AI And Urine Therapy

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1 Introduction

AI is processing and analyzing urine detection data, such as urine proteins, urine metabolites, and urine RNA, which not only contributes to the early and accurate diagnosis of diseases but also provides new ideas for the non-invasive and simplified diagnosis of diseases.Urine detection technologies, such as urine proteomics, urine metabolomics, and urine RNomics, have developed rapidly with the advancements in omics and medical tests. Advances in urine testing have made it possible to obtain a wealth of information from easily accessible urine. However, it has always been a problem to extract effective information from this information and use it. AI technology provides the possibility to process and use the information in urine. AI, combined with urine detection, not only provides new possibilities for precise and individual diagnosis and disease treatment, but also helps promote non-invasive diagnosis and treatment. Urine contains many substances, such as proteins, electrolytes, sugars, and creatinine, amongst others, which can change under different physiological and pathological conditions. Therefore, AI combined with urine detection provides the possibility for the diagnosis of diseases which is the based on the different urine components.

2 How AI can help in the area of urine proteomics

Urine produced under normal conditions contains a small number of polypeptides and proteins. When the body undergoes physiological and pathological changes, the types and content of polypeptides and proteins in the urine may change. Therefore, it is possible to recognize the changes of related proteins in urine through AI and carry out disease diagnosis. The University of Copenhagen in Denmark obtained urine proteins by capillary electrophoresis combined with mass spectrometry. Von Zur Mühlen et al. from the Department of Cardiology of Freiburg University, Germany, used a support vector machines model and urine proteins obtained from capillary electrophoresis coupled to mass spectrometry to construct a prediction model, this technique may help find the specific proteins and peptide markers of lower extremity venous thrombosis and assist

clinicians in predicting the occurrence of lower extremity venous thrombosis earlier and more accurately in future clinical practice.

3 How AI can help in the area of metabolomics

Metabolomics is a research method that conducts a quantitative analysis of all metabolites in organisms' bodies and seeks to determine the relative relationship between metabolites and physiological and pathological changes. Urine, as the excreta produced by human metabolism, contains much metabolomics information. However, due to the variety of metabolites, a mass of data, and the remaining uncertainties regarding research on diseases' pathophysiological changes, using urinary metabolites for disease diagnosis and treatment in the past mostly remained theoretical. The development of AI technology makes it possible to process urinary metabonomics data, which contains much noise. Eisner et al. used machine learning algorithms to establish a predictive model, which aimed to predict whether a patient needed a colonoscopy based on urine's metabolic profile. Shao et al. analyzed the metabolites in patients' urine with bladder cancer and hernia by ultra-high perandom forestsormance liquid chromatography-mass spectrometry. They then established the prediction model of bladder cancer based on the urine metabolism spectrum and 6 candidate urine markers.

4 How AI can help in area of urine RNomics

RNAs are key molecules that regulate protein synthesis and cell functions in the body. Urine generally contains a small amount of microRNAs, which regulate gene expression by binding to mRNA molecules and affect their stability or translation. Therefore, microRNAs are often specifically expressed during tumor occurrence. These abnormal microRNAs can act as molecular biomarkers to assist in tumor diagnosis, predict prognosis, and evaluate treatment responses, and can be detected and analyzed using AI.