

Review of Biomarkers involved in Obesity associated with Diabetes

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Abstract: *By taking the advantage of Information Technology, today's researcher successfully navigate the flood of data and many diabetic complications can be overcome. Biomarker plays very major role in disease detection at early stages of its stages and also helpful in knowing the state of treatment and how body is acting or responding to the medication. The dramatic rise in obesity-associated diabetes resulted in an alarming increase in the incidence and prevalence of obesity an important complication of diabetes. The aim of this review paper is to study the Biomarkers involved in Obesity associated with Diabetes*

Keywords: Biomarkers, Obesity, Diabetes

I. INTRODUCTION

In recent years, the escalating worldwide prevalence of obesity is considered as one of the most serious issues. This is because obesity is significantly associated with diabetes, heart disease, cancer, high blood pressure, and high cholesterol [1][2]. The cause of diabetes is a mystery, although obesity and lack of exercise appear to possibly play significant roles. The ultimate goals for research focused on complex human diseases are to either prevent or to cure the diseases. These are ambitious goals that will be greatly facilitated by the identification of new biomarkers that can serve as novel diagnostic or prognostic indicators of disease course, that can be used as surrogate disease markers to track the efficacy of novel treatment strategies, or that may provide new targets for the treatment of the diseases. By taking the advantage of Information Technology, today's researcher successfully navigate the flood of data and many diabetic complications can be overcome. Biomarker plays very major role in disease detection at early stages of its stages and also helpful in knowing the state of treatment and how body is acting or responding to the medication. The dramatic rise in obesity-associated diabetes resulted in an alarming increase in the incidence and prevalence of obesity an important complication of diabetes. The aim of this review paper is to study the Biomarkers involved in Obesity associated with Diabetes

II. BACKGROUND

The use of the term "biomarker" has been dated back to as early as 1980. In 1998, the National Institutes of Health Biomarkers Definitions Working Group defined a biomarker as "a characteristic that is objectively measured and evaluated as an indicator of normal biological processes, pathogenic processes, or pharmacologic responses to a therapeutic intervention [3]. A Biomarker is a substance used as an indicator of a biologic state. The uses of biomarkers are shown in Fig 1. In genetics, a biomarker (identified as genetic marker) is a DNA sequence that causes disease or is associated with susceptibility to disease. They can be used to create genetic maps of whatever organism is being studied. Biomarker discovery is a medical term describing the process by which biomarkers are discovered. Many commonly used blood tests in medicine are biomarkers. There is interest in biomarker

discovery on the part of the pharmaceutical industry; blood-test or other biomarkers could serve as intermediate markers of disease in clinical trials, and as possible drug targets.

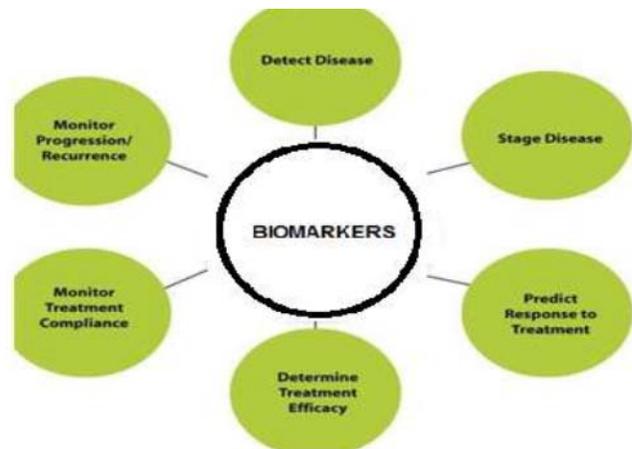


Fig 1 : Biomarkers Use

The recent interest in biomarker discovery is spurred by new molecular biologic techniques, which promise to find the relevant markers rapidly without detailed insight into the mechanisms of a disease. By screening many possible biomolecules at a time, a parallel approach can be attempted the genomics and proteomics are some of the bioinformatic technologies used in this process. Secretomics has also emerged as an important technology in the high-throughput search for biomarkers, [4] however, significant technical difficulties remain. Obesity is closely related with type II diabetes, fatty liver, cardiovascular and cerebrovascular diseases, hypertension, dyslipidemia and other chronic diseases [5]. The strategies to solve obesity epidemic range from educating people about nutrition to enabling possibilities for physical exercise. Diabetes Mellitus continues to be a devastating and daunting health scourge spreading across geographical and genetic boundaries. The growing incidence of type 2 diabetes with increasing obesity reflects that obesity is an emerging risk factor for the progression of insulin resistance and subsequently to overt type 2 diabetes. Both in normoglycemic and hyperglycemic states, obese people exhibit a higher degree of hyper insulinemia that correlates with the

degree of insulin resistance, in order to maintain normal glucose tolerance [6]. It is well known that body fat distribution and obesity are important risk factors for type 2 diabetes. Prediction of type 2 diabetes using a combination of anthropometric measures remains a controversial issue. Lee et al [7] study to predict the fasting plasma glucose (FPG) status that is used in the diagnosis of type 2 diabetes by a combination of various measures among Korean adults.

Obesity is associated with the rise of noncommunicable diseases worldwide. The pathophysiology behind this disease involves the increase of adipose tissue, being inversely related to adiponectin, but directly related to insulin resistance and metabolic syndrome (MetS). Klünder-Klünder et al [8] made a study aimed to determine the relationship between adiponectin levels with each component of MetS in eutrophic and obese Mexican children and found that adiponectin concentrations and MetS components have an inversely proportional relationship, which supports the idea that this hormone could be a biomarker for identifying individuals with risk of developing MetS. Despite multiple efforts are being made to dampen obesity impact on the quality of life of affected patients, there remains a lot of complexity exists in the pathogenesis of obesity mediated type 2 diabetes. By virtue of endocrinal role of adipose tissue, it is known to produce a vast array of adipocyte derived factors such as tumor necrosis factor alpha, interleukin-6, leptin, adiponectin and resistin. Since many of these adipokines profoundly influence insulin sensitivity and glucose metabolism, they form a fundamental bridge between increased adiposity and impaired insulin sensitivity [9]. Although adipocytes are critical in obesity, their role in diabetes has been recognized. Xue et al [10] has investigated the relationship between alpha 1-antitrypsin (A1AT), adiponectin, leptin, blood glucose, and insulin protein levels in human serum and obesity and found Alpha 1-antitrypsin correlates closely with obesity, and is related to other factors such as leptin, adiponectin, and insulin. Alpha 1-antitrypsin might be used as a clinical biomarker and be a potential target for treating obesity

III. DATA MINING AND BIOMARKER DETECTION

The area of data mining and knowledge discovery in databases (KDD) has been growing rapidly, and has shown great potential for the future. From the last two decades data mining and knowledge discovery applications have got a rich focus due to its significance in decision making and it has become an essential component in various organizations. Bioinformatics is the application of computer technology to the management of biological information. Over the past 10 years, there has been a technical revolution in the life sciences leading to the emergence of a new discipline called bioinformatics [11]. Bioinformatics can be broadly defined as the creation and development of advanced information and computational techniques for problems in biology. Bioinformatics, a truly multidisciplinary science, aims to bring the benefits of computer technologies to bear in understanding the biology of life itself. A biomarker, or biological marker, generally refers to a measured characteristic which may be used as an indicator of some biological state or condition. The term occasionally also refers to a substance whose presence indicates the existence of

living organisms. Biomarkers are often measured and evaluated to examine normal biological processes, pathogenic processes, or pharmacologic response to a therapeutic intervention. Biomarkers are used in scientific field.

We made an extensive study of Identification of Biomarkers for Obesity associated with Diabetes using Sequence Mining Techniques [12] and evaluated the role of several genes/proteins that are believed to be involved in the evolution of obesity associated diabetes by employing a sequence mining technique, multiple sequence alignment using ClustalW tool and constructed a phylogram tree using functional protein sequences extracted from NCBI. Phylogram was constructed using Neighbor-Joining Algorithm a bioinformatic tool. Our bioinformatic analysis reports a biomarker, resistin gene as ominous link with obesity associated diabetes.

IV. CONCLUSIONS

This paper reviews the use of Biomarkers in Obesity associated with Diabetes Prevention. The application of bioinformatic technologies is becoming an increasingly effective approach for identifying the biological markers of genetically complex obesity and diabetic diseases. Not all biomarkers should be used as surrogate endpoints to assess clinical outcomes. Biomarkers can be difficult to validate and require different levels of validation depending on their intended use. If a biomarker is to be used to measure the success of a therapeutic intervention, the biomarker should reflect a direct effect of that intervention.

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