The role of biomarkers to detect progression of diseases
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Biomarkers are substances isolated from human fluids (serum, urine or other body fluids), cells and tissues which are known as the compounds to indicate the presence or intensity of a particular disease condition. These compounds are divided into two major categories including biomarkers of exposure and biomarkers of disease. According to various studies, accuracy, reproducibility, sensitivity, specificity, and plausibility are criteria for useful biomarkers.

Hulka and colleagues isolated biomarkers from human fluids (serum, urine), cells and tissues as compounds that indicate the presence or intensity of a particular disease condition. These biological characteristics can be measured not only to demonstrate pathogenic processes, diagnosis, progression, and the results of treatment, but also to detect normal biotic procedures. Physicians have depended on biomarkers to aid in the diagnosis and treatment some important diseases including cardiovascular disease, infections, immunological and genetic disorders, cancer, and nervous system disorders. There are different techniques to check the status of health or disease of the nervous system. These may require a straight evaluation of blood, urine, brain, cerebrospinal fluid, nerve, muscle, and skin. Furthermore, biomarkers are suitable for measuring changes in the physiology, behavior, and function of a malfunctioning organ. For example, different configurations of biomarkers include proteins or peptides used to indicate the risk for prostate cancer, antibodies (such as anti-citrullinated protein antibodies for rheumatoid arthritis), cell types such as white blood cells count for infection or cancer, metabolites such as evaluation of phenylalanine in patients with phenylketonuria. Similarly, lipids evaluated in cardiovascular disease, hormones, hepatic enzymes for liver cancer. Radioactive iodine is a biomarker that determines the function of thyroid gland. Furthermore, blood pressure and fever as the physiological states are other forms of biomarkers to demonstrate a diseased situation in specific organs.

Ductal cells in prostate gland secrete a protein named PSA (prostate antigen) into semen that is measured in cancer of the prostate. There is a close relationship between high PSA and prostate cancer.

Many trials have demonstrated that evaluation of PSA can help the early detection of prostate cancer. According to the trials, the biomarkers are divided into two major categories including biomarkers of exposure and biomarkers of disease. The biomarker of exposure is related to exposure of an organism to a substance, typically a synthetic chemical that is foreign to the body or to an ecological system. A biomarker of exposure is a chemical or its metabolite, or even is the result of the products of an interaction among a chemical and some target molecules or cells which is measured in the human body. Biomarker of disease is associated with early biological effect, changing of physiologic status, behavior, and dysfunction of an organ.

Time consuming, high costs for analysis and laboratory mistakes are some of significant disadvantages of biomarkers. Therefore, the problems of using biomarkers for diagnosis should be reduced as much as possible. According to numerous studies, accuracy, reproducibility, sensitivity, specificity, and plausibility are criteria for useful biomarkers. The disease biomarkers referred to serum and urine are good signs for application of primitive screening.

Author’s contribution
AB is the single author of the manuscript.

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References

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