Genetic counselors and other health care providers will look for “clues” that may indicate that there is an increased risk for cancer running in a family. Some of those clues include:

AGE: Age of onset in cancer (particularly breast cancer) in the individual and/or their family members matters in terms of the chance that there is a genetic or hereditary cause.

- National Comprehensive Cancer Network (NCCN) guidelines (v 2.2016) recommend that any woman that has been diagnosed with breast cancer at age 50 or younger consider genetic testing for regardless of her family history of cancer.
- Women diagnosed with breast cancer under the age 31 should also consider testing for the *TP53* gene, which can cause Li Fraumeni syndrome.

FAMILY HISTORY: Family history is another major clue for a potential underlying hereditary cancer predisposition syndrome. A trained healthcare professional such as a genetic counselor will look for certain patterns that can suggest hereditary risk. Typically they are looking for how many people have had cancer in the family, the ages those people developed cancer, if there is a possible pattern of inheritance of cancer in the family, and if the types of cancers are associated with any of the known hereditary cancer genes. For example, breast and ovarian cancer can be seen in Hereditary Breast and Ovarian Cancer syndrome (*BRCA1* and *BRCA2* genes); breast, uterine, and thyroid cancers can be seen in Cowden syndrome (*PTEN* gene), and later-onset, bilateral breast cancers, and colon cancers can be seen in *CHEK2* gene mutations.

Some individuals have limited information about their family history, which could be due to adoption, falling out of touch, or difficult family dynamics, among other things. Other individuals may have a limited family history of cancer but also have a very small family. These factors can make it difficult to accurately determine how high the risk is for certain cancers within a family. If you have a limited or unknown family history, a genetic counselor or other trained healthcare professional can help determine whether or not genetic testing would be recommended for you

UNUSUAL CANCER DIAGNOSES: Bilateral breast cancer (breast cancer in both breasts), multiple cancers in the same person, male breast cancers, or other unusual presentations of cancer can be red flags that there is a genetic or hereditary risk for cancer in the family.

TRIPLE NEGATIVE BREAST CANCER: Breast cancer that is negative for the three common hormonal receptors (estrogen-receptor (ER), progesterone-receptor (PR), and human epidermal growth factor-2 (HER-2)) have a link with hereditary mutations (changes) in the *BRCA1* gene. Women diagnosed with triple negative breast cancer at the age of 60 or

earlier should consider genetic testing.

ETHNICITY: Our ethnic backgrounds can influence our risks for many different genetic conditions, including cancer. For example, changes in the *BRCA1* and *BRCA2* genes are relatively uncommon in the general population (~1 in 400 people). In people who have Ashkenazi Jewish ancestry, their chance to carry a mutation in *BRCA1* or *BRCA2* goes up to ~1 in 40.

Ethnicity can affect not only how often we expect to find these gene mutations, but also what kind of changes we expect to find. There are two different types of changes that can generally affect how genes work: sequencing and deletions/duplications. There are three specific sequencing changes, or spelling errors, that responsible for most of the non-working *BRCA1* and *BRCA2* genes in people with Ashkenazi Jewish ancestry. So, instead of casting a wide net for these individuals, we can offer more targeted testing. People with Hispanic and Middle Eastern ancestry are more likely to have deletions/duplications, or extra or missing parts of the gene, rather than spelling errors that will cause the *BRCA1* and *BRCA2* genes to not work.

It is important to remember that only about 5-10% of cancer is caused by a strongly hereditary cause. The vast majority of cancer (~75-80%) is sporadic and not due to a genetic risk running in the family. If you are concerned that your personal or family history may fit the pattern of a hereditary cancer syndrome, you may benefit from an evaluation by a genetic counselor or other trained healthcare professional to help determine your risks. Click here for more information on how to find a genetic counselor in your area.