

Biomarkers and Surrogate Endpoints

What Is a Biomarker?

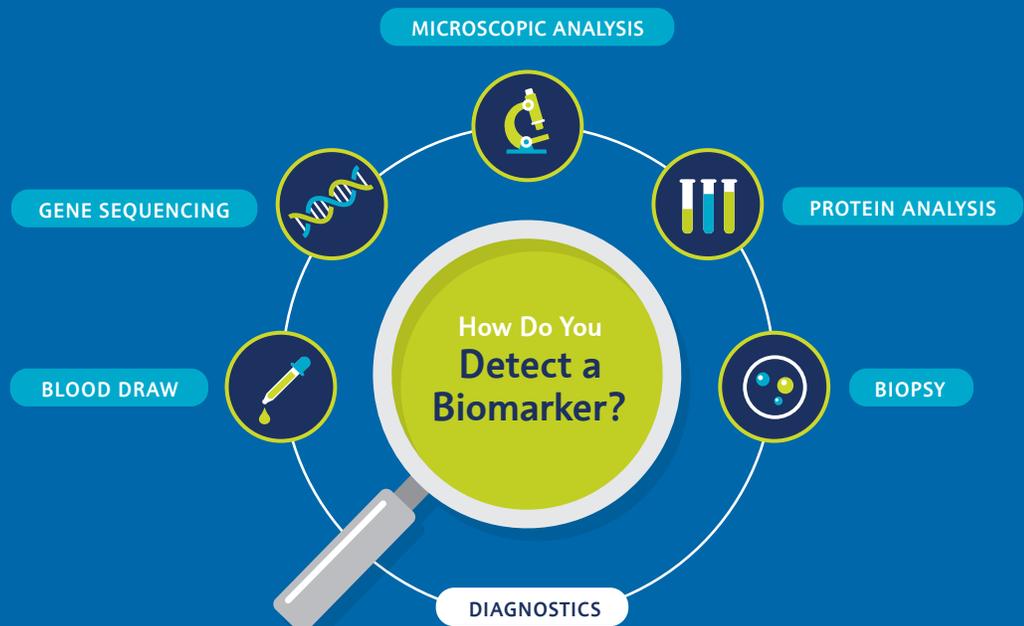
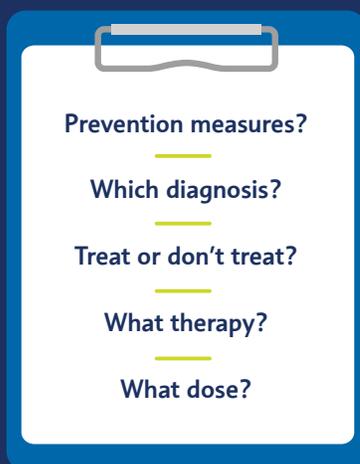
A biomarker, shorthand for “biological marker,” is a measure or physical sign that can be used to determine how the body is functioning. Examples of biomarkers include using blood sugar levels to identify and monitor patients with diabetes, BRCA1 and BRCA2 gene mutations to evaluate a patient’s risk of developing breast cancer or viral load counts to evaluate a patient’s response to antiretroviral treatments. These types of biomarkers indicate biological functions in the body and can also be used to measure how activities in the body might be changing or impacted as a result of outside factors, such as disease processes or a therapeutic intervention.

How Are Biomarkers Used?

Medical professionals use biomarkers in many ways, including in the diagnosis of disease, monitoring how a disease is progressing and, if a treatment is given, how the body is responding. Biomarkers may also be used to reduce uncertainty and guide treatment decisions by helping to determine the appropriate medicine and dose for a patient.

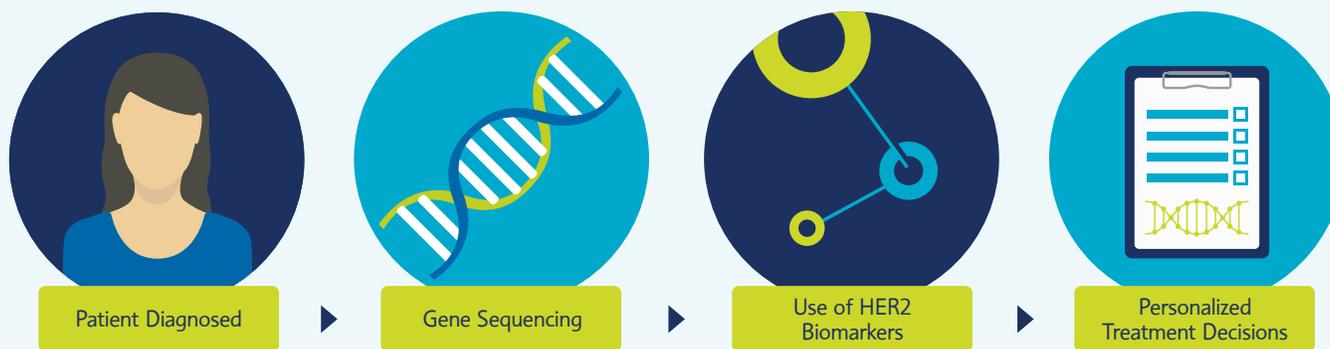
Rapid advances in science are driving an increased understanding of human physiology and how diseases affect the body; these advances are helping researchers identify new biomarkers. As more biomarkers are identified, they have the potential to enhance the research and development process of new medicines by providing new ways to measure disease activity. Biomarkers can also help measure the impact of medicines being studied and can significantly shorten the time required to show that a new medicine is safe and effective.

Biomarkers Help Inform Medical Decisions



Advances in genomics have spurred better understanding of certain types of cancer, allowing for the development of precision therapies based on a specific gene mutation or molecular target, which can give patients better options to treat their cancer.

Biopharmaceutical researchers have focused on identifying biomarkers—such as the HER2 positive gene mutation—for women with breast cancer. These mutations may be passed from generation to generation and can help predict a patient’s risk of developing certain cancers. By tailoring treatments using biomarkers, health care providers can deliver the most personalized benefit to each patient.



What Is a Surrogate Endpoint?

Before the U.S. Food and Drug Administration (FDA) approves a new medicine, researchers must demonstrate that the medicine is safe and effective. Specific measures, called clinical endpoints, must be met in order to demonstrate safety and efficacy. These clinical endpoints are often assessed over a long period of time, for example, patient survival with serious and life-threatening diseases.

Biomarkers have many uses in the drug development process, including providing the ability to track the progress of disease. For a serious disease or condition where there is a significant unmet need, like cancer, the FDA may allow for the use of a surrogate endpoint to demonstrate the effect of a medicine. A surrogate endpoint is a marker—such as a biomarker or other measure—that is expected to predict, but is not itself a measure of clinical benefit, and can thus be substituted for a clinical endpoint. For example, in clinical trials for cancer, researchers may be able to detect that a medicine is having an impact if there is a reduction in the size of a patient’s tumor before the disease fully manifests.

The use of surrogate endpoints can accelerate drug development and considerably shorten the time required for FDA approval, allowing patients quicker access to promising new medicines. Medicines approved based on surrogate endpoints are typically granted an accelerated approval that is contingent upon the sponsor continuing research, called Phase 4 studies, in order to confirm long-term safety and efficacy.

How Can Biomarkers Improve Drug Development?

The fast pace of medical innovation is helping biopharmaceutical researchers continue to uncover new biomarkers that are helping to advance better diagnosis and treatment options for patients. Not only do biomarkers have the potential to serve as surrogate endpoints, but the use of biomarkers can open new avenues for drug research. Biomarkers may provide researchers with the ability to measure a treatment’s effectiveness against a disease with a difficult to define endpoint. They may also provide clinicians with useful measurements, allowing for an early diagnosis of a disease or condition.

In order to take advantage of the promise biomarkers hold in drug research, researchers first must get assurance from the FDA that the biomarker is an acceptable measure. With the increasing use of biomarkers in clinical trials, there is a greater need to establish a clearly defined biomarker qualification process in order to continue to advance clinical research. A well-defined regulatory pathway for biomarker qualification can help improve our understanding of drug development, accelerate patient access to promising therapies, open new avenues for research and yield a more competitive and sustainable biopharmaceutical ecosystem.