Individuals with MUTYH-Associated Polyposis syndrome (MAP) have a high lifetime risk for colon polyps and colon cancer. There are usually tens to hundreds of polyps found in the large intestine, but some people may develop colon cancer without polyps.

Unlike most of the hereditary cancer syndromes, MAP is inherited in an autosomal recessive pattern, meaning that both copies of the gene are turned off or not working properly because they have a change, called a mutation, in them. This means that someone would have to inherit mutations in both genes that they get from their parents for them to have this condition. If someone has two non-working copies of MUTYH, they are diagnosed with MUTYH-Associated Polyposis syndrome (MAP).

For someone with MAP, in each pregnancy there is a 100% chance for them to pass a non-working copy of MUTYH to the baby because someone with MAP has no working copies of the gene to pass down. All children will at least be carriers, which means they have one working and one non-working copy of the gene (see Single MUTYH Mutation Carriers, below). If their partner was a carrier for MUTYH, then there would be a 50% chance that the partner would also pass their broken copy of the gene to the baby, meaning the baby would have MAP. There would also be a 50% chance that the partner could pass down their working copy of MUTYH, which would mean the baby would be a carrier.

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>General Population Risk</th>
<th>Risk with MAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colon</td>
<td>5.5%</td>
<td>80%</td>
</tr>
<tr>
<td>Duodenal (small intestine)</td>
<td>&lt;1%</td>
<td>4%</td>
</tr>
<tr>
<td>Stomach</td>
<td>&lt;1%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Individuals with MAP are also at increased risk of:

- Polyps in the stomach and small intestine
- Spots on the inside of your eye, like freckles, called CHRPE
- Cysts in your jaw bone, liver, or kidney
- Fatty tumors, called subcutaneous lipomas
- Other tumors of the skin that can start in the glands or different skin layers, called sebaceous gland adenomas or epitheliomas

**GENETIC TESTING FOR MUTYH**

Genetic testing is available for this condition. This can be done on a blood or saliva sample. The results take about 3 weeks to return. There are different ways to complete this testing. This can include:
Full gene **sequencing** and **rearrangement analysis**: Comprehensive testing to search for all currently detectable mutations in the genes

**Gene panels**: Newer, more broadly based gene tests that would include MUTYH gene, but other genes known or suspected to be associated with colon polyps and increased cancer risks

**Single site analysis**: Testing specific to a known mutation(s) in the family

Those who undergo testing for the MUTYH gene due to a personal history of many colon polyps should also be offered testing for another genetic predisposition to colon polyps called **Familial Adenomatous Polyposis (FAP)**. These two conditions are caused by separate genetic mutations but it is often difficult to distinguish between the two conditions without genetic testing.

**WHO SHOULD BE OFFERED TESTING FOR MUTYH?**

The [National Comprehensive Cancer Network (NCCN)](https://www.nccn.org) is a group of medical professionals that regularly meet to look over any updates in research studies and determine recommendations for who should be considered at a higher risk for one of these gene mutations, and thus should be offered genetic testing:

- Personal history of at least 20 adenomatous colon polyps. Testing can be considered if 10-20 polyps found.
- Family history of known MUTYH mutation(s), or a family member has a positive test result.
- Those with **Serrated Polyposis Syndrome** and have at least 5 adenomatous polyps. There is no clear genetic cause for serrated polyposis syndrome, but testing for MUTYH can be done, especially with a personal history of adenomas along with the serrated polyps.

**CANCER SCREENING AND RISK MANAGEMENT FOR MUTYH ASSOCIATED POLYPOSIS (MAP)**

If you are tested and found to have MUTYH/MAP, it is recommended to discuss your management plan with your healthcare team, and if available, to seek consultation through a specialized high-risk clinic. General recommendations are included here based on the updated guidelines of the [NCCN](https://www.nccn.org), but may be tailored to your specific medical and family
history.

For individuals with MAP (2 mutations) who have not had polyps; or for siblings of people with MAP who have not had testing themselves:

- Colonoscopy starting at age 25-30, continuing every 2-3 years if no symptoms. If polyps discovered, go to plan below.
- Annual physical exam.
- Baseline endoscopy at 30-35.

For individuals with MAP (2 mutations) who have already had polyps:

- Younger than 21: colonoscopy every 1-2 years. Surgery can be considered if too many polyps.
- 21 or older, with manageable polyp burden: colonoscopy every 1-2 years. Consider surgical evaluation and colectomy as appropriate
- Too many polyps to handle endoscopically: consider surgery. Exact type should be discussed with physician.
- Annual physical exam.
- Baseline endoscopy at 30-35.

SINGLE MUTYH MUTATION CARRIERS (MAP CARRIERS)

Individuals who have one nonworking copy of MUTYH and one working copy, are considered carriers for MAP. One to two percent of the general population are carriers for MAP. Some studies have shown that carriers for MAP may have a slightly increased risk for colon cancer, but specific numbers are not currently available. The National Comprehensive Cancer Network (NCCN, version 1.2018) recommends to begin colonoscopy screening at age 40 and to repeat every 5 years if there is a first degree relative who has been diagnosed with colorectal cancer. If the relative was diagnosed with colon cancer before age 50, then colonoscopies should start 10 years younger than the family member’s age when they were diagnosed with colon cancer.

If there are no close family members with colon cancer, then the data is uncertain if any additional screening is needed. Discuss with your doctor. In general, a colonoscopy is recommended for everyone at age 50, unless there is a family history or genetic test history that has recommendations to start sooner.