describes updates and revisions to this report.

Date	Change
Oct. 16, 2023	41 genetic variants were added to the report for customers on the most recent version of the 23andMe genotyping platform (V5). If any of these variants were detected, customers will see this reflected in their result. For customers with a BRCA2 variant detected, the interpretation of the genetic result was changed from "may have an increased risk for pancreatic cancer" to "increased risk for pancreatic cancer" based on updated clinical guidelines. For customers with a BRCA1 variant detected, information about Fanconi anemia group S was added. Variant names were updated to align with the naming conventions used in the scientific literature. The names of the three Ashkenazi Jewish founder variants have been updated as follows: 185delAG is now

	c.68_69del, 5382insC is now c.5266dup, and 6174delT is now c.5946del.
Nov. 5, 2020	Information about pancreatic cancer screening was added for people with a BRCA1 or BRCA2 variant and a family history of pancreatic cancer.
April 9, 2018	BRCA1/BRCA2 (Selected Variants) report created.

BRCA1/BRCA2 (Selected Variants)

Specific genetic variants in the BRCA1 and BRCA2 genes are associated with an increased risk of developing breast cancer (in females and males) and ovarian cancer. These variants may also be associated with an increased risk for prostate cancer, pancreatic cancer, and potentially other cancers. This test includes 44 out of more than 4,000 variants in the BRCA1 and BRCA2 genes that are known to increase cancer risk.

BRCA1/BRCA2 (Selected Variants)

What does this test do?

What does this test **not** do?

Who is at risk for breast, ovarian, prostate, and other cancers?

The report says this report does **not** include the majority of BRCA1 and BRCA2 variants found in people of most ethnicities. What does this mean?

Where can I learn more about cancer, support groups, and other resources?

My report says **zero variants** were detected. What does this mean?

My report says **zero variants** were detected. Does this mean I'm not at risk of developing breast and ovarian cancer?

My report says **zero variants** were detected, but I have a personal or family history of breast or ovarian cancer. What does this mean for me?

My report says **zero variants** were detected. What are some things I could do?

Have more questions? **Check out our Customer Care Help Center.**

