Editorial
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Diagnosis of Type 2 Diabetes: Role of Biomarkers

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Editorial

Type 2 diabetes (T2D) is a complex metabolic disease related with uncertainties in carbohydrates, lipids and proteins metabolism. The prevalence of T2D, representing >90% of all cases of diabetes, are rapidly growing globally [1]. Therefore, diagnosis of individuals at high risk of developing diabetes is of high importance. High prevalence and increased incidence in T2D worldwide raise interest of discovery new molecular markers for diagnosis, prevention and development of T2D. Diabetes mellitus is defined as a one-time reading of elevated blood glucose levels monitored symptoms or as elevated when two measurements:

- Fasting plasma glucose ≥ 7.0 mmol/l (126 mg/dl), FPG or Plasma glucose ≥ 11.1 mmol/l (200 mg/dl), OGTT
- More than 6.5% glycated hemoglobin (HbA1c).

Biomarkers like glycated hemoglobin (HbA1c), fructosamine, and glycated albumin have limits comprising moderate sensitivity and specificity and are imprecise in certain clinical conditions. Consequently, identification of additional biomarkers is being explored recognizing that any single biomarker will also likely have inherent limitations. Therefore, merging numerous biomarkers may more accurately identify those at high risk for diabetes.

Biomarkers well-defined as biological molecules that represent healthy and unhealthy state of the body measurable in biological media like human tissues, cells or fluids. This designation has been prolonged to comprise of biological characteristics that can be measured and evaluated as an indicator of normal biological processes, pathogenic processes, or pharmacological responses to a therapeutic intervention. Nowadays, biomarkers include tools and analytical technologies that can be help in understanding of the prediction, cause, diagnosis, and progression or outcomes of treatment of disease.

At present, in clinical practice FPG, OGTT and hemoglobin A1c are extensively used for the diagnosis of diabetes mellitus or for monitoring of treatment. As a complex metabolic disorder, T2D signifies interaction between multiple genetic and environmental factors including lifestyle, dietary intake, ethnicity, race, age, heritability, duration of disease, etc. Knowledge of chemical processes and metabolic pathways needed to better understanding risk factors of development T2D [2,3].

Numerous current large population-based studies and their meta-analyses have identified multiple potential genetic and non-genetic biomarkers for the risk of T2D. Amalgamation of genetic variants and physiologically characterized pathways progresses the organization of individuals with T2D into subgroups, and is also paving the way to a precision medicine approach, in T2D. A novel molecular biomarker appear from modern research in applied genomics, metabolomics and other modern "omics" technologies as powerful tools in identification of T2D. Various omics platforms like genomics, metabolomics, proteomics, and microbiomics—and RNA sequencing-based studies, combined to novel data science methods including bioinformatics, data mining, imaging, machine learning, neural networks, are now revolutionizing biomarker development .

"Omics" technology acquired the model profiles of key intermediates or metabolites of lipid metabolism, as well carbohydrates, nucleic acids and proteins give a "signature" in the precise diagnosis and treatment of T2D. Further analysis should focus on application of metabolic and lipidomic techniques into clinical practice for an early detection risk factors of developing T2D and a novel therapeutic target and treatment of disease. Development of novel movements in analysis and detection of different metabolites, especially fatty acids and amino acids, along with genetic polymorphisms points out new directions in precise diagnosis and therapy of Type 2 diabetes. Specialized health care centers, diabetes clinics and hospitals that manage patient-based registers longitudinally and impart education to patients and health workers, have already started effective collaborations with data scientists to narrow the gap between bio banking, biomarker development, and biomarker validation in intervention studies or clinical trials. Accepting such methods, in agreement with data protection and ethical guidelines, with emphasis on judicial use of follow up patient data is steadily moving closer to successful personalized treatment and constructing efficient translational research facilities, which promise to improve the quality of life for the patients and enable better health care.

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