Biomarkers Journal
ISSN: 2472-1646

Open access Commentary

An Overview of Biological Markers Measurements

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DESCRIPTION

A biomarker (short for biological marker) is an objective measure that captures what is happening in a cell or an organism at a given moment. Biomarkers can serve as early warning systems for your health. For example, high levels of lead in the bloodstream may indicate a need to test for nervous system and cognitive disorders, especially in children. High cholesterol levels are a common biomarker for heart disease risk. Many biomarkers come from simple measurements made during a routine doctor visit, like blood pressure or body weight. Other biomarkers are based on laboratory tests of blood, urine, or tissues. Some capture changes at the molecular and cellular level by looking at genes or proteins. The following clinical trials are currently recruiting. Biomarkers play an important role in illuminating relationships among environmental exposures, human biology, and disease. Scientists can use biomarkers to better understand fundamental biological processes, advance exposure science, and turn research findings into practical medical and public health applications. Diagnostic biomarkers that meet a burden of proof can serve a role in narrowing down diagnosis. This can lead to diagnosis that is significantly more specific to individual patients. After a heart attack a number of different cardiac biomarkers can be measured to determine exactly when an attack occurred and how severe it was. A biomarker can be a traceable 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 as a radioactive isotope 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. One example of a commonly used biomarker in medicine is Prostate-Specific Antigen (PSA). This marker can be measured as a proxy of prostate size with rapid changes potentially indicating cancer. The most extreme case would be to detect mutant proteins as cancer specific biomarkers through Selected Reaction Monitoring (SRM), since mutant proteins can only come from an existing tumor, thus providing ultimately the best specificity for medical purposes. Another example is KRAS, an oncogene that encodes a GTPase involved in several signal transduction pathways. Biomarkers for precision oncology are typically utilized in the molecular diagnostics of chronic myeloid leukemia, colon, breast, and lung cancer, and in melanoma. Digital biomarkers are a novel emerging field of biomarkers, mostly collected by smart biosensors. So far, digital biomarkers have been focusing on monitoring vital parameters such as accelerometer data and heartrate but also speech. Novel non-invasive, molecular digital biomarkers are increasingly available recorded by e.g., on-skin sweat analysis (internet-enabled Sudorology), which can be seen as next-generation digital biomarkers. Digital biomarkers can be easily shared with the responsible physician, and novel diagnostics approaches can be developed using artificial intelligence.

ACKNOWLEDGEMENT

None.

CONFLICT OF INTEREST

The author's declared that they have no conflict of interest.

Received:	30-January-2023	**Manuscript No:**	IPBM-23-16016
Editor assigned:	01-February-2023	**PreQC No:**	IPBM-23-16016 (PQ)
Reviewed:	15-February-2023	**QC No:**	IPBM-23-16016
Revised:	20-February-2023	**Manuscript No:**	IPBM-23-16016 (R)
Published:	27-February-2023	**DOI:**	10.35841/2472-1646.23.09.007

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Citation John H (2023) An Overview of Biological Markers Measurements. Biomark J. 9:007.