

## PALB2

The *PALB2* gene is a tumor suppressor gene. Tumor suppressor genes slow down cell division, repair DNA mistakes, or tell cells when to die. When they don't work properly, cells can grow out of control, which can lead to cancer. The primary role of *PALB2* is to stabilize and assist other genes, specifically *BRCA1* and *BRCA2*, in repairing damaged DNA before a cell divides to make more copies of itself.

Like most genes, each person has two copies of the *PALB2* gene: one inherited from each parent. A mutation in a single *PALB2* gene inherited from either parent is known to increase risk of breast, ovarian and pancreatic cancer over a lifetime.

In very rare cases, a person can inherit two *PALB2* mutations, one from each parent. This causes a blood condition called Fanconi anemia, which is associated with bone marrow failure, physical disabilities, and childhood cancers.

### How common are mutations in the *PALB2* gene?

Mutations in the *PALB2* gene are rare—the exact frequency is not yet known. Studies to establish the frequency of *PALB2* mutations are ongoing.

## How mutations in this gene impact risk

### Women

If a woman has a mutation in the *PALB2* gene, her chances of developing breast, ovarian and pancreatic cancer are 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 70	Average US woman <sup>1</sup>	With <i>PALB2</i> mutation
Breast	7.1%	Elevated (35-58%) <sup>2,3</sup>
Ovarian	<1%	Elevated <sup>3,4</sup>

<sup>1</sup> 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.

<sup>2</sup> Casadei S, Norquist BM, Walsh T, et al. Contribution of inherited mutations in the BRCA2-interacting protein PALB2 to familial breast cancer. *Cancer Res*. 2011 Mar 15;71(6):2222-9.

<sup>3</sup> Antoniou AC, Casadei S, Heikkinen T, et al. Breast-cancer risk in families with mutations in PALB2. *N Engl J Med*. 2014 Aug 7;371(6):497-506.

<sup>4</sup> Walsh T, Casadei S, Lee MK, et al. Mutations in 12 genes for inherited ovarian, fallopian tube, and peritoneal carcinoma identified by massively parallel sequencing. *Proc Natl Acad Sci U S A*. 2011 Nov 1;108(44):18032-7.

Pancreatic <1% Elevated<sup>2,5</sup>

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

## Men

If a man has a mutation in the *PALB2* gene, his chances of developing male breast and pancreatic cancer are 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.

Cancer by age 70	Average US man <sup>3</sup>	With <i>PALB2</i> mutation
Male breast	<0.1%	Elevated (<1%) <sup>2,3</sup>
Pancreatic	<1%	Elevated <sup>2,5</sup>

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

## Additional information

### The relationship between *PALB2* and *BRCA2*.

The name of the *PALB2* gene stands for “Partner and Localizer of *BRCA2*.” *PALB2* works closely with *BRCA2* and other genes inside the cells of the body to repair damaged DNA.

## 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](http://www.nccn.org)).<sup>6</sup> They are for individuals who have a mutation in the *PALB2* 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

Breast cancer<sup>7</sup>

<sup>5</sup> Becker AE, Hernandez YG, Frucht H, Lucas AL. Pancreatic ductal adenocarcinoma: risk factors, screening, and early detection. *World J Gastroenterol*. 2014 Aug 28;20(32):11182-98.

<sup>6</sup> Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for Genetic/Familial High-Risk Assessment: Breast and Ovarian V.1.2017. © National Comprehensive Cancer Network, Inc 2016. All rights reserved. Accessed September 20, 2016. To view the most recent and complete version of the guideline, go online to [NCCN.org](http://www.nccn.org). NATIONAL COMPREHENSIVE CANCER NETWORK®, NCCN®, NCCN GUIDELINES®, and all other NCCN Content are trademarks owned by the National Comprehensive Cancer Network, Inc.

<sup>7</sup> National Comprehensive Cancer Network. Genetic/Familial High-Risk Assessment: Breast and Ovarian. *NCCN Guidelines Version 1.2017*. Available at [www.nccn.org](http://www.nccn.org). Published September 2016.

- Starting at age 30: Your provider may discuss mammogram and breast MRI with contrast every year.
- Your provider may discuss the option of having a risk-reducing bilateral mastectomy (the surgical removal of both breasts) based on family history.

#### Ovarian cancer<sup>7</sup>

- Currently, there are no ovarian cancer screening guidelines from the NCCN specific to *PALB2* mutation carriers. Your provider may discuss screening or referral to a specialist.

#### Men

##### Male breast cancer

- Currently, there are no male breast cancer screening guidelines from the National Comprehensive Cancer Network ([NCCN](#)) specific to *PALB2* mutation carriers. Your provider may discuss screening or referral to a specialist.

#### Women and Men

##### Pancreatic cancer<sup>8</sup>

- Currently, there are no pancreatic cancer screening guidelines from the NCCN specific to *PALB2* mutation carriers. Please discuss your risk of pancreatic cancer with your healthcare provider.

## Useful resources

### FORCE

Providing support, education, research, and resources for survivors and people at increased risk of cancer due to an inherited mutation or family history of cancer.

[www.facingourrisk.org](http://www.facingourrisk.org)

### Bright Pink

Focused on the prevention and early detection of breast and ovarian cancer in young women, while providing support for high-risk individuals.

[www.brightpink.org](http://www.brightpink.org)

### Susan G. Komen

Dedicated to reducing deaths from breast cancer by funding breast cancer research, ensuring access to care through community programs worldwide and supporting public health policies that help people facing breast cancer.

[www.komen.org](http://www.komen.org)

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<sup>8</sup> International Cancer of the Pancreas Screening (CAPS) Consortium summit on the management of patients with increased risk for familial pancreatic cancer. *Gut*. March 2013; 62(3):339-47.

**His Breast Cancer**

Information about male breast cancer. Here to inform, educate, bring awareness, and teach prevention regarding breast cancer in men.

[www.hisbreastcancer.org](http://www.hisbreastcancer.org)

*Last updated May 15, 2017*