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:	NATALIE DEMO	**Gender:**	Female
Date of Birth:		**Date Collected:**	11-30-2016
Coriell ID:	DEMONAT	**Date Received:**	11-30-2016
Lab Accessioning Number:	DEMONAT	**Date of Report:**	09-13-2012
Ordering Physician:	Dr. Edward Viner		

Risk of developing Crohn's Disease based on:

- **CPMC Crohn's Disease Variant 1 (rs11209026)**
- **Family History**
- **Smoking Status**

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

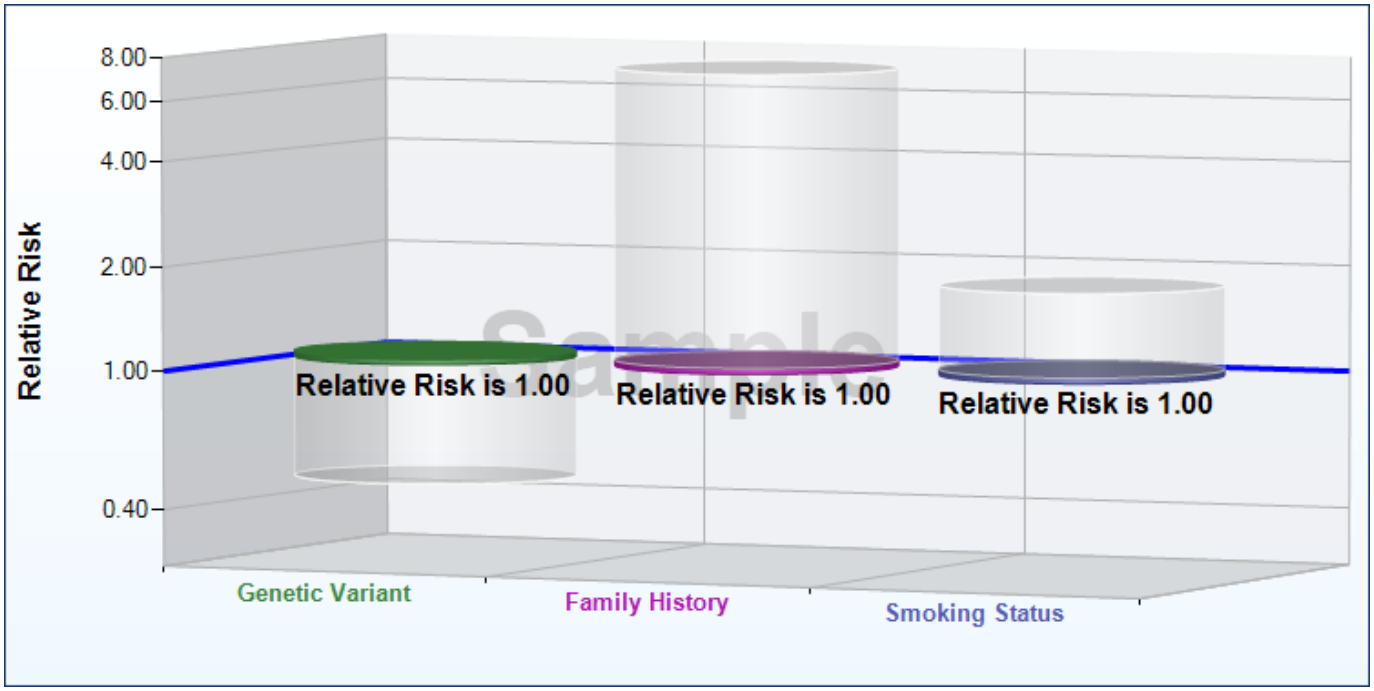
More information about the study, how to interpret CPMC results, and how we calculate risk is available on our website http://cpmc.coriell.org or by contacting our genetic counselors. Participants may schedule an appointment with one of our board-certified genetic counselors through the web portal by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

Genetic Variant Result, Details and Population Data

Crohn's Disease

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, family history and smoking.



You reported you are African American, between 30 and 39 years old; data for African Americans in your age group is not available, however, 2 in 1,000 Caucasians in your age group have Crohn's disease.

Chart Color	Relative Risk Due To:	Your Risk	Minimum Risk	Maximum Risk	Interpretation
	Genetic Variant	**1.00**	0.43	1.00	**You have 2 copies of the non-protective variant. Based on this result, you are at a higher risk to develop Crohn's disease compared to someone with one or two copies of this protective genetic variant.**
	Family History	**1.00**	1.00	7.40	**Based on your family history, you are at a lower risk to develop Crohn's disease compared to someone with a first degree relative (parent, sibling, or child) with either Crohn's disease or ulcerative colitis.**
	Smoking Status	**1.00**	1.00	1.80	**Because you are not a smoker, you are at a lower risk to develop Crohn's disease compared to current and former smokers.**

Crohn's Disease

Risk Due To Genetic Variant #1 (rs11209026)

Your Result: 2 copies of the non-protective variant were detected (GG)

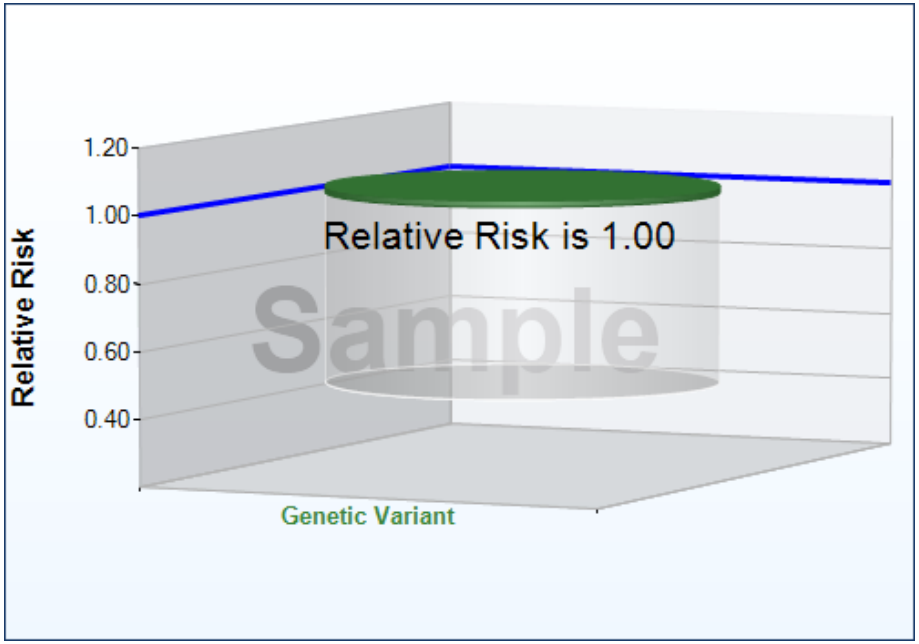
Non-Protective Variant = G Protective Variant = A

Chart Color	Your Risk	Minimum Risk	Maximum Risk	Interpretation
	1.00	0.43	1.00	**You have 2 copies of the non-protective variant. Based on this result, you are at a higher risk to develop Crohn's disease compared to someone with one or two copies of this protective genetic variant.**

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

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

A relative risk less than 1.0 indicates a decreased risk.



These risk estimates are based on studies in Caucasian populations.

Crohn's Disease

Risk Due To Family History

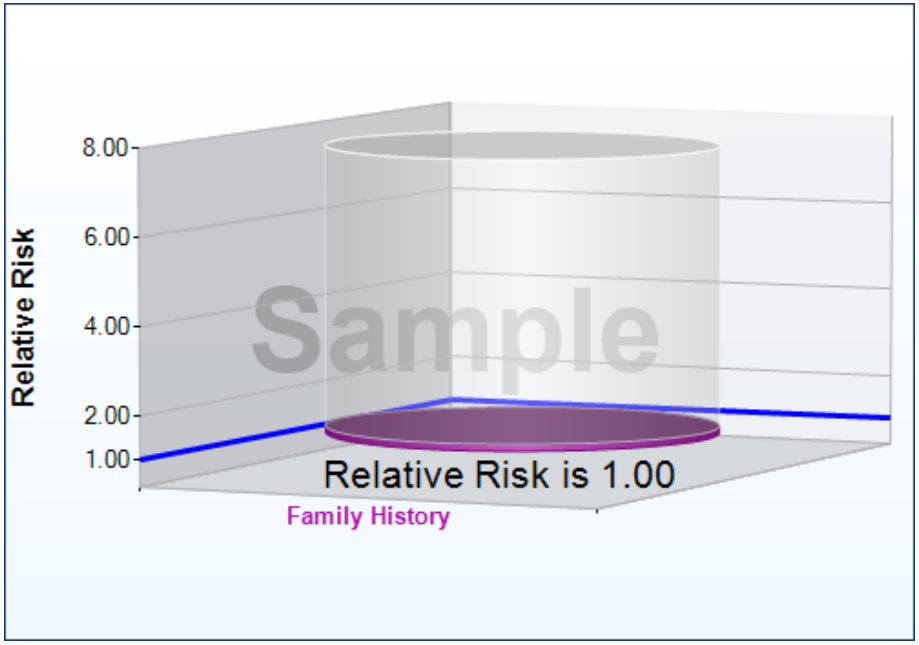
You reported that none of your first degree relatives (parents, siblings or children) have Crohn's disease or ulcerative colitis.

Chart Color	Your Risk	Minimum Risk	Maximum Risk	Interpretation
	1.00	1.00	7.40	**Based on your family history, you are at a lower risk to develop Crohn's disease compared to someone with a first degree relative (parent, sibling, or child) with either Crohn's disease or ulcerative colitis.**

Risk is compared based on family history.

People with one or more first degree relatives (parents, siblings, or children) with either Crohn's disease or ulcerative colitis are compared to people with no first degree relatives with either Crohn's disease or ulcerative colitis to determine relative risk of developing Crohn's disease.

A relative risk greater than 1.0 indicates an increased risk.



These risk estimates are based on studies in Caucasian populations.

Crohn's Disease

Risk Due To Smoking Status

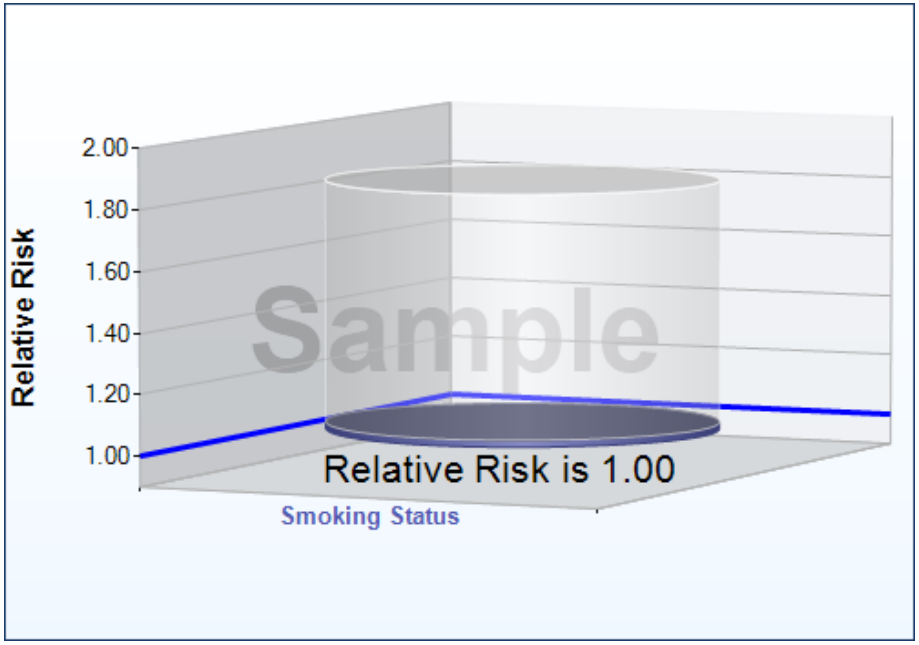
You reported that you do not smoke.

Chart Color	Your Risk	Minimum Risk	Maximum Risk	Interpretation
	1.00	1.00	1.80	**Because you are not a smoker, you are at a lower risk to develop Crohn's disease compared to current and former smokers.**

Risk is compared based on smoking habits.

People who are current smokers or former smokers are compared to people who have never smoked to determine relative risk.

A relative risk of greater than 1.0 indicates an increased risk.



These risk estimates are based on studies in Caucasian populations.

Crohn's Disease - Variant #1 (rs11209026)

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.

This genetic variant is **protective**. Having one or two copies of this variant **lowers** your risk for Crohn's disease.

How Common Is This Variant?

Non-Protective Variant = G **Protective Variant = A**

GG - 96 in 100 people have 2 copies of the non-protective variant

GA - 4 in 100 people have 1 copy of the non-protective variant and 1 copy of the protective variant

AA - 0 in 100 people have 2 copies of the protective variant

This data is based on studies in African American populations.

Gene: IL23R **Chromosome: 1p31.3**

Causes

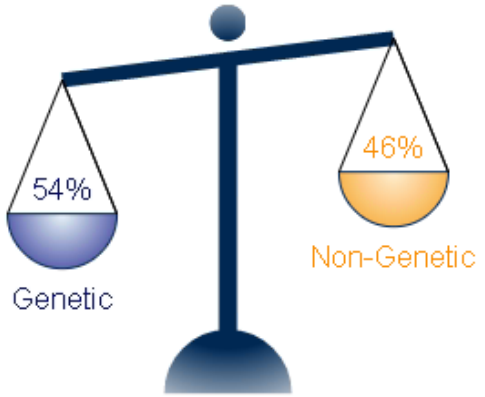
Genetic vs. Non-Genetic Risk Factors

Crohn's disease can be caused by both genetic factors and non-genetic (or environmental) risk factors.

It is estimated that **non-genetic** factors (like cigarette smoking) account for about **46%** of the risk of Crohn's disease.

It is estimated that **54%** of the risk for Crohn's disease 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 Crohn's disease. We are only able to tell you about one genetic and one non-genetic risk factor at this time.

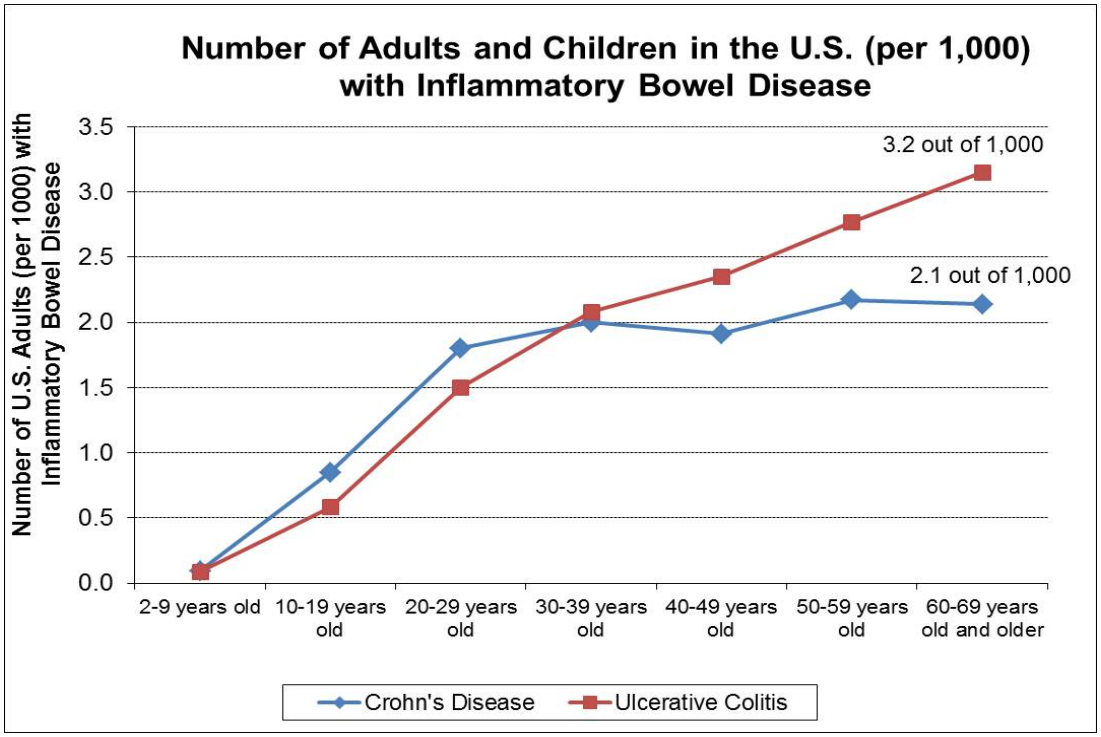


How Common

Crohn's disease is less common than ulcerative colitis.

You reported you are African American, between 30 and 39 years old; data for African Americans in your age group is not available, however, 2 in 1,000 Caucasians in your age group have Crohn's disease.

Your age contributes to your risk of inflammatory bowel diseases like Crohn's disease and ulcerative colitis.



Limitations

Crohn's Disease

- This result alone does NOT diagnose Crohn's disease. Crohn's disease must be diagnosed by your health care provider.
- This result does NOT mean that you have or will absolutely develop Crohn's disease.
- This result does NOT mean that you will not develop Crohn's disease in the future.
- This result ONLY assesses your risk for developing Crohn's disease due to the factors presented in this report and does not mean that other genetic variants or risk factors for Crohn's disease are present or absent.
- Personal risk factors, such as age, family history or lifestyle, may have a greater impact on your risk to develop Crohn's disease 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 annually.
- 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

Crohn's Disease

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 Crohn's Disease Risk Algorithm Version 1 (August 12, 2012)]

1. Stack, C. et al (2011). Genetic risk estimation in the Coriell Personalized Medicine Collaborative. Genet Med. 13(2):131-139.
2. Kappelman, M.D. et al. (2007). The prevalence and geographic distribution of Crohn's disease and Crohn's disease in the United States. Clinical Gastroenterology and Hepatology. 5:1424-1429.
3. Silverberg, M.S. et al. (2009). Crohn's disease-risk loci on chromosomes 1p36 and 12q15 found by genome-wide association study. Nature Genetics. 41:216-220.
4. Li, Y. et al. (2010). Interleukin-23 receptor genetic polymorphisms and Crohn's disease susceptibility: a meta-analysis. Inflammation Research. DOI 10.1007/s00011-010-0171-y
5. Mahid, S.S. et al. (2006). Smoking and inflammatory bowel disease: a meta-analysis. Mayo Clinic Proceedings. 81:1462-1471.
6. Gearry, R.B. et al. (2010). Population-based cases control study of inflammatory bowel disease risk factors. Journal of Gastroenterology and Hepatology. 25:325-333.

Sample Results

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Clinical Report for Crohn's Disease Genetic Variant 1 (rs11209026)

Name:	NATALIE DEMO	**Sample Type:**	Saliva
Race/Ethnicity:	Black or African-American	**Gender:**	Female
Date of Birth:		**Date Collected:**	11-30-2016
Coriell ID:	DEMONAT	**Date Received:**	11-30-2016
Lab Accessioning Number:	DEMONAT	**Date of Report:**	09-13-2012
Ordering Physician:	Dr. Edward Viner		

Name of Gene/Region: IL23R		**Chromosomal Location:** 1p31.3
Variants tested	**Result**	**Reference Genotype**
rs11209026	GG	GG
Interpretation	**Individuals with this result are at a higher risk to develop Crohn's disease compared to someone with one or two copies of the protective variant.** These results are based on studies in Caucasian populations. 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 Crohn's disease. For additional information on other risk factors please see the accompanying CPMC research report.	

Risk interpretation based on Coriell's Crohn's Disease Risk Algorithm Version 1 (August 12, 2012)

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 Crohn's disease. This test is not diagnostic for Crohn's disease and cannot rule out the risk of developing Crohn's disease 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. Li, Y. et al. (2010). Interleukin-23 receptor genetic polymorphisms and Crohn's disease susceptibility: a meta-analysis. Inflammation Research. DOI 10.1007/s00011-010-0171-y

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