Report Contents

1. **Coriell Personalized Medicine Collaborative Research Study Report. This report includes all data included in the clinical report as well as supplemental interpretations and educational material. This research report is based on Questionnaires Finalized on 08/01/2010**

2. **Clinical Report. This report was generated and approved by Coriell's CLIA certified genotyping laboratory.**

Sample Results

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CPMC Research Study Report

Name:	STEVE CPMC	**Gender:**	Male
Date of Birth:		**Date Collected:**	11-30-2016
Coriell ID:	DEMOSTEVE	**Date Received:**	11-30-2016
Lab Accessioning Number:	DEMOSTEVE	**Date of Report:**	05-07-2013
Ordering Physician:	Dr. Edward Viner		

Risk of Developing Breast Cancer Based on:

- **CPMC Breast Cancer Variant 1 (rs2981582)**

The CPMC is a research study investigating the utility of personalized genomic information on health and health behavior. At this time, the CPMC is reporting only one genetic variant per health condition. Since most common health conditions are caused by an interaction between more than one genetic factor and non-genetic factors such as lifestyle, the genetic variant risk in this report does not represent your complete genetic risk for breast cancer. The breast cancer risk factors that the CPMC reports on have only been studied in women; therefore men will not receive risk estimates for breast cancer. However, genetic variant results are provided to men because the result may be informative for their female relatives (mother, sisters, and daughters).

In some cases, a change in a single gene (like **BRCA1** or **BRCA2**), can cause significantly increased risk for breast cancer. These genetic variants are rare, associated with a strong family history cancer, and **are not tested as part of the CPMC research study**. If you have a family history of early onset breast cancer (before age 50), multiple family members with breast and/or ovarian cancer diagnosed at any age, or any male relatives with breast cancer, please contact a CPMC genetic counselor to determine if you are at risk for a hereditary form of cancer.

These results were generated as part of this research study in a CLIA-approved laboratory.

More information about the study, how to interpret CPMC results, and how we calculate risk is available on our website http://cpmc.coriell.org or by contacting our genetic counselors. Participants may schedule an appointment with one of our board-certified genetic counselors through the web portal by clicking on “request an appointment”. Our genetic counselors also can be reached by email at cpmcgc@coriell.org or by phone at 888-580-8028.

This research report includes all data included in the clinical report as well as supplemental interpretations and educational material. Please see the report that follows for the official clinical report.

Breast Cancer

The breast cancer risk factors that the CPMC reports on have only been studied in women; therefore men will not receive risk estimates for breast cancer. Your genetic variant result may be informative for female relatives (mother, sisters, daughters).

Breast Cancer

Risk Due To Genetic Variant #1 (rs2981582)

Your Result: 2 copies of the risk variant were detected (AA)

Non-Risk Variant = G Risk Variant = A

The breast cancer risk factors that the CPMC reports on have only been studied in women; therefore men will not receive risk estimates for breast cancer.

Your genetic variant result may be informative for your female relatives (mother, sisters, and daughters). Women with 1 or 2 copies of this risk variant are more likely to develop breast cancer than women with 2 copies of the non risk variant.

Breast Cancer - Variant #1 (rs2981582)

We all have 2 copies of every gene, one from each of our parents.
Each copy may have small changes called genetic variants.
Some genetic variants are associated with an increased risk of disease.
Some genetic variants are associated with a decreased risk of disease.

Having one or two copies of this variant **increases** the risk for breast cancer in **women**.

How Common Is This Variant?

Non-Risk Variant = G **Risk Variant = A**

GG - 38 in 100 people have 2 copies of the non-risk variant

GA - 47 in 100 people have 1 copy of the non-risk variant and 1 copy of the risk variant

AA - 15 in 100 people have 2 copies of the risk variant

This data is based on studies in Caucasian populations.

Gene: FGFR2 **Chromosome: 10q26.13**

Causes

Genetic vs. Non-Genetic Risk Factors

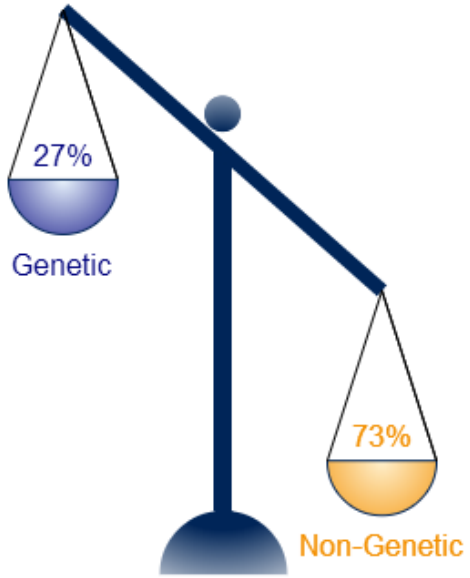
Breast cancer can be caused by both genetic factors and non-genetic (or environmental) risk factors.

It is estimated that **non-genetic** factors (like body mass index, alcohol consumption, etc.) account for about **73%** of the risk of breast cancer.

It is estimated that **27%** of the risk for breast cancer is based on **genetic** risk factors. This estimate accounts for both known and unknown gene variants.

In rare cases, breast cancer can be caused by a change in a single gene (like BRCA1 or BRCA2), not tested as part of the CPMC research study. If you have a family history of early onset breast cancer (before age 50), multiple family members with breast or ovarian cancer diagnosed at any age, or any male relatives with breast cancer, please contact a CPMC genetic counselor to determine if you are at risk for a hereditary form of cancer.

There are many different genetic and non-genetic risk factors that contribute to the risk of breast cancer. The breast cancer risk factors that the CPMC reports on have only been studied in women; therefore men will not receive risk estimates for breast cancer. However, your genetic variant result may be informative for your female relatives (mother, sisters, and daughters).

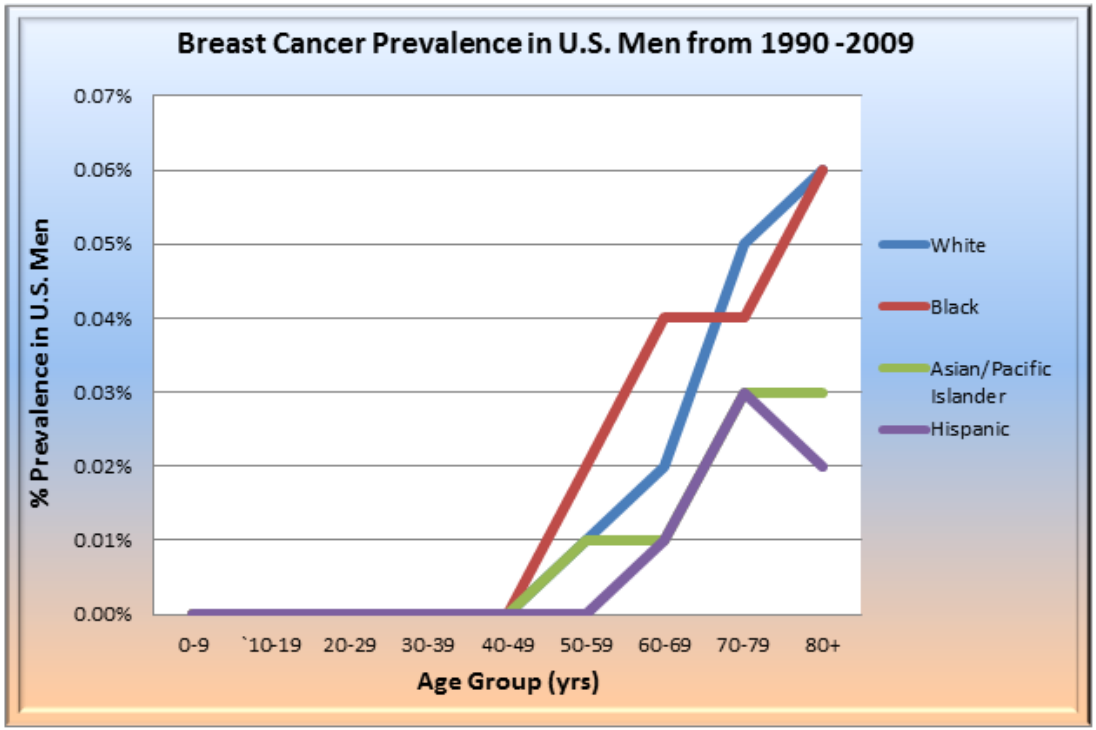


How Common

The risk of having breast cancer increases with age and is more common among Caucasian women.

You reported you are a Caucasian man, between 60 and 69 years old; 2 in 10,000 Caucasian men in your age group have breast cancer.

Age, gender and race/ethnicity contribute to your risk of breast cancer.



Limitations

Breast Cancer

- This result alone does NOT diagnose breast cancer. Breast cancer must be diagnosed by your health care provider.
- This result does NOT mean that you have or will absolutely develop breast cancer.
- This result does NOT mean that you will not develop breast cancer in the future.
- This result ONLY assesses your risk for developing breast cancer due to the factors presented in this report and does not mean that other genetic variants or risk factors for breast cancer are present or absent.
- Personal risk factors, such as age, family history or lifestyle, may have a greater impact on your risk to develop breast cancer than any individual genetic variant.
- Risk estimates are based on current available literature.
- Although rare, it is possible that you may receive an incorrect result; 100% accuracy of reported results cannot be guaranteed.
- Occasionally there may be a specific variant on a gene chip that is not able to be read or interpreted. In this case you will not receive a result for that variant. It is expected that you will receive results for about 95% of variants approved by the ICOB.
- Relative risks used to estimate risk of disease for CPMC participants are based on groups of people with the same risk or protective factor as the individual CPMC participant. In some cases, the relative risk is estimated based upon an odds ratio and known or assumed disease prevalence.
- Separate risk estimates for each risk or protective factor have been given. Risk or protective factors may be related to each other and risk estimates cannot be combined.
- Risk information for non-genetic factors is based on information you provided in your medical, family, lifestyle questionnaire. If you did not provide answers or if you answered “do not know”, risk estimates for some factors may not be available.
- Risk information for non-genetic factors is based on information you provided in your medical, family, lifestyle questionnaire and may not be reflective of your current risk if any of these factors have changed. You will be given the opportunity to update your medical, family and lifestyle questionnaire responses periodically.
- Every effort will be made to provide you with risk information based on your reported race/ethnicity. However, data may not be available for all races/ethnicities for all risk factors. Please see your individual results to determine which race/ethnicity the data given is based on.

Methods

Breast Cancer

This condition and genetic variant(s) were approved by the Informed Cohort Oversight Board (ICOB)

Test Methodology
Saliva samples were collected using Oragene DNA Collection Kits (DNA Genotek) and DNA was extracted manually according to the manufacturer's instructions. Purified DNA was quantified using UV absorbance at 260 nm. Five hundred nanograms of the resulting DNA from each sample were used as template in the Affymetrix Genome-Wide Human SNP Nsp/Sty 6.0 GeneChip assay. Data analysis was performed using Affymetrix Genotyping Console software.

See CPMC Technical Paper for genetic variant selection and reporting methodology.

[Risk interpretation based on Coriell's Breast Cancer Risk Algorithm Version 1 (May 14, 2013)]

1. Stack, C. et al (2011). Genetic risk estimation in the Coriell Personalized Medicine Collaborative. Genet Med. 13(2):131-139.
2. Easton, DF. et al (2007). Genome-wide association study identifies novel breast cancer susceptibility loci. Nature. 447(28):1087-1095.
3. Travis, RC. et al (2010). Gene-environment interactions in 7610 women with breast cancer: prospective evidence from the Million Women Study. Lancet. 375(9732):2143-2151
4. Reeves, GK. et al 2007. Cancer incidence and mortality in relation to body mass index in the Million Women Study: cohort study. BMJ. 335(7630):1134S
5. Allen, NE. et al (2009). Moderate alcohol intake and cancer incidence in women. J Natl Cancer Inst. 101(5):296-305.
6. Saxena, T. et al (2010). Menopausal hormone therapy and subsequent risk of specific invasive breast cancer subtypes in the California Teachers Study. Cancer Epidemiol Biomarkers Prev. 19(9):2366-2378.
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10. Schonfeld, SJ. et al (2011). Hormone related risk factors and postmenopausal breast cancer among nulliparous versus parous women: An aggregated study. Am J Epidemiol. 173(5):509-517.
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12. Lichtenstein, P. et al (2000). Environmental and heritable factors in the causation of cancer. New Eng J Med. 343(2): 78-85.
13. Howlader, N. et al. SEER Cancer Statistics Review, 1975-2009 (Vintage 2009 Populations), National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2009_pops09/browse_csr.php?section=4&page=sect_04_table.25.html, based on November 2011 SEER data submission, posted to the SEER web site, April 2012.

Sample Results

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Clinical Report for Breast Cancer Genetic Variant 1 (rs2981582)

Name:	STEVE CPMC	**Sample Type:**	Saliva
Race/Ethnicity:	White (Caucasian)	**Gender:**	Male
Date of Birth:		**Date Collected:**	11-30-2016
Coriell ID:	DEMOSTEVE	**Date Received:**	11-30-2016
Lab Accessioning Number:	DEMOSTEVE	**Date of Report:**	05-07-2013
Ordering Physician:	Dr. Edward Viner		

Name of Gene/Region: FGFR2		**Chromosomal Location:** 10q26.13
Variants tested	**Result**	**Reference Genotype**
rs2981582	AA	GG
Interpretation	**This genetic variant has only been studied in women; therefore risk estimates are not available for men.** This result may be informative for female relatives (mother, sisters, and daughters). Women with this result are 50% more likely (or 1.5 times as likely) to develop breast cancer than women with no copies of this variant.	
Other Risks	Other genetic variants and other risk factors including co-morbidities, lifestyle and family history may contribute to the risk of breast cancer. For additional information on other risk factors please see the accompanying CPMC research report.	

Risk interpretation based on Coriell's Breast Cancer Risk Algorithm Version 1 (May 14, 2013)

Test Limitations

DNA-based testing is highly accurate, however there are many sources of potential error including: mis-identification of samples, rare technical errors, trace contamination of PCR reactions, and rare genetic variants that interfere with analysis. There may be other variants, not included in this test, that influence the risk to develop breast cancer. This test is not diagnostic for breast cancer and cannot rule out the risk of developing breast cancer in the future. Risk estimates are based on current available literature (see reference). This test or one or more of its components was developed and its performance characteristics determined by the Coriell Institute for Medical Research. It has not been approved by the Food and Drug Administration (FDA). The FDA has determined that such approval is not necessary. The Coriell Institute is regulated under the Clinical Laboratory Improvement Amendments (CLIA) of 1988 as qualified to perform high-complexity testing.

Test Methodology

Saliva samples were collected using Oragene DNA Collection Kits (DNA Genotek) and DNA was extracted manually according to the manufacturer's instructions or automatically using a DNAdvance Kit (Agencourt). Purified DNA was quantified using UV absorbance at 260 nm. Five hundred nanograms of the resulting DNA from each sample were used as template in the Affymetrix Genome-Wide Human SNP Nsp/Sty 6.0 GeneChip assay. Data analysis was performed using Affymetrix Genotyping Console software.

electronically signed by
Marie Hoover, PhD, Laboratory Director

References

1. Travis, RC. et al. (2010). Gene-environment interactions in 7610 women with breast cancer: prospective evidence from the Million Women Study. Lancet. 375(9732):2143-2151

This clinical report only includes data generated in the CLIA approved genotyping laboratory, for additional information please see the CPMC research report.