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Web Exclusive: Inheritability of Genetic Mutations

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Most cancers are caused by outside forces that may result in cancer-causing DNA changes. But about 10 percent of patients develop cancer because of inherited mutations that are passed down from either parent. If a person has an inherited cancer-causing mutation, there is a 50 percent chance that person will pass on the mutation to his or her child or that a sibling will have the mutation. How that mutation affects cancer risk, however, depends on the specific mutation, other inherited factors, and possibly environmental effects, such as estrogen replacement, exercise, and diet.

Some of the most well-known genetic mutations that carry susceptibility for cancer include BRCA1 and BRCA2, which confer a high risk of breast and ovarian cancers. Even male carriers of BRCA2 mutations have a risk of breast cancer, as well as prostate cancer.

While most colorectal cancers occur because of sporadic mutations, about 5 percent are linked to inherited genes. Individuals with hereditary nonpolyposis colorectal cancer, also called Lynch syndrome, have up to an 80 percent chance of developing colorectal cancer before age 50, and the mutation can also increase the risk of other cancers, including ovarian, brain, and uterine.

Familial adenomatous polyposis, or FAP, carries nearly a 100 percent chance of developing colorectal cancer. A mutation of APC, a tumor suppressor gene, can cause hundreds to thousands of precancerous polyps to form, usually resulting in cancer by the age of 40.

A hereditary mutation of the von Hippel-Lindau (VHL) tumor suppressor gene has been linked to clear cell renal cell carcinoma, a common type of kidney cancer. People with this gene mutation carry about a 40 percent risk of developing kidney cancer. It has also been linked to rare blood vessel tumors of the eye, brain, and spinal cord.

Individuals who have a family history of cancer can consult with a genetic counselor to determine their risk and discuss genetic testing. Frequent cancer

screenings beginning at an early age, and possibly preventive surgery for extreme cases, are options for people who are found to be at high risk for certain cancers.