Review of: "DNA is usually a good tool as a biosensor because the base-pairing reaction between complementary play sequences is both specific and stable."

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> ***DNA is usually a good tool as a biosensor because the base-pairing reaction between complementary play sequences is both specific and stable. In this case, the single-stranded probe DNA is immobilized on the detection layer and then reacts with the probe on the surface by pairing with the target DNA. The duplication and uniqueness of DNA structures determine their accumulation on the surface. It is on this surface that the target DNA is captured and a signal is generated.***

Therefore, immobilizing the nucleic acid of the probe while maintaining its initial adhesion strength is important for detecting target DNA. But how this diagnostic procedure is measured depends on the method of signal transduction, which may be optical, mechanical, or electrochemical. Optical biosensors based on fluorescent light have features. These types of biosensors are sensitive to molecules per square centimeter. They are made up of rows that are arranged so that their detection limit is made up of almost thousands of probes. Because the tools in this field (fluorescence biosensors) are complex and expensive, gene chip technology is more suitable for laboratory work. Gene chips are appropriate in cases where a lot of work needs to be done at the same time, such as profiling transcriptional examination or discovery of single nucleotide polymorphisms, but clinical diagnoses usually require the collection of this large amount of data. What is important for molecular detection is the capability to ensure recognition as well as generality regardless of the order of the game. Therefore, gene chips are not preferred for clinical diagnosis for reasons such as: they are expensive and the device is complex. Also, for other specific reasons, reading accuracy is reduced. Another method for measuring the signal optically is the Resonance Plasmon Surface method. In this method, the refractive index of a thin metal film substrate is changed, which is due to the adsorption of analyte and is suitable for detecting the target in cases where the surface is a grating. Because in this way we can achieve the target molecule below the detection limit, causing the signal to the hybridization signal to be strengthened. This can be done by increasing the amount of material that is on the surface of the film before or after attaching the increased target DNA. The Resonant Plasmon Surface method (SPR) is similar to the expensive and complex fluorescence method, which is why it is used more for research than for routine diagnostic work. One method of measuring the signal by light, which is very clear, is the light reading method, in which single-stranded DNAs are labeled with gold nanoparticles that easily

change color due to hybridization in the order of the target game. Using silver staining, DNA analysis can be performed with this optical method on very small plates with high sensitivity. Although the use of gold nanoparticles may be expensive, this method has the necessary sensitivity and simplicity for clinical diagnoses.

One way to read or measure a signal is to measure the changes that occur in the immobilized detection layer that result from binding to the target molecule. In this case, a Quartz Microbalance Crystal is mostly used. This device is sensitive and can report the production of a hybrid (mating) at the time of its creation. One of the limitations of the QMC method is that this method cannot be done when the target sample is in the solution phase, but with advances in this area, i.e., the creation of new methods of propagation and amplification of the sample, this limitation may be removed. Another method of volumetric measurement is the use of Cantilever Microfabricated methods. In this method, the increase in volume that accompanies the hybridization is detected by the laser beam from the surface of the cantilever.

> ***One of the advantages of this method is that it is suitable for developing linear grooves and that this method can correct non-specific connections. One of the disadvantages of this method is the high cost and complexity of the tools and devices used. Electrochemical methods are very suitable for DNA detection because electrochemical reactions directly generate electronic signals and therefore do not require expensive converters. In addition, because the order of the immobilized game can be limited to a single set of electrode substrates, the tracking operation can be performed by a series of inexpensive electrochemical analyses.***

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