



FACT SHEET



# BIOMARKERS

By choosing a treatment plan that best matches your tumor type, you may experience fewer side effects and improved health. This approach to planning treatment is known as “personalized medicine.” Personalized medicine uses specific information about your body and tumor to help diagnose and plan treatment, as well as find out how well the treatment is working based on your own body’s biology.

Biomarkers play a key role in developing individualized treatment plans. A biomarker is a biological molecule found in blood, other body fluids or tissues -- biomarkers appear in tumors, too. Testing your tumor for biomarkers (AKA knowing your tumor type) can help you understand if there are abnormal functions of your body’s organs and systems. Biomarkers can come in the form of genetic mutations (genes), proteins and DNA abnormalities.

Here are the known biomarkers impacting colorectal cancer patients and how to understand their implications:

Biomarkers and Colorectal Cancer		
Genetic Mutations	The RAS Genes: KRAS and NRAS	KRAS and NRAS genes play an important role in instructing colorectal cancer cells to grow and divide as part of the epidermal growth factor receptor (EGFR) process. If your biomarker test indicates you have a KRAS or NRAS mutation, drugs that target EGFR (like cetuximab, and panitumumab) may not benefit you. “Wild type” means you do not have the mutation and the drugs may provide some benefit.  This test is typically for stage IV patients, though may be tested in earlier stages. *All stage IV patients need to undergo RAS biomarker testing before beginning treatment.
	BRAF	BRAF is also a gene that signals cells to divide. Patients with mutant BRAF genes generally have a poorer prognosis (chance of survival and worse side effects).  BRAF testing is generally done at the same time as RAS testing.
	PIK3CA	While somewhat new, a growing number of clinicians are testing for mutant PIK3CA genes; particularly patients who have early-stage colorectal cancer.  There is some suggestion that aspirin use may help decrease the risk of recurrent colorectal cancer in patients with early stage disease and PIK3CA mutation.
Proteins	Carcinoembryonic Antigen (CEA)	CEA is a protein that may be higher in colorectal cancer patients. High levels of CEA may indicate that cancer is present or a treatment is not working. Low levels may indicate that the body is responding to a treatment. (Keyword: <i>may</i> )



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## Biomarkers and Colorectal Cancer

<b>DNA Abnormalities</b>	Microsatellite Instability High (MSI-H)	<p>MSI-H is found in about 15% of colon tumors. It is most often found in tumors associated with genetic syndromes like Lynch syndrome. It can also occur sporadically.</p> <p>MSI-H is what “happens” when the genes that regulate DNA function don’t work correctly. These DNA regulating genes, known as Mismatch Repair Genes (MMR), work like genetic “spell checkers.” When problems occur in these spell-checking MMR genes, it means that areas of DNA start to become instable. A high frequency of instability is called MSI-H.</p> <p>Patients with MSI-H tumors may respond differently to certain treatments. It is important to test tumors for this trait. It can also help determine if a patient developed colorectal cancer related to an inherited family syndrome.</p>
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### IMPLICATIONS & RECOMMENDATIONS (as of March 2016)

The National Comprehensive Cancer Network (NCCN) guidelines are what physicians follow to recommend treatment plans to patients. They currently recommend:

- CEA: ALL colorectal cancer patients - will be done as part of labwork
- MSI: ALL colorectal cancer patients - tumor will be biopsied
- RAS & BRAF: When diagnosed with stage IV disease or sooner, always before treatment begins. Occasionally tests are run in earlier stages - tumor will be biopsied.
- PIK3CA: most common in stage II and III; tumor will be biopsied (not all clinicians are doing this test)

### FREQUENTLY ASKED QUESTIONS

#### What will my results look like?

Your biopsy test results will show whether your tumor has a mutation or if you are MSI positive (meaning you have MSI-H). “Wild-type” means a mutation was not found in the gene.

#### When should I talk to my doctor?

Talk with your healthcare team about tumor biomarker tests immediately after your diagnosis.

#### Will I need another biopsy to test my tumor?

No. When you had surgery, some of your tumor tissue was removed and stored at the hospital. Your doctor can arrange for your tissue to be sent to a lab. Results will go to your doctor. The tissue sample tested can be from your original cancer in your colon or rectum, or from a metastatic tumor that has spread from that primary one.

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