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Cite this: DOI: 10.1039/d5pm00125k

Nanosensors in healthcare: transforming real-time monitoring and disease management with cutting-edge nanotechnology

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The field of healthcare monitoring continuously strives to find new and better ways of improving healthcare access and advancing the accuracy and precision of diagnostic and treatment approaches. To add to its challenges, the modern and fast-paced lifestyle now presents the need for even more sensitive, specific, and rapid methods of continuous healthcare monitoring technology that can generate real-time information. The integration of cutting-edge nanotechnology in health care with its unique and versatile properties has brought a technological revolution in the way disease detection, management, and treatment are approached, finding applications from early-stage disease detection to real-time physiological parameter monitoring. The unique physical and chemical properties of nanoparticles provide a basic structural framework on which successive chemical and biological detection systems can be built. This characteristic of nanoparticles provided healthcare researchers with opportunities to create nanoparticle-based nanosensors, nanomedicine, bioimaging, point-of-care, and other such devices. Here we provide a comprehensive review of the development and advancement of nanosensors in healthcare monitoring, its types, applications, and future prospects, and highlight the development and challenges faced in the field. The review also sheds light on the all-encompassing nature of nanotechnology, in terms of compatibility with different existing streams of applied sciences in healthcare.

Received 27th April 2025.
Accepted 22nd June 2025
DOI: 10.1039/d5pm00125k
rsc.li/RSCPharma

1. Introduction

Nanosensors are devices that can identify and react to physical, chemical, or biological events on a nanoscale and they are trans-

them to conduct intricate analyses that were not possible with traditional sensors. In the realm of healthcare, nanosensors are essential for the early detection of diseases, constant monitoring of health status, and tailored medical treatments, offering

