

# Lynch Syndrome (HNPCC) and *MYH*-Associated Polyposis (MAP)

## A Patient's Guide

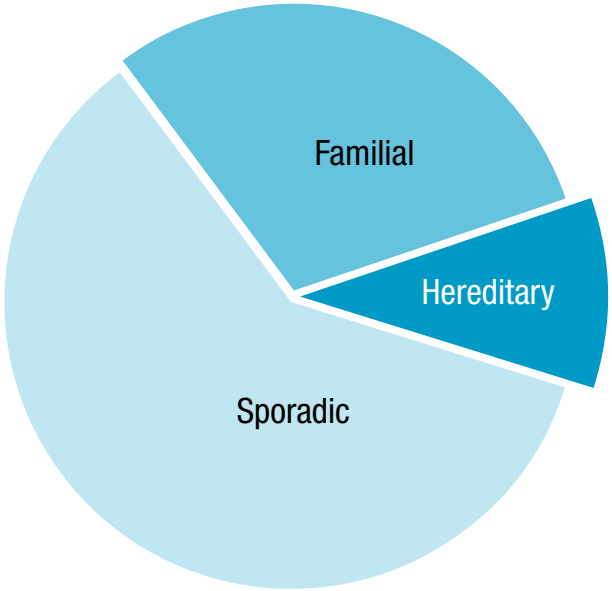
to risk assessment

# Hereditary Cancer Testing: Is it Right for You?

This workbook is designed to help you decide if hereditary cancer testing is right for you. Testing should be completed with a trained healthcare provider.

## Introduction

Most cancer occurs by chance. This is often called “sporadic cancer.” In some families we see more cancer than we would expect by chance alone. Determining which of these families have cancer related to an inherited gene mutation is important, as the cancer risks in hereditary cancer families are much higher than the general population.




**Sporadic Cancer -** Cancer which occurs by chance. People with sporadic cancer typically do not have relatives with the same type of cancer.

**Familial Cancer -** Cancer likely caused by a combination of genetic and environmental risk factors. People with familial cancer may have one or more relatives with the same type of cancer; however, there does not appear to be a specific pattern of inheritance (eg, the cancer risk is not clearly passed from parent to child).

**Hereditary Cancer -** Cancer occurs when an altered (broken) gene is passed down in the family from parent to child. People with hereditary cancer are more likely to have relatives with the same type or a related type of cancer. They may develop more than one cancer and their cancer often occurs at an earlier than average age.

## Personal and Family History*

**Check all that apply:**

- ☐ You or a close family member† were diagnosed with colon, rectal, or uterine cancer before age 50
- ☐ You or a family member were diagnosed with two or more Lynch syndrome cancers‡ at any age in the same person
- ☐ Two or more family members were diagnosed with a Lynch syndrome cancer‡ on the same side of the family, one before age 50
- ☐ There are three or more family members with a Lynch syndrome cancer‡ on the same side of the family at any age
- ☐ There is a previously identified Lynch syndrome or MAP syndrome mutation in your family

**Lynch syndrome**, also known as hereditary nonpolyposis colorectal cancer (HNPCC), is an inherited condition that causes an increased risk for colorectal cancer, gynecological cancers, as well as other related cancers.† The majority of Lynch syndrome is due to a mutation in the *MLH1*, *MSH2*, *MSH6, PMS2,* or *EPCAM* (also known as *TACSTD1*) genes. These mutations can be inherited from either your mother or father.

***MYH*-associated polyposis (MAP)** is a hereditary condition that causes an increased risk for colorectal cancer and colorectal polyps. Individuals with MAP may not have a family history of colon cancer or colon polyps in family members (although siblings may be affected). MAP is caused by mutations in the *MYH* gene, and individuals with MAP have mutations in both of their *MYH* genes (one from each parent).

*Assessment criteria based on medical society guidelines. For these individual medical society guidelines go to www.MyriadPro.com
† Close family members are parents, siblings, aunts, uncles, nieces, nephews, grandparents and grandchildren
‡ Lynch syndrome-associated cancers include colon/rectal, uterine/endometrial, ovarian, stomach/gastric, kidney/urinary tract, biliary tract, small bowel, pancreas, brain and sebaceous adenoma cancers

## Risks for Lynch Syndrome Mutation Carriers

| | Mutation Carrier Risk | General Population Risk |
|---|---|---|
| Colorectal | up to 82% | 2% |
| Endometrial (uterine) | up to 71% | 1.5% |
| Stomach | up to 13% | less than 1% |
| Ovarian | up to 12% | less than 1% |
| Second cancer within 10 years | 30% | 3.5% |
| Second cancer within 15 years | 50% | 5% |

Lynch syndrome mutation carriers also have a slightly elevated risk over the general population of developing cancers of the kidney/urinary tract, brain, biliary tract, small bowel and pancreas.

## Notes:

# Managing Lynch Syndrome Risk*

It is recommended that you be managed according to these guidelines, depending on your personal and family history. Discuss these options with the appropriate medical professionals to determine how you will manage your cancer risks.

## INCREASED SURVEILLANCE

| Site | Procedure | Age to Begin | Repeat Test |
|---|---|---|---|
| Colon | Colonoscopy | 20-25 years (or 2-5 years prior to the earliest colorectal cancer if it is diagnosed under age 25) | 1-2 years |
| Endometrium (Uterus)/ Ovaries | Gynecologic exam<br>Transvaginal ultrasound<br>Endometrial tissue sample<br>CA-125 | 25-35 years | 1-2 years |

Screening for other Lynch syndrome-related cancers (stomach, kidney/urinary tract, biliary tract, brain, small bowel, pancreatic) may be considered based on the presence of that cancer in a family member. Please speak to your healthcare provider.

## SURGICAL MANAGEMENT

- Removal of the colon is often recommended in patients who develop colon cancer. The rectum is usually left in place.
- Preventive removal of the uterus (endometrium) and/or ovaries reduces the risk of uterine and/or ovarian cancer and may be an option when childbearing is complete.
- Unaffected mutation carriers not willing or unable to undergo screening colonoscopies may consider preventive removal of the colon.

*For reference and supporting data on risk factors and medical management visit www.MyriadPro.com/references

## Cancer Risks Associated With MAP

*MYH*-associated polyposis (MAP) is a syndrome that was discovered fairly recently. MAP causes an increased risk for developing colon polyps (adenomas). Because of the numerous colorectal polyps (adenomas) that occur in MAP, the colorectal cancer risk is known to be significantly increased. Additionally, it is possible that risks of other cancers, such as small bowel, may be increased as well. More detailed information about cancer risks in MAP will likely be available in the future. Contact your healthcare provider on a regular basis for up-to-date information on MAP.

Patients who test positive for a single *MYH* mutation do not have MAP, but they may have a slightly increased risk of developing colorectal cancer.

## Notes

# Managing Your MAP Cancer Risks*

Options for reducing cancer risk are available whether or not you have already had a diagnosis of cancer and/or polyps (adenomas). It is recommended that you be managed according to these guidelines, depending on the number of colorectal polyps (adenomas) in you and your family members. Discuss these options with the appropriate medical professionals to determine how you will manage your cancer risks.

## INCREASED SURVEILLANCE

| SITE | PROCEDURE | AGE TO BEGIN | REPEAT |
|---|---|---|---|
| Colon—Small polyp (adenoma) burden, manageable by colonoscopy | Colonoscopy | 25-30 years | 1-2 years |
| Colon—Large polyp (adenoma) burden | Counseling regarding surgical options | Varies based upon polyp (adenoma) burden | N/A |
| Colon—After colon surgery | Endoscopy of any remaining colon and rectum | After colon surgery | 1-2 years |
| Duodenum and stomach† | Upper endoscopy and side viewing duodenoscopy | 30-35 years | 3-5 years |

†Patients who have small bowel polyps (adenomas) should follow FAP small bowel screening guidelines.

## SURGICAL MANAGEMENT

- Preventive removal of the colon and rectum may be recommended depending on the number of polyps (adenomas).

*For references and supporting data on risk factors and medical management, visit www.MyriadPro.com/references

## Testing Options

☐ **COLARIS$^{PLUS®}$ (Lynch Syndrome Plus MAP):**

Sequence and large rearrangement analysis of the *MLH1, MSH2, MSH6, PMS2*, and *MYH* genes, and large rearrangement analysis of *EPCAM*.

☐ **Single Gene Testing:**

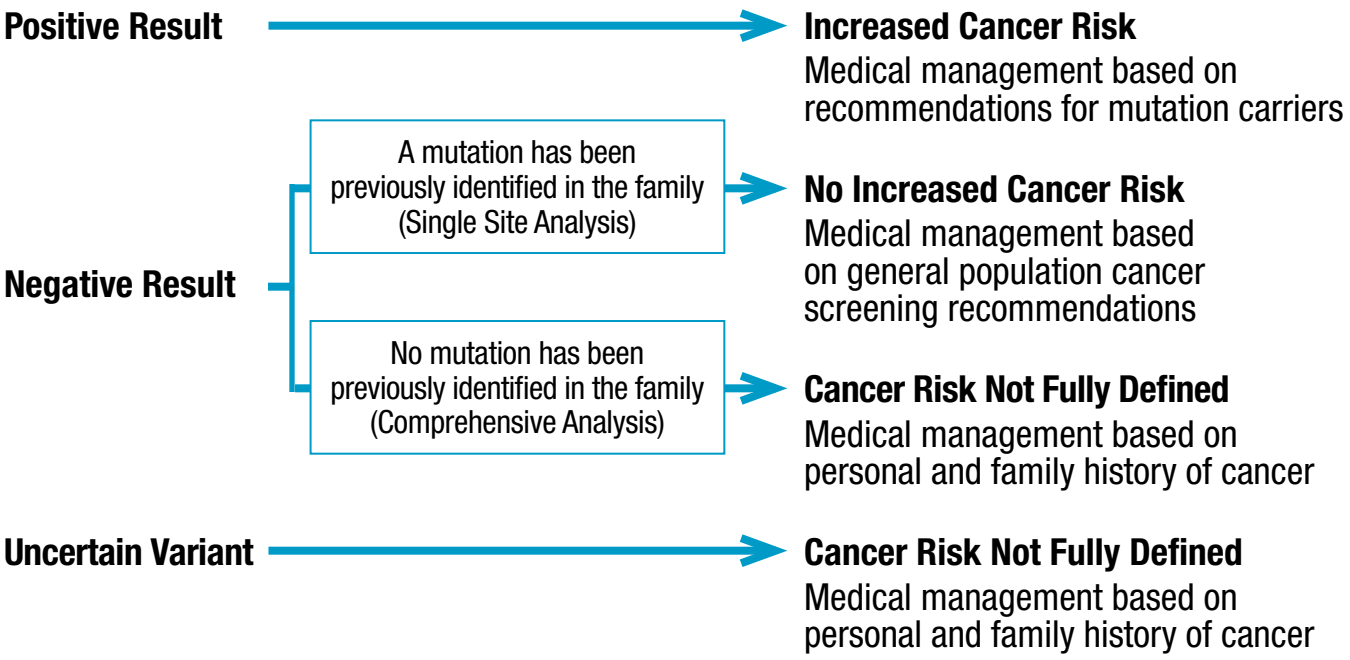
Sequence and large rearrangement analysis of one of the following genes: *MLH1, MSH2/EPCAM, MSH6, PMS2*, or *MYH.*

☐ **Single Site Testing:**

Mutation specific analysis for individuals with a known Lynch syndrome or MAP mutations in the family.

## Notes

## Possible Test Results




*Patients who test positive for one *MYH* gene mutation do not have *MYH*-associated polyposis (MAP), but may have a small increased risk for colon cancer.

## Notes

## It's a Family Affair

- Lynch syndrome and MAP related mutations can be passed on in a family.
  - If you have a mutation in one of these genes, your parents, your children, and your brothers and sisters have a chance that they have the same mutation.
  - Other relatives may be at risk to carry the same mutation.
- Testing is the only way to accurately identify mutation carriers.
- It is important to share test results with family members.
- Individuals may differ in their viewpoints and reactions to genetic testing.

## Benefits and Limitations of Testing

**Benefits**

- Personalized risk assessment
- Appropriate medical management to help reduce cancer risk
- Important information for family members
- Reduced anxiety and stress

**Limitations**

- Testing does not detect all causes of hereditary cancer
- A negative result is most helpful when there is a known mutation in the family
- Some variants are of unknown clinical significance

## Notes

## Health Care Coverage

Insurance coverage for genetic testing of at-risk patients is excellent, with the majority of patients covered for testing. The average patient payment for an integrated COLARIS test, including patients who pay nothing, is less than $100.*

## Privacy

Federal laws (HIPAA and GINA) and laws in most states prohibit discrimination regarding employment eligibility, benefits, or premiums based solely on genetic information. Additionally, it is Myriad's policy that test results are disclosed only to the ordering healthcare professional or designee, unless the patient consents otherwise.

## Next Steps:

☐ Pursue testing

☐ Schedule follow-up appointment for results disclosure

Date: _____ Time: _____

☐ Decline testing — Medical management based on personal and family history of cancer

☐ Undecided

Who to contact with questions: _____

*Test prices may be confirmed by calling Myriad Customer Service at 800-469-7423. Unmet deductibles are always the responsibility of the patient.

## Additional Resources:

### Colorectal Cancer Network

A support network for individuals and families touched by colon cancer that promotes awareness, screening, and early detection programs as well as legislative actions.
**www.colorectal-cancer.net**

### Gynecologic Cancers Foundation

This group aims to ensure public awareness of gynecologic cancer prevention, early diagnosis and proper treatment as well as supports research and training related to gynecologic cancers.
**www.thegcf.org**

### Myriad Genetic Laboratories, Inc.

**www.MySupport360.com**
800-4-MYRIAD (800-469-7423)
E-mail: helpmed@myriad.com
**www.HereditaryCancerQuiz.com**

### Colon Cancer Alliance

The Colon Cancer Alliance (CCA) is a national patient advocacy organization dedicated to ending the suffering caused by colorectal cancer.
**www.ccalliance.org**

### Lynch Syndrome International

The primary mission of Lynch Syndrome International (LSI) is to serve global communities by focusing on providing support for individuals afflicted with Lynch syndrome, creating public awareness of the syndrome, educating members of the general public and health care professionals and providing support for Lynch syndrome research endeavors.
**www.lynchcancers.org**

### Fight Colorectal Cancer

FCC is the leading national colorectal cancer advocacy organization empowering survivors to raise their voices, training advocates around the country, and educating lawmakers and pushing them for better policies. FCC offers support for patients, family members and their caregivers, and serves as a resource for colorectal cancer advocates, policymakers, medical professionals, and healthcare providers. Additionally, they increase and improve research—at all stages of development and for all stages of cancer.
**www.fightcolorectalcancer.org**

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Myriad Genetic Laboratories, Inc.
320 Wakara Way
Salt Lake City, Utah 84108