

XRCC (DNA Damage)

Gene Report

REPORT CATEGORIES —



DETOX



CANCER

Sample Client

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DISCLAIMER

This report does not diagnose this or any other health conditions. Please talk to a healthcare professional if this condition runs in your family, you think you might have this condition, or you have any concerns about your results.

Personal information

NAME

Sample Client

SEX AT BIRTH

Male

HEIGHT

5ft 5" 165cm

WEIGHT

137lb 62kg



How this works

Our Wellness Reports analyze how your DNA influences your health.
We then use this analysis to give you personalized risk estimates and recommendations.



Similarly, our Trait Reports look at how your DNA influences your traits.



Your DNA is like an instruction manual — it contains a lot of information.
You can think of it as a blueprint for your body.

Genetic variants are parts of DNA that differ from person to person. Some can make you more vulnerable to certain health issues, while others may influence traits such as eye color.



We use artificial intelligence and machine learning to analyze all this information.
We then summarize your results as a risk score or display it on a gauge.

In total, we analyze up to 83 million genetic variants.

When we give a risk score, the risk icon tells you if you are at a higher or lower risk compared to other people:



Genotype color info:

AA

You don't have any risk alleles

AA

You have 1 risk allele

AA

You have 2 risk alleles

Your risk is also displayed as a percentile. This will tell you how your risks compare to our sample population. The lower your percentile number, the lower your risk. The "50th percentile" would be an average risk.

Similarly, the gauge tells you your relative risk score compared to our sample population, or it indicates a specific trait or haplotype you are more likely to have based on your genetic variants.

When applicable, we also list top evidence-based recommendations that may help lower your risk. The focus is on recommendations that may be of benefit to you, based on your genetics.

Our recommendations come in four categories: lifestyle, diet, supplements and drugs.
The following icons tell you which category a recommendation falls into:



Our team of scientists also ranks each recommendation.
We rank based on impact and the strength of evidence in the medical literature.

Impact shows how strongly a recommendation will affect your health in a certain area.
Evidence is how much scientific support there is for the recommendation. Rankings are from 1 to 5 (low to high):



Impact

Impact scores range from 1-5. These scores reflect how much of an effect each recommendation can have. An impact score of 5 predicts the biggest effect.

When a recommendation affects something we can measure, we use those measurements to assign the impact score. For example, a recommendation that decreases cholesterol by 20% will have a higher impact score than one that decreases it by 5%.

Some recommendations affect things that we cannot directly measure, like stress or mood. For these, the impact score is based on how well they work relative to other recommendations and standard treatments. The best ones get the highest scores.

If there is a lot of research that shows a recommendation works especially well for your genotype, the impact score gets increased.

Recommendation Evidence

5 / 5

Recommendations that are considered effective and generally recommended by experts and medical bodies.

4 / 5

Recommendations that are considered likely effective and that have multiple independent meta-analyses and a great many studies supporting them.

3 / 5

Recommendations that are considered possibly effective and have many studies supporting them

2 / 5

Recommendations that have insufficient evidence, with two or several clinical trials supporting them, or many studies but with ambiguous results.

1 / 5

Recommendations that have insufficient evidence, with a single clinical trial, or with many studies most of which didn't find support for the recommendation.

0 / 5

No evidence in humans.

Genotype-specific Evidence

High-quality

Direct evidence that a recommendation helps more in people with your gene variant (many clinical trials, a few large clinical trials, or a meta-analysis).

Medium-quality

Direct evidence that a recommendation helps more in people with your gene variant (a few clinical trials or one large clinical trial).

Low-quality

Direct evidence that a recommendation helps more in people with your gene variant (a single clinical trial or more trials with inconsistent results).

Indirect

A recommendation may help more in people with your gene variant because it targets a specific gene or protein affected by your variant (e.g., MTHFR, dopamine).

In theory

A recommendation may help more in people with your gene variant because it targets a specific mechanism affected by your variant (e.g., inflammation, oxidative stress).

Some things to keep in mind:

- Genetics doesn’t play a considerable role in a condition or a trait.
- There is not enough research available to estimate a genetic predisposition.
- There are technical limitations to estimating or presenting a genetic predisposition.
- The topic is sensitive, and a genetic predisposition should only be estimated and presented by a healthcare professional.

Introduction

XRCC (X-Ray Repair Cross Complementing) is a family of proteins involved in the homologous recombination repair (HRR) pathway of double-stranded DNA. This pathway helps recognize and repair DNA damage such as chromosomal fragmentation, translocations, and deletions caused by **radiation, toxic chemicals, heavy metals, and mold** [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Variants in *XRCC* genes may impair DNA damage repair, resulting in an increased risk and severity of several cancer types such as:

- Lung cancer [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Stomach cancer [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Brain cancer [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Breast cancer [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Bladder cancer [\[R\]](#), [\[R\]](#)
- Oral cancer [\[R\]](#), [\[R\]](#)
- Esophageal cancer [\[R\]](#), [\[R\]](#)
- Prostate cancer [\[R\]](#)
- Colorectal cancer [\[R\]](#)
- Ovarian cancer [\[R\]](#)
- Skin cancer [\[R\]](#)
- Thyroid cancer [\[R\]](#)

Genetics of XRCC

Certain genetic variations in *XRCC* genes reduce its ability to repair DNA damage caused by mold toxins, potentially increasing the risk of liver cancer in people exposed to high levels.

For instance, a study of 1486 patients with hepatocellular carcinoma and 1996 controls exposed to the foodborne mold toxin aflatoxin B1 identified the following variants as increasing the risk [\[R\]](#):

- ‘T’ at [XRCC1 rs25487](#)
- ‘A’ at [XRCC3 rs861539](#)
- ‘A’ at [XRCC4 rs28383151](#)
- ‘C’ at [XRCC7 rs7003908](#)

The association of the rs25487 polymorphism with increased risk of hepatocellular carcinoma and DNA damage in response to aflatoxins was confirmed in other studies. This variant has also been associated with [\[R\]](#), [\[R\]](#):

- Brain cancer [\[R\]](#), [\[R\]](#)
- Cervical cancer [\[R\]](#), [\[R\]](#)
- Pancreatic cancer [\[R\]](#)
- Breast cancer [\[R\]](#)
- Bladder cancer [\[R\]](#)
- Prostate cancer [\[R\]](#)
- Thyroid cancer [\[R\]](#)
- Age-related cataracts [\[R\]](#)
- Worse outcome in lung cancer patients [\[R\]](#)
- Worse response to platinum chemotherapy [\[R\]](#), [\[R\]](#), [\[R\]](#)

The association of rs861539 with aflatoxin-related hepatocellular carcinoma was confirmed in two more studies. This variant has also been associated with [\[R\]](#), [\[R\]](#):

- Ovarian cancer [\[R\]](#), [\[R\]](#)
- Brain cancer [\[R\]](#), [\[R\]](#)
- Oral cancer [\[R\]](#)
- Nasopharyngeal cancer [\[R\]](#)
- Stomach cancer [\[R\]](#)
- Cervical cancer [\[R\]](#)
- Bladder cancer [\[R\]](#)
- Osteosarcoma [\[R\]](#)
- Leukemia [\[R\]](#)



TYPICAL ACTIVITY

Likely typical XRCC activity based on 5 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
PRKDC	rs7003908	AC
XRCC4	rs3734091	GG
XRCC3	rs861539	GG
XRCC4	rs28383151	GG
XRCC1	rs25487	CC

The number of "risk" variants in this table doesn't necessarily reflect your overall result.

- Lupus [\[R\]](#)
- Radiation-induced adverse effects [\[R\]](#)

Another study confirmed the relationship between the rs7003908 polymorphism and aflatoxin-related hepatocellular carcinoma. This variant has also been associated with [\[R\]](#):

- Prostate cancer [\[R\]](#)
- Brain cancer [\[R\]](#)
- Esophageal cancer [\[R\]](#)
- Bladder cancer [\[R\]](#)

Finally, a study of 1499 liver cancer cases and 2045 controls associated the ‘G’ allele of *XRCC4* [rs3734091](#) with a slightly increased risk of hepatocellular carcinoma due to aflatoxin B1 exposure and confirmed the association of rs28383151 with this disease. The rs3734091 variant has also been associated with [\[R\]](#):

- Nasopharyngeal cancer [\[R\]](#)
- Breast cancer [\[R\]](#)
- Acute lymphocytic leukemia [\[R\]](#)
- Oral cancer [\[R\]](#)