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Bio Barcode Technology and its Applications in Research

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Introduction

As a new diagnostic tool, the bio-barcode assay (BCA) has been gradually applied to the detection of protein and nucleic acid targets as well as small-molecule compounds thanks to the rapid advancement of nanotechnology. High sensitivity, quick detection time, ease of use, low cost, high repeatability, and a good linear relationship between detection results are all advantages of BCA. However, bio-barcode technology is still in its infancy as a comprehensive detection system, and the entire detection procedure is unstable. As a result, important research directions for the standardization and commercialization of BCA include investigating the multi-residue detection of small-molecule substances, optimizing the experimental steps, and preparing immune-bio-barcode kits. This review's primary focus was on introducing the single-residue and multi-residue detection of macromolecules, as well as the single-residue detection of small molecules, as well as a comparison of their respective applications. We also compared it to other methods of detection and summarized its advantages and disadvantages. We anticipate that, with further development, the method can be utilized more widely in the field of stable small-molecule and multi-residue detection.

Description

The fields of medicine, clinical detection, molecular biology, immunology, and nanotechnology, among others, have all seen on-going research and development in recent years. Trace analysis of macromolecules and small molecules, like proteins and nucleic acids, agricultural and veterinary drugs, and environmental pollutants, are now more important than ever. Due to the lack of direct amplification methods like PCR, traditional immunoassay methods struggle to detect proteins with ultrahigh sensitivity. BCA has recently emerged as a novel technology in a variety of fields, including clinical diagnosis and trace analysis. Its advantages include low cost, simplicity of operation, and high sensitivity. The traditional BCA method uses double-stranded DNA as a bio-barcode, with one strand connected to an AuNP via an Au-S chain and the other indicating the analyte. This technology can be used to achieve indirect amplification of a probe and is widely used for the highly sensitive detection of DNA and protein. Poor hybridization is a drawback of this approach that has an impact on the experimental findings in some way. BCA technology now has high specificity and ultrahigh sensitivity that is 5–6 orders of magnitude higher than that of ELISA after more than ten years of exploration and research. In comparison to PCR, BCA makes up for its complexity, cost, time consumption, laboriousness, and disadvantage of only providing a limited quantitative range of target DNA after amplification; As a result, BCA technology can detect traces quickly and effectively and offer novel detection platforms and concepts in a variety of fields, including drug detection, environmental analysis, clinical medicine, and food toxins. One classic example of nanogold diagnostic technology is BCA technology. AuNP can be combined with a variety of biological macromolecules without affecting their biological activity because they have high electron densities, dielectric properties, and catalytic properties [1-3].

Two probes are used in this method: trisodium citrate reduction-prepared AuNP coated with anti-target protein antibody and thiol-modified barcode DNA, and magnetic beads coated with monoclonal antibodies for the protein, producing a magnetic probe that can adsorb onto the target protein. The two probes and a test sample containing a target protein (such as sera, pathogen culture, or body fluid) can then be combined using a magnetic field to form a "magnetic microsphere-target protein-AuNP." The target protein content can be determined by the chosen colorimetric, fluorescence labelling, biochip, or other detection method after the labelled DNA barcode strands on the gold nanoprobes are dissociated through de-hybridization elution release [4,5].

Conclusion

Protein biomarkers are crucial for clinical diagnosis and treatment because protein is the fundamental building block of human cells and tissues. In any case, in many beginning phases of illness, the groupings of protein markers are significantly low, and customary ELISA-based strategies are not useful in that frame of mind of different sicknesses. Traditionally, ELISA-based methods for detecting trace amounts of proteins have not been able to detect protein label concentrations and have not yet met clinical requirements in terms of sensitivity. Bio-barcode technology is a highly sensitive and specific method of detection because it is 5–6 orders of magnitude more sensitive than conventional ELISA. Several protein targets have been identified using BCA technology since 2003. 50 ADDL were discovered using BCA technology to detect amyloid-derived diffusible ligands (ADDL) in CSF. As a result, BCA technology has the potential to offer a rapid, dependable, high-throughput, high-sensitivity method for the clinical diagnosis of Alzheimer's disease.

References

1. Agusdinata, Datu B., Fu Zhao, Klein Ileleji and Dan DeLaurentis. "Life cycle assessment of potential biojet fuel production in the United States." 45 (2011): 9133-9143.
2. Argote, Linda and Dennis Epple. "Learning curves in manufacturing." *Environ Sci Technol* (1990): 920-924.
3. Herden, Uta, Enke Grabhorn, Andrea Briem-Richter and Rainer Ganschow, et al. "Developments in pediatric liver transplantation since implementation of the new allocation rules in Eurotransplant." *Clin Transplant* 28 (2014): 1061-1068.
4. Adjaye, John D., and N. N. Bakhshi. "Upgrading of a wood-derived oil over various catalysts." *Biomass Bioenerg* 7 (1994): 201-211.
5. Adjaye, J. D., and N. N. Bakhshi. "Production of hydrocarbons by catalytic upgrading of a fast pyrolysis bio-oil. Part II: Comparative catalyst performance and reaction pathways." *FPT* 45 (1995): 185-202.

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