Perspective
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Immunosensors: Immunochemical Reaction

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Perspective

An immunosensor is a solid-state device in which an immunochemical reaction is bound to a transducer. They form one of the most important classes of affinity biosensors, which, like immunoassays, form stable complexes based on the specific molecular recognition of antigens by antibodies. In contrast to immunoassays, state-of-the-art transducer technology enables label-free detection and quantification of immune complexes. The immune system has a great ability to distinguish between self and non-self. Highly specific antibodies (Abs) are synthesized by the organism in appropriate amounts after recognizing an alien species called an antigen (Ag) as part of the immune system. The ability of an organism to recognize the presence of Ag and react rapidly by synthesizing Ab with a high binding constant has been used by scientists to develop new specific analyzers. Molecules, commonly designed as antibodies, cover many classes and subclasses of immunoglobulins that are highly specific for a variety of targets. The high sensitivity and selectivity of the immune response and the availability of Abs or Apt to a wide range of molecules make immunochemical techniques useful tools in a variety of applications, including clinical analysis. Using immunosensors instead of other immunochemical techniques greatly simplifies analysis, making it faster and more reliable. Recently, various biomolecules (referred to here as biomarkers) whose presence or level is an indicator of pathological status are currently used in immunoassays. These devices provide a convenient way to measure the concentration of biomolecules in body fluids (serum, urine, etc.) using an immune response. Most clinical protein biomarker detections today are performed by enzyme-linked immunosorbent assay (ELISA), but the requirements of relatively expensive test kits and plate readers make ELISA useful for rapid diagnosis. You will be restricted. LCMS-based proteomics is currently used in the study of biomarkers, but is now too expensive and technically too complex for routine clinical diagnostics. Developed in 96-well or 384-well plate formats and coated with colorimetric detection, microarrays are also used for clinical diagnostics. These arrays are simple and highly selective, allowing multiple measurements of proteins. Whereas fluorescence-based detection strategies typically require precise alignment of laser sources and optics, electrochemical detection strategies allow robust and quantitative measurements using inexpensive and simple equipment.

There are four types of immune sensors, depending on the type of transducer. Electrochemistry (potential difference measurement, amperometry, and impedance measurement), optics, micro weight measurement, and temperature measurement. All of these types can be operated as direct (unlabeled) or indirect (labeled) immune sensors. The most commonly used labels are enzymes such as peroxidase, glucose oxidase, alkaline phosphatase, catalase, and luciferase. Other markings such as electro active compounds (ferrocene or In2+ salt), fluorescent reagents (Rhoda mine, fluorescein, Cy5, ruthenium diimine complex, fluorescent porphyrin dyes, etc.), and more recently metal nanoparticles (electrochemically gold or silver). .. Used on the spot. Indirect immunosensors are highly sensitive, primarily for analytical marking, but the concept of direct sensor technology represents a reliable alternative in the development of immunoassay systems. Proper fixing of the detection element to the surface of the transducer element is maximal. Importance of various immobilization techniques such as direct adsorption to the electrode surface, self-assembled monolayer (SAM), polymer matrix or magnetic beads (MB) can be used. Direct adsorption is easy, but the correct orientation of the cognitive elements for immune complex formation is inadequate, and passivation of the electrode surface often occurs.

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