Muir-Torre Syndrome [1]

What is Muir-Torre syndrome?

Muir-Torre syndrome is a form of Lynch syndrome [2]. Cancer begins when normal cells begin to change and grow uncontrollably, forming a mass called a tumor. A tumor can be benign, meaning noncancerous, or malignant, meaning cancerous and it can spread to other parts of the body. People with Muir-Torre syndrome have an increased risk of the types of cancer seen in Lynch syndrome [2], including colorectal [3], endometrial [4] (uterine), stomach [5], ovarian [6], small bowel [7] (intestinal), urinary tract [8], prostate [9], and hepatobiliary (liver [10] or bile duct [11]) cancers.

People with Muir-Torre syndrome are also at risk for developing certain skin changes in adulthood that may form in the sebaceous glands. The sebaceous glands are located just under the skin and produce an oily substance that is a part of sweat called sebum. The typical skin changes found in Muir-Torre syndrome are sebaceous adenomas, sebaceous epitheliomas, sebaceous carcinomas, and keratocanthomas. Most of these skin conditions are associated with noncancerous lumps on the skin, some of which are liquid-containing cysts. Basal cell carcinoma, a common type of skin cancer [12] usually related to sun exposure, has also been reported in people with Muir-Torre syndrome. Only the skin carcinomas are cancerous. Muir-Torre syndrome is also associated with rare cancers of the sebaceous glands. If a cancer of the sebaceous gland is diagnosed, it is recommended that the patient talk with a doctor who has training in genetic diseases and conditions, such as a genetic counselor or geneticist that is familiar with the syndrome as part of his or her medical care.

ASCO recommends testing for hereditary conditions linked to colorectal cancer in all patients with colorectal cancer or for those who are younger than 70 and meet the revised Bethesda guidelines (see Lynch syndrome, Cancer.Net?s section for guidelines [2]).

What causes Muir-Torre syndrome?

Muir-Torre syndrome is a genetic condition. This means that the cancer risk can be passed from generation to generation in a family. Two genes have been linked to Muir-Torre syndrome, *MLH1* and *MSH2*. A mutation (alteration) in either of these genes gives a person an increased lifetime risk of developing the types of cancer or noncancerous skin changes listed above. Mutations in the *MLH1* or *MSH2* gene also cause Lynch syndrome. It is possible that there may be other genes that play a role in Muir-Torre syndrome. Research is ongoing to learn more about Muir-

Torre syndrome.

How is Muir-Torre syndrome inherited?

Normally, every cell has two copies of each gene: one inherited from the mother and one inherited from the father. Muir-Torre syndrome follows an autosomal dominant inheritance pattern in which a mutation needs to happen in only one copy of the gene for the person to have an increased risk of getting that disease. This means that a parent with a gene mutation may pass along a copy of their normal gene or a copy of the gene with the mutation. Therefore, a child who has a parent with a mutation has a 50% chance of inheriting that mutation. A brother, sister, or parent of a person who has a mutation also has a 50% chance of having the same mutation.

Options exist for couples interested in having a child when they know that one of them carries a gene mutation that increases the risk for this hereditary cancer syndrome. Preimplantation genetic diagnosis (PGD) is a medical procedure done in conjunction with in-vitro fertilization (IVF). It allows people who carry a specific known genetic mutation to have children who do not carry the mutation. A woman?s eggs are removed and fertilized in a laboratory. When the embryos reach a certain size, one cell is removed and is tested for the hereditary condition in question. The parents can then choose to transfer embryos which do not have the mutation. PGD has been in use for over a decade, and more recently has been used for several hereditary cancer predisposition syndromes. However, this is a complex procedure with financial, physical, and emotional factors for couples to consider before starting. For more information, talk with an assisted reproduction specialist at a fertility clinic.

How common is Muir-Torre syndrome?

Muir-Torre syndrome is considered to be rare.

How is Muir-Torre syndrome diagnosed?

Muir-Torre syndrome is diagnosed if a person has one or more of the skin changes and one or more of the internal cancers listed above. A person diagnosed with Muir-Torre syndrome can have a blood test to see if they have a mutation in the *MLH1* or *MSH2* genes. However, not everyone with Muir-Torre syndrome will have a detectable mutation in one of these two genes.

What are the estimated cancer risks associated with Muir-Torre syndrome?

The cancer risks are considered to be similar to the risks of people who have Lynch syndrome.

General cancer risks for people with Muir-Torre syndrome:

• Colorectal cancer [3]	80%
• Stomach cancer [5]	11% to 19%

• Hepatobiliary tract (liver [10] or bile duct [11]) cancer	2% to 7%
• Urinary tract cancer [8]	4% to 5%
• Small bowel (intestines) cancer [7]	1% to 4%
• Brain or central nervous system tumor [13]	1% to 3%
• Skin cancer [12]	increased risk
• Cancer of the sebaceous gland	increased risk

Cancer risks for women with Muir-Torre syndrome:

• Endometrial (uterine) cancer [4]	20% to 60%
• Ovarian cancer [6]	9% to 12%

What are the screening options for Muir-Torre syndrome?

As outlined above, screening recommendations for Muir-Torre syndrome are similar to those for Lynch syndrome. It is important to discuss the following screening options with your doctor, as each individual is different:

General screening guidelines

- Colonoscopy [14] to check for abnormalities within the colon and rectum every one to two years, beginning between the ages of 20 to 25 or five years younger than the earliest age at diagnosis in the family, whichever is sooner
- Testing and treatment for *Helicobacter pylori* is recommended
- Periodic upper endoscopy [15] to look for stomach or intestinal cancer may be done, especially if a family member has had one of these cancers
- Yearly urine cytology (lab test) to screen for urinary tract cancer
- Dermatologic (skin) screening by a health care professional at least once a year, beginning in early adulthood or five to 10 years before the earliest age at which skin problems developed in the family, whichever is sooner

Screening for women, beginning between the ages of 25 to 30

- Yearly pelvic examination
- Pap test [16]
- Transvaginal ultrasound [17] to obtain a better image of the uterus
- Endometrial biopsy [18] of the inner lining of the uterus
- CA-125 blood test to look for a protein found to be elevated in the blood of some women with ovarian cancer [6]

Screening options may change over time as new technologies are developed and more is learned about Muir-Torre syndrome. It is important to talk with your doctor about appropriate screening tests.

Learn more about what to expect when having common tests, procedures, and scans [19].

Questions to ask the doctor

If you are concerned about your risk of cancer, talk with your doctor. Consider asking the following questions of your doctor:

- What is my risk of developing colorectal cancer?
- What is my risk of developing skin cancer?
- What is my risk of other types of cancer?
- What can I do to reduce my risk of cancer?
- What are my options for cancer screening?

If you are concerned about your family history and think your family may have Muir-Torre syndrome, consider asking the following questions:

- Does my family history increase my risk of colorectal cancer?
- Does my family history increase my risk of skin cancer or other skin problems?
- Does my family history increase my risk of other types of cancer?
- Should I meet with a genetic counselor?
- Should I consider genetic testing?

More Information

The Genetics of Cancer [20]

Genetic Testing [21]

What to Expect When You Meet With a Genetic Counselor [22]

Collecting Your Family Cancer History [23]

Sharing Genetic Test Results with Your Family [24]

Additional Resources

Colon Cancer Alliance
www.ccalliance.org [25]

Lynch Syndrome International
www.lynchcancers.com [26]

National Cancer Institute
www.cancer.gov [27]

American Cancer Society
www.cancer.org [28]

Cancer*Care*
www.cancercare.org [29]

To find a genetic counselor in your area, ask your doctor or visit the following websites:

National Society of Genetic Counselors
www.nsgc.org [30]

National Cancer Institute: Cancer Genetics Services Directory
www.cancer.gov/cancertopics/genetics/directory [31]

Links:
[1] http://www.cancer.net/cancer-types/muir-torre-syndrome
[2] http://www.cancer.net/node/19223
[3] http://www.cancer.net/node/31317
[4] http://www.cancer.net/node/31260
[5] http://www.cancer.net/node/31376
[6] http://www.cancer.net/node/31343
[7] http://www.cancer.net/node/31377
[8] http://www.cancer.net/node/31330
[9] http://www.cancer.net/node/31382
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[22] http://www.cancer.net/node/24907
[23] http://www.cancer.net/node/30761
[24] http://www.cancer.net/node/24906

[25] http://www.ccalliance.org/
[26] http://www.lynchcancers.com/
[27] http://www.cancer.gov/
[28] http://www.cancer.org/
[29] http://www.cancercare.org/
[30] http://www.nsgc.org/
[31] http://www.cancer.gov/cancertopics/genetics/directory