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:**	10-04-2013
Ordering Physician:	Dr. Edward Viner		

Risk of Obesity Based on:

- **CPMC Obesity Variant 1 (rs9939609)**
- **Sitting While Watching Television**
- **Fruit and Vegetable Consumption**
- **Leisure Time Physical Activity**

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

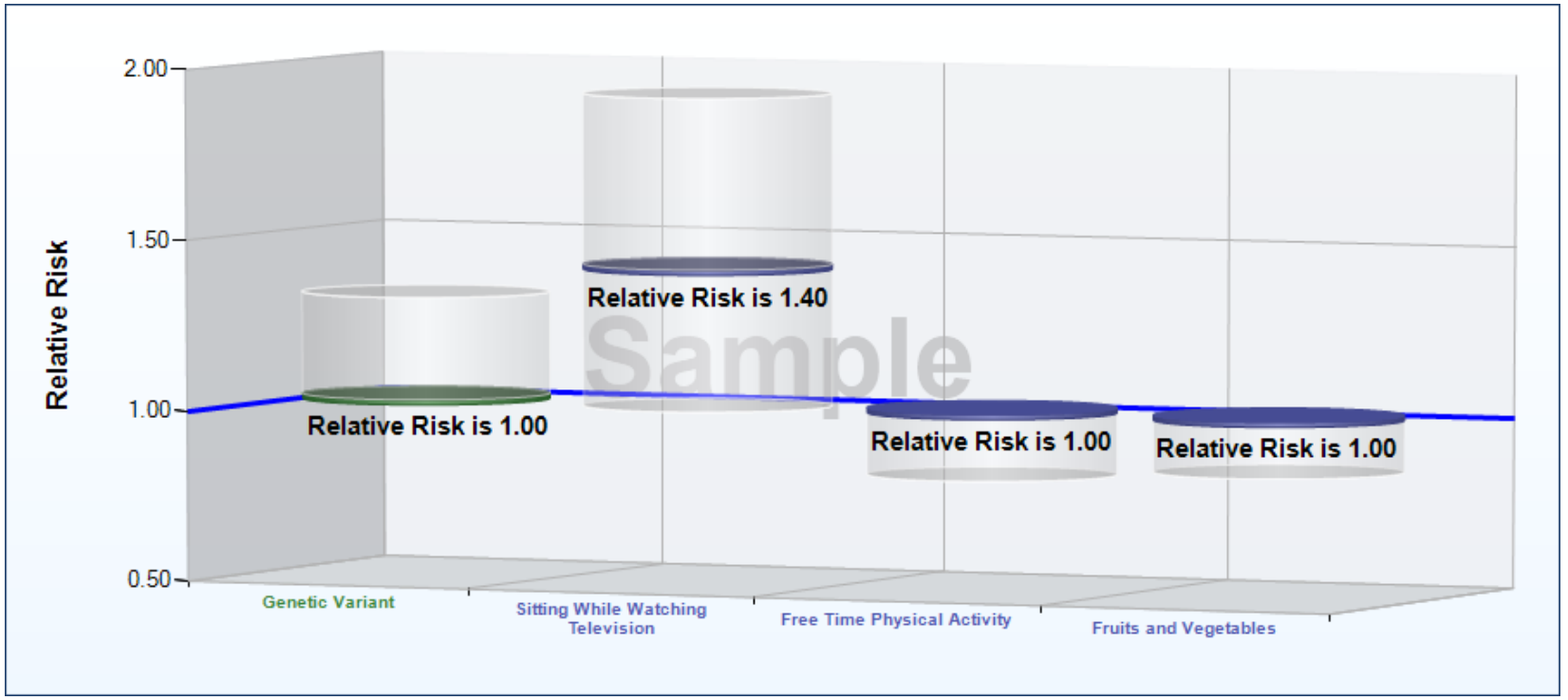
More information about the study, how to interpret CPMC results, and how we calculate risk is available on our website http://cpmc.coriell.org or by contacting our genetic counselor. Participants may schedule an appointment with our board-certified genetic counselor through the web portal by clicking on “request an appointment”. Our genetic counselor 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.

Genetic Variant Result, Details and Population Data

Obesity

Risk factors may be related to each other and risk estimates cannot be combined.
This graph provides a summary of the relative risks for genetic variant, sitting while watching television, fruit and vegetable consumption and leisure time physical activity.



You reported you are a Caucasian man, 60 years old or older; 30.6% of Caucasian men in your age group are obese.

Chart Color	Relative Risk Due To:	Your Risk	Minimum Risk	Maximum Risk	Interpretation
	Genetic Variant	**1.00**	1.00	1.30	**You have 2 copies of the non-risk variant. Based this result, you are at a lower risk to become obese than someone with one or two copies of this variant.**
	Sitting While Watching Television	**1.40**	1.00	1.90	**Because you spend between 6 and 20 hours per week sitting while watching television, you are 40% more likely (or 1.4 times as likely) to become obese as someone who spends no more than 1 hour per week sitting while watching television.** *Sitting while watching television contributes to your risk of becoming obese.*
	Free Time Physical Activity	**1.00**	0.82	1.00	**Because you get less than the recommended amount of physical activity during your free time in a typical week, you are at a higher risk of becoming obese than someone who does get the recommended amount of physical activity during their free time in a typical week.**
	Fruits and Vegetables	**1.00**	0.85	1.00	**Because you eat less than 3.5 servings per day of fruits and vegetables, you are at a higher risk of becoming obese than someone who eats 3.5 or more servings of fruits and vegetables per day.**

Obesity

Risk Due To Genetic Variant #1 (rs9939609)

Your Result: 2 copies of the non-risk variant were detected (TT)

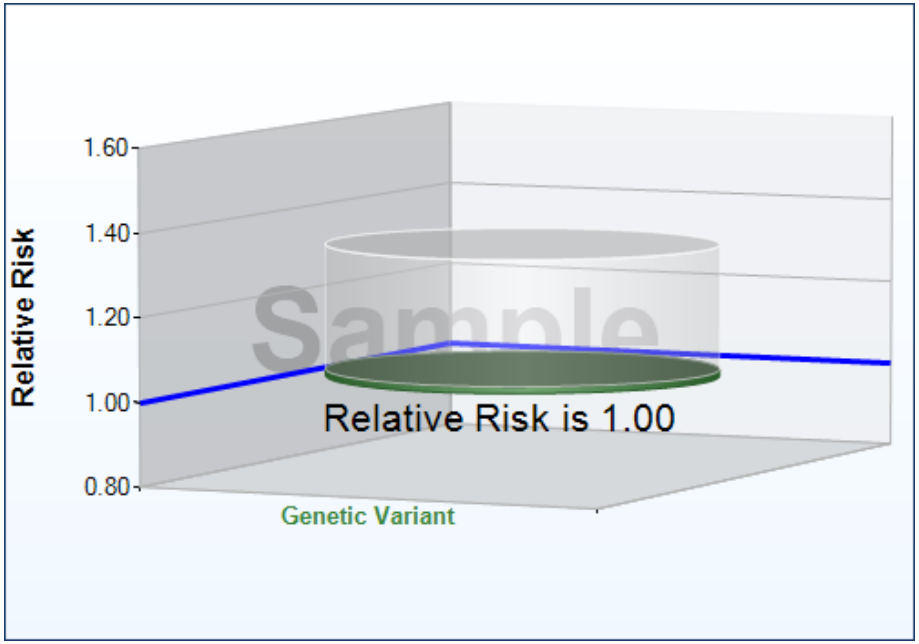
Non-Risk Variant = T Risk Variant = A

Chart Color	Your Risk	Minimum Risk	Maximum Risk	Interpretation
	1.00	1.00	1.30	**You have 2 copies of the non-risk variant. Based this result, you are at a lower risk to become obese than someone with one or two copies of this variant.**

Genetic Variant Risk is based on the number of copies of this genetic risk variant.

People with one or two copies of the risk variant are compared to people with no copies of the risk variant to determine relative risk.

A relative risk greater than 1.0 indicates an increased risk.



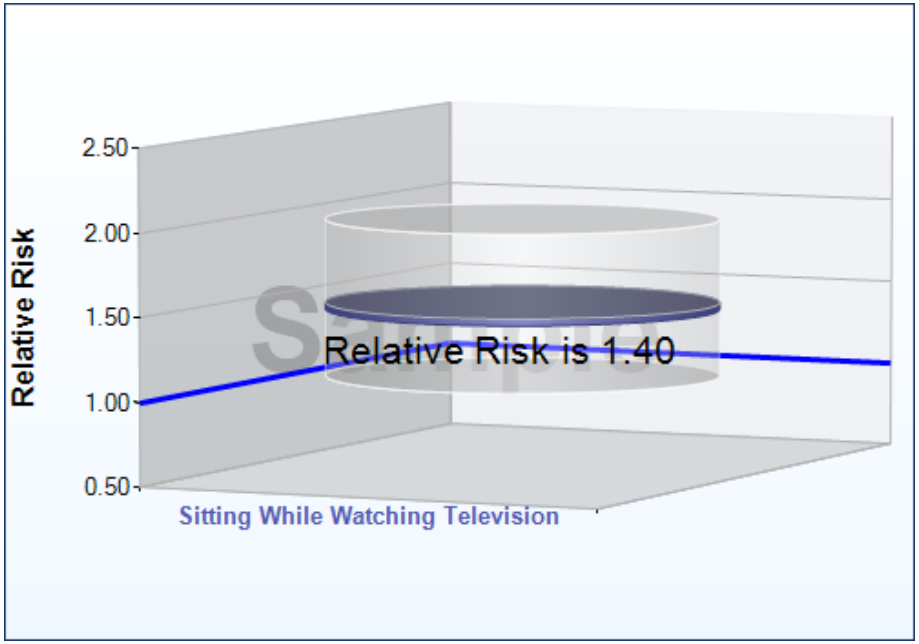
These risk estimates are based on studies in Caucasian populations.

Obesity

Risk Due To Sitting While Watching Television

You reported that you spend between 6 and 20 hours per week sitting while watching television.

Chart Color	Your Risk	Minimum Risk	Maximum Risk	Interpretation
	1.40	1.00	1.90	**Because you spend between 6 and 20 hours per week sitting while watching television, you are 40% more likely (or 1.4 times as likely) to become obese as someone who spends no more than 1 hour per week sitting while watching television.** *Sitting while watching television contributes to your risk of becoming obese.*



Risk is compared based on the number of hours per week spent sitting while watching television.

People who spend more than 1 hour per week sitting while watching television are compared to people who spend no more than 1 hour per week sitting while watching television to determine relative risk.

A relative risk greater than 1.0 indicates an increased risk.

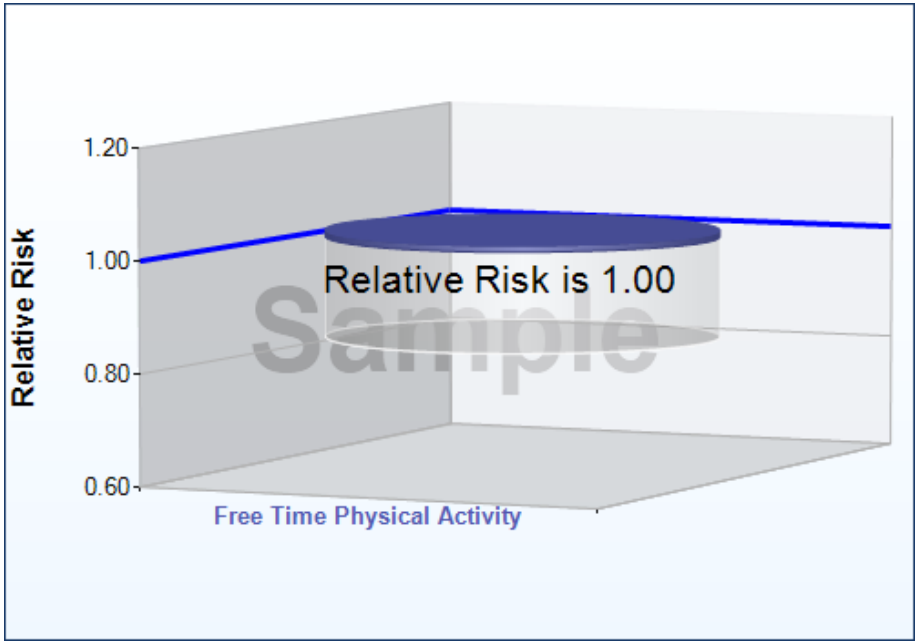
These risk estimates are based on studies in Caucasian populations.

Obesity

Risk Due To Amount of Free Time Physical Activity

You reported that you get less than the recommended amount of physical activity during your free time in a typical week.

Chart Color	Your Risk	Minimum Risk	Maximum Risk	Interpretation
	1.00	0.82	1.00	**Because you get less than the recommended amount of physical activity during your free time in a typical week, you are at a higher risk of becoming obese than someone who does get the recommended amount of physical activity during their free time in a typical week.**



Risk is compared based on the amount of free-time physical activity during a typical week.

People who get the recommended amount of free-time physical activity during a typical week are compared to people who do not get the recommended amount of free-time physical activity during a typical week to determine relative risk.

Recommended weekly amounts of free-time physical activity are defined as:

≥30 minutes of moderate intensity (e.g. walking, tennis) physical activity on ≥5 days per week
OR
≥20 minutes of vigorous intensity (e.g. running, basketball) physical activity on ≥3 days per week.

A relative risk less than 1.0 indicates a *decreased* risk.

These results are based on studies in multiple populations of different racial and ethnic backgrounds.

Obesity

Risk Due To the Amount of Fruits and Vegetables Eaten Per Day

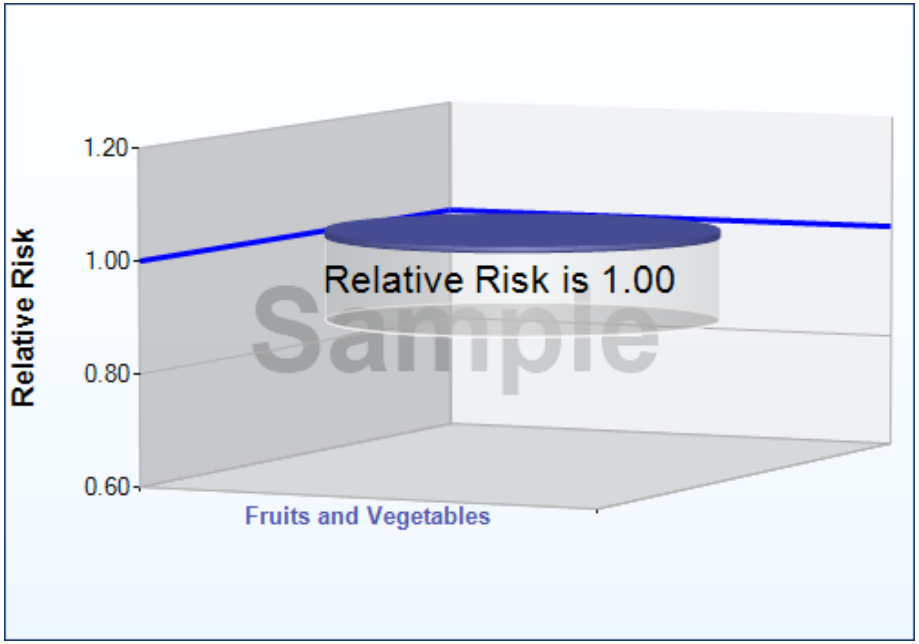
You reported that you eat less than 3.5 servings per day of fruits and vegetables.

Chart Color	Your Risk	Minimum Risk	Maximum Risk	Interpretation
	1.00	0.85	1.00	**Because you eat less than 3.5 servings per day of fruits and vegetables, you are at a higher risk of becoming obese than someone who eats 3.5 or more servings of fruits and vegetables per day.**

Risk is compared based on the number of servings of fruits and vegetables eaten per day.

People who eat less than 3.5 servings of fruits and vegetables per day are compared to people who eat 3.5 or more servings of fruits and vegetables per day to determine relative risk.

A relative risk less than 1.0 indicates a *decreased* risk.



These results are based on studies in multiple populations of different racial and ethnic backgrounds.

Obesity - Variant #1 (rs9939609)

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** your risk of becoming obese.

How Common Is This Variant?

Non-Risk Variant = T **Risk Variant = A**

TT - 37 in 100 people have 2 copies of the non-risk variant

TA - 48 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: FTO **Chromosome: 16q12.2**

Causes

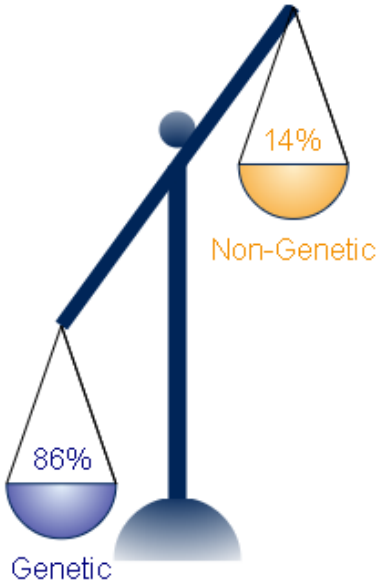
Genetic vs. Non-Genetic Risk Factors

Obesity is caused by eating more calories than are used in physical activity. The risk of becoming obese is influenced by both genetic factors and non-genetic (or environmental) risk factors.

It is estimated that **non-genetic** factors (like diet and exercise) account for about **14%** of the risk of becoming obese.

It is estimated that **86%** of the risk of becoming obese is based on **genetic** risk factors. This estimate accounts for both known and unknown gene variants.

There are many different genetic and non-genetic risk factors that contribute to the risk of becoming obese. We are only able to tell you about 1 genetic and 3 non-genetic risk factors at this time.

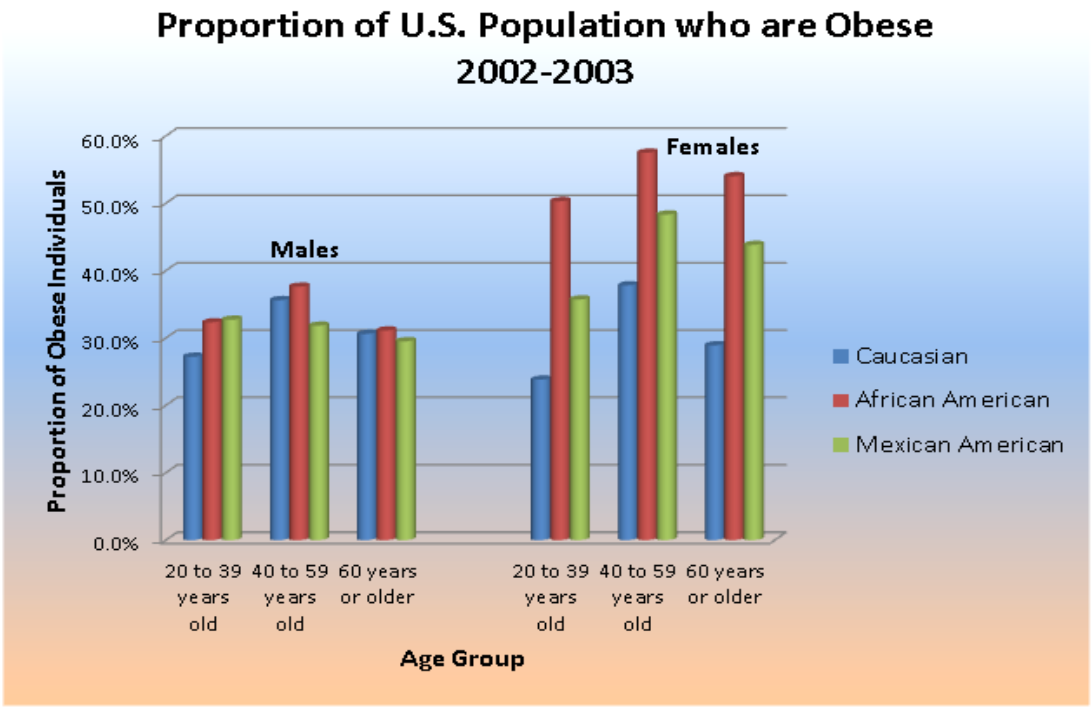


How Common

Obesity is more common among females than males and the risk of becoming obese increases with age.

You reported you are a Caucasian man, 60 years old or older; 30.6% of Caucasian men in your age group are obese.

Your age, race and gender contribute to your risk of becoming obese.



Limitations

Obesity

- This result alone does NOT mean that you will absolutely become obese.
- This result does NOT mean that you will not become obese in the future.
- This result ONLY assesses your risk for developing obesity due to the factors presented in this report and does not mean that other genetic variants or risk factors for obesity are present or absent.
- Personal risk factors, such as age, family history or lifestyle, may have a greater impact on your risk to become obese 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.
- For some risk factors data may be provided by gender. Every effort will be made to provide you with risk information based on your reported gender. However, when risk data is not available for both genders, risk results for the available gender will be provided.

Methods

Obesity

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 Obesity Risk Algorithm Version 1 (July 18, 2011)]

1. Stack, C. et al (2011). Genetic risk estimation in the Coriell Personalized Medicine Collaborative. Genet Med. 13(2):131-139.
2. Frayling et al. (2007). A common Variant in the FTO Gene is Associated with Body Mass Index and Predisposes to Childhood and Adult Obesity. Science. 316 (5826):889-894.
3. Bulik et al. (2003). Genetic and Environmental Contributions to Obesity and Binge Eating. Int J Eat Disord. 33:293-298.
4. Qi et al. (2008). Fat Mass-and Obesity-Associated (FTO) Gene Variant Is Associated With Obesity. Diabetes. 57:3145-3151.
5. Ogden et al. (2006). Prevalence of Overweight and Obesity in the United States, 1999-2004. JAMA. 295:1549-1555.
6. Hu et al. (2003). Television watching and other sedentary behaviors in relation to risk of obesity and type 2 diabetes mellitus in women. JAMA. 289:1785-1791.
7. Kruger et al. (2009). Behavioral risk factors associated with overweight and obesity among older adults: the 2005 National Health Interview Survey. Prev Chronic Dis. 6(1):A14.

Sample Results

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Clinical Report for Obesity Genetic Variant 1 (rs9939609)

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:**	10-04-2013
Ordering Physician:	Dr. Edward Viner		

Name of Gene/Region: FTO		**Chromosomal Location:** 16q12.2
Variants tested	**Result**	**Reference Genotype**
rs9939609	TT	TT
Interpretation	**Individuals with this result are at a lower risk to become obese compared to someone with one or two copies of this genetic risk variant.** These risk estimates are based on studies in the Caucasian population. When race/ethnicity specific risk estimates are not available, risk estimates based on Caucasian populations are provided.	
Other Risks	Other genetic variants and other risk factors including co-morbidities, lifestyle and family history may contribute to the risk of becoming obese. For additional information on other risk factors please see the accompanying CPMC research report.	

Risk interpretation based on Coriell's Obesity Risk Algorithm Version 1 (July 18, 2011)

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 become obese. This test is not diagnostic for obesity and cannot rule out the risk of becoming obese 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. Qi et al. (2008). Fat Mass-and Obesity-Associated (FTO) Gene Variant Is Associated With Obesity. *Diabetes*. 57:3145-3151.

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