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How Biosensors are Transforming Chronic Disease Management?

Pradip Shitole

Technical SEO Specialist, GEO & SEO Specialists, Market Research Firms, Marketing SEO Manager and Digital Marketer & Mentor, Pune, Maharashtra, India

***Corresponding author**
Pradip Shitole, Technical SEO Specialist, GEO & SEO Specialists, Market Research Firms, Marketing SEO Manager and Digital Marketer & Mentor, Pune, Maharashtra, India.

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With the rising prevalence of chronic conditions like diabetes, it has become increasingly important to track the blood glucose levels of patients. This has resulted in increased adoption of various blood tracking devices among healthcare professionals, medical facilities, and patients. Among these devices, biosensors have gained traction due to the numerous benefits they offer in order to alleviate symptoms of diseases like diabetes and blood-related conditions such as blood pressure.

Looking to dwell deeper into the world of biosensors? This blog covers everything about biosensors, from their basics and types to the major companies that are involved in the production of biosensors. Read on!

Biosensors: Quick Overview

Biosensors are devices that help detect chemical and physiological changes in the body. Wearable biosensors have also been adopted by many patients as the go-to device in order to gauge their health and inform them accordingly. These devices contain biomolecules and receptors, such as enzymes and nucleic acids, which interact with the ones present within the body [1]. The presence of biological as well as chemical analytes helps better understand the inner workings of the body. By measuring the signal using the transducer element, an accurate analysis of the working of the human body can be made over some time.

Did you know that the rising demand point-of-care diagnostics across various sectors is fueling rapid demand for biosensors? According to the latest market research report, the biosensors market is projected to exhibit a CAGR of 7.8% from 2025 to 2034, reaching a valuation of USD 58,268.69 million by 2034.

Major Biosensor Components Listed

Biosensors are highly sophisticated devices providing superb results when it comes to understanding the biochemical changes that are occurring in the human body. A typical biosensor contains the following components:

- **Analyte:** An analyte refers to a specific substance that needs to be studied. This can be seen in glucose-detecting biosensors, where glucose is the analyte of interest.
- **Bioreceptor:** A biomolecule that recognizes the analyte is known as a bioreceptor. Enzymes, cells, deoxyribonucleic acid (DNA), and antibodies are some examples of receptors. It performs the function of biorecognition wherein when it encounters any analyte of interest, it sets off a process of signal generation in the form of light, heat, pH, charge, or mass change [2].
- **Transducer:** The transducer helps in the seamless conversion of energy from one form to the other. In a biosensor, the important role of the transducer is to convert the bio-recognition action into a measurable signal. This is known as signalization. Usually, transducers produce either optical or electrical signals that are observed when an analyte interacts with a specific bioreceptor.
- **Electronics:** The transduced signal is processed and prepared for display. It consists of complex electronic circuits that conduct signal amplification as well as conversion of signals from analog into digital form. The display unit of the biosensor then quantifies the processed signals.
- **Display:** The display consists of an interpretation feature, such as the liquid crystal display of a computer, which the patient can easily understand. It consists of a combination of hardware and software that generates the results of the biosensor. The signal, also known as output signal, is usually provided in numerical format, which the patient can read and interpret accordingly.

Top Companies offering Biosensors

DuPont

DuPont is an American Chemical company that was initially involved in the production of polymers such as Teflon, Nylon, Neoprene, and Kevlar. Over the years, the company has also branched out into the healthcare sector by leading in the biosensor market. DuPont offers the DuPont Liveo Smart Biosensing Patch, which allows healthcare professionals to easily understand the various mechanical, electrical, and cardiac workings of the body.

Medtronic

Medtronic is an American Irish company that has headquarters in Minnepolis, Minnesota. It has expanded to approximately 150 countries. It currently stands as the most revenue generating company in the world as it sells some of the best medical devices the multinational health corporation has to offer. In 2022 Medtronic announced a partnership with BioIntellisense for the distribution of wearable biosensors exclusively in the US.

Siemens

Siemens is a well established company when it comes to electronics and its respective components. The company has also

made waves in the healthcare sector, especially when it comes to biosensors. Their biosensor and nanosensors have been adopted extensively due to their superior sensitivity for the biorecognition of analytes using receptors in the form of enzymes or nucleic acids. By embedding nanotechnology into the already advanced biosensor, Siemens has hit the mark when it comes to combining comfort with technology.

Wrapping Up

Biosensors have disrupted the healthcare sector by integrating technological components in understanding the biochemical changes of the body. This immediate conversion of the slightest of biochemical changes has helped in analyzing accurately the inner workings of the human body and how biomolecules interact with one another. Taking into account certain biochemicals, such as glucose, can immensely help patients who are looking to understand better the disease of diabetes they are suffering from. By combining various other technologies, such as nanotechnology, many patients will benefit from the marvelous wonder of biosensors.

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