

Blink and Monitor: The Future of Diabetes Control is in Our Eyes

Mouli Das

B.optom, 3rd Year, 6TH Semester

Vidyasagar College of Optometry & Vision Science

The increasing global prevalence of diabetes mellitus necessitates innovative, non-invasive solutions for continuous blood glucose monitoring. Traditional finger-prick methods, though widely used, are invasive and often fail to provide real-time data essential for optimal glycemic control. In this context, wearable smart contact lenses have emerged as a promising alternative, offering continuous, non-invasive monitoring of glucose levels through tear fluid analysis. These advanced lenses integrate miniature biosensors, wireless communication systems, and energy-harvesting technologies to measure glucose concentrations in real time, thereby enhancing patient compliance and overall diabetes management.

This poster presentation aims to explore the development, working principles, and clinical potential of smart contact lenses as wearable biomedical devices. Key aspects include the integration of glucose-sensitive sensors, signal transduction mechanisms, and data transmission modules within biocompatible lens materials. Additionally, the presentation will highlight the challenges involved in sensor sensitivity, selectivity, power supply, and data security, along with recent advancements in nanotechnology and flexible electronics that have addressed many of these limitations.

Current research and clinical trials indicate that smart contact lenses could revolutionize diabetes care by offering a painless, discreet, and efficient method of monitoring blood glucose levels. Moreover, the convergence of optometry and wearable technology underscores the pivotal role of eye care professionals in

facilitating early diagnosis, patient education, and technology adoption. In conclusion, wearable smart contact lenses represent a transformative leap in personalized healthcare, with significant implications for both optometric practice and chronic disease management.