GREM1

The *GREM1* gene is a cancer predisposition gene. The primary role of *GREM1* is to interact with other proteins that help regulate the growth of cells in the gastrointestinal tract.

Like most genes, each person has two copies of the *GREM1* gene: one inherited from each parent. A mutation in a single *GREM1* gene inherited from either parent causes Hereditary Mixed Polyposis syndrome (HMPS), which is known to increase risks for colorectal cancer and multiple types of colorectal polyps.

Research on the *GREM1* gene is ongoing, especially related to the exact cancers and cancer risks associated with mutations in this gene. To date, studies on this gene have been focused only on duplications in the upstream regulatory region in people of Ashkenazi Jewish descent.

How common are mutations in the *GREM1* gene?
Mutations in the *GREM1* gene are rare—the exact frequency is not yet known. Studies to establish the frequency of *GREM1* mutations are ongoing.

How mutations in this gene impact risk

Women
If a woman has a *GREM1* mutation, her chance of developing colorectal cancer is greater than that of the average US woman. This does not mean that she has a diagnosis of cancer or that she will definitely develop cancer in her lifetime.

Cancer by age 95	Average US woman[1]	With *GREM1* mutation
Colorectal	4.2%	Elevated[2]

Elevated: Risk is increased, but further research may clarify the exact risk figure.

Men
If a man has a *GREM1* mutation, his chance of developing colorectal cancer is greater than that of the average US man. This does not mean that he has a diagnosis of cancer or that he will definitely develop cancer in his lifetime.

[1] Surveillance, Epidemiology, and End Results (SEER) Program, National Cancer Institute. 2010-2012. DevCan software (http://surveillance.cancer.gov/devcan) V 6.7.0, Accessed June 2015.
[2] Jaeger E, Leedham S, Lewis A, et al. Hereditary mixed polyposis syndrome is caused by a 40-kb upstream duplication that leads to increased and ectopic expression of the BMP antagonist GREM1. Nat Genet. 2012;44(6):699-703.

Cancer by age 95	Average US man[1]	With *GREM1* mutation
Colorectal	4.2%	Elevated[2]

Elevated: Risk is increased, but further research may clarify the exact risk figure.

Additional information

Not all *GREM1* mutations are linked to increased cancer risk.
For *GREM1*, only duplications in the upstream regulatory region are analyzed, because other positions are not known to impact cancer risk.

Screening guidelines

Below is a summary of screening guidelines from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) established by experts at the National Comprehensive Cancer Network (NCCN).[3] They are for individuals who have a mutation in the G*REM1* gene. If you have a mutation in this gene, your healthcare provider may use these NCCN Guidelines® to help create a customized screening plan for you.

Women and Men

Colorectal cancer[4]

- **Starting at age 25-30**: Colonoscopy every 2–3 years.
- **Depending on age and number of polyps**: Colonoscopy every 1-2 years and evaluation for colectomy (surgical removal of the colon and/or rectum).
- These recommendations may change if you have, colorectal cancer, inflammatory bowel disease (IBD), or family history of colorectal cancer.

Useful resources

Colon Cancer Alliance

An organization dedicated to colon cancer prevention, funding colon cancer research and providing support to patients.
www.ccalliance.org

[3] Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for Genetic/Familial High-Risk Assessment: Colorectal. V.2.2016. © National Comprehensive Cancer Network, Inc 2016. All rights reserved. Accessed October 26, 2016. To view the most recent and complete version of the guideline, go online to NCCN.org. NATIONAL COMPREHENSIVE CANCER NETWORK®, NCCN®, NCCN GUIDELINES®, and all other NCCN Content are trademarks owned by the National Comprehensive Cancer Network, Inc.
[4] National Comprehensive Cancer Network. Genetic/Familial High-Risk Assessment: Colorectal. NCCN Guidelines Version 2.2016. Available at www.nccn.org. Published September 2016.

Hereditary Colon Cancer Foundation
A nonprofit organization serving the hereditary colorectal cancer community.
www.hcctakesguts.org

Kintalk
An educational and family communication site for individuals and their families with hereditary cancer conditions
www.kintalk.org

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