

Importance of Molecular Biomarkers

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Brief Report

Biomarkers play major roles in medicinal biology. Biomarkers help in early diagnosis, disease prevention, drug target identification, drug response etc. Several biomarkers have been identified for many diseases such as serum LDL for cholesterol, blood pressure, and P53 gene and MMPs as tumor markers for cancer. In medicine, a biomarker is a measurable indicator of the severity or presence of some disease state. More generally a biomarker is anything that can be used as an indicator of a particular disease state or some other physiological state of an organism. According to the WHO, the indicator may be chemical, physical, or biological in nature - and the measurement may be functional, physiological, biochemical, cellular, or molecular. A biomarker can be a substance that is introduced into an organism as a means to examine organ function or other aspects of health. For example, rubidium chloride is used in isotopic labeling to evaluate perfusion of heart muscle. It can also be a substance whose detection indicates a particular disease state, for example, the presence of an antibody may indicate an infection. More specifically, a biomarker indicates a change in expression or state of a protein that correlates with the risk or progression of a disease, or with the susceptibility of the disease to a given treatment. Biomarkers can be characteristic biological properties or molecules that can be detected and measured in parts of the body like the blood or tissue. They may indicate either normal or diseased processes in the body.[2] Biomarkers can be specific cells, molecules, or genes, gene products, enzymes, or hormones. Complex organ functions or general characteristic changes in biological structures can also serve as biomarkers. Although the term biomarker is relatively new, biomarkers have been used in pre-clinical research and clinical diagnosis for a considerable time.[3] For example, body temperature is a well-known biomarker for fever. Blood pressure is used to determine the risk of stroke. It is also widely known that cholesterol values are a biomarker and risk indicator for coronary and vascular disease, and that C-reactive protein (CRP) is a marker for inflammation. Biomarkers are useful in a number of ways, including measuring the progress of disease, evaluating the most effective therapeutic regimes for a particular cancer type, and establishing long-term susceptibility to cancer or its recurrence.[4] The parameter can be chemical, physical or biological. In molecular terms

biomarker is "the subset of markers that might be discovered using genomics, proteomics technologies or imaging technologies. Biomarkers play major roles in medicinal biology. Biomarkers help in early diagnosis, disease prevention, drug target identification, drug response etc. Once a proposed biomarker has been validated, it can be used to diagnose disease risk, presence of disease in an individual, or to tailor treatments for the disease in an individual (choices of drug treatment or administration regimes). In evaluating potential drug therapies, a biomarker may be used as a surrogate for a natural endpoint such as survival or irreversible morbidity. If a treatment alters the biomarker, which has a direct connection to improved health, the biomarker serves as a surrogate endpoint for evaluating clinical benefit. Some of the main areas in which molecular biomarkers are used in the drug development process are: early drug development studies, safety studies, proof of concept studies, and molecular profiling. In order to use a biomarker for diagnostics, the sample material must be as easy to obtain as possible. This may be a blood sample taken by a doctor, a urine or saliva sample, or a drop of blood like those diabetes patients extract from their own fingertips for regular blood-sugar monitoring.

For rapid initiation of treatment, the speed with which a result is obtained from the biomarker test is critical. A rapid test, which delivers a result after only a few minutes, is optimal. This makes it possible for the physician to discuss with the patient how to proceed and if necessary to start treatment immediately after the test.

Many new biomarkers are being developed that involve imaging technology. Imaging biomarkers have many advantages. They are usually non-invasive, and they produce intuitive, multidimensional results. Yielding both qualitative and quantitative data, they are usually relatively comfortable for patients. When combined with other sources of information, they can be very useful to clinicians seeking to make a diagnosis. Biomarkers are integral to drug development; they're really critical, because we need to measure the effects of investigational drugs on people during the clinical trials. And the way we do that is to look at their effect on biomarkers. Biomarker is short for biological marker, and is used as an indication that a biological process in the body has happened or is ongoing. While some biomarkers are used to show that the body has been exposed to a chemical, toxin or other environmental impact - most associate biomarkers with medicine.

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