

We have over 20,000 different genes in the body. These genes are like instruction manuals for how to build a protein, and each protein has an important function that helps to keep our body working how it should. Our cells are constantly dividing to make new cells, and to do that the cell has to make a copy of all of its DNA, which is what our genes are made out of. As this copying process happens, there can be errors (called variants) that happen in our DNA. Having these variants build up in our DNA raises the risk for cancer. The NBN gene makes a protein called nibrin. Nibrin works with other proteins to help repair these errors in our DNA. If someone has a non-working copy of the NBN gene, then their cells lose the ability to fix these errors in our DNA, which can then increase the risk to develop cancer.

NBN pathogenic (harmful) variants related to cancer risk are inherited in an [autosomal dominant](#) pattern, meaning that children of someone who carries a pathogenic variant each have a 50% risk to inherit the variant and associated cancer risks. Notably, women and men both have the NBN gene and have the same chances to inherit and pass down variants in these genes. Therefore, both sides of the family are important when assessing inherited risk.

Cancer type	Risk in the general population	Risk in NBN pathogenic variants carriers
Female breast	12%	Up to 30%

GENETIC TESTING FOR NBN

Genetic testing for pathogenic variants in NBN are currently available, but there are a few different ways to approach testing:

- [Single site analysis](#): Testing specific to a known pathogenic variant in the family
- Full gene [sequencing](#) and [rearrangement analysis](#): Comprehensive testing to search for all currently detectable variants in the gene
- [Gene panels](#): Newer, more broadly based gene tests that would include not only the NBN gene, but other genes known or suspected to be associated with increased cancer risks

Cancer screening and management for NBN

If you are tested and found to have a pathogenic variant in the NBN gene, it is recommended to discuss your management plan with your healthcare team, and if available, to see consultation through a specialized high-risk clinic. General recommendations are

included here based on updated guidelines of the National Comprehensive Cancer Network (NCCN), but may be tailored to your specific medical and family history.

Women who carry a pathogenic variant in the NBN gene should consider annual mammography and breast MRI starting at the age of 40, or 5-10 years before the earliest age of diagnosis of breast cancer in the family.

One important thing to note is that the data on how the NBN gene affects cancer risk is still limited, and more research is needed to completely understand the lifetime risks for cancers associated with inherited pathogenic variants in this gene. There have thus far been a limited number of research studies, and some of those studies have had a small number of participants, or participants from a specific ethnic group.

Men who have inherited a NBN pathogenic variant *may* be at a slightly increased risk for [prostate cancer](#), but there is not enough data to say for certain what the level of risk is, and there are no current recommendations for increased prostate cancer screening different from that of the general population. Further research about the NBN gene is expected to be available in the coming years, so recommendations may evolve.

Nijmegen Breakage syndrome (NBS)

If someone inherits copies of the NBN gene that both have pathogenic variants in them (one from each parent), this can lead to a condition called Nijmegen Breakage Syndrome (NBS). NBS is a very rare [autosomal recessive](#) condition involving a variety of developmental abnormalities including microcephaly (small head size), immune deficiency, and an increased risk leukemia or lymphoma. When an individual and her/his partner both carry an NBN pathogenic variant, their chance to have a child affected with NBS is 25%. For family planning purposes, genetic counseling regarding NBS may be considered for individuals of reproductive age in at-risk families.

Click [here](#) to learn more about scheduling a genetic counseling appointment for questions about hereditary cancer predisposition.