'Revolutionary future' for contact lenses—drug delivery, disease monitoring and more

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Imagine contact lenses that can deliver medicines directly to the eye, slow progression of nearsightedness in children, or monitor glucose levels in patients with diabetes. Those are some of the emerging advances in contact lens technology reported in the April special issue of *Optometry and Vision Science*, official journal of the American Academy of Optometry.

The special issue on "Revolutionary Future Uses of Contact Lenses" presents original research and reviews on proposed new uses for contact lenses. Taking advantage of new materials and technologies, these ideas go far beyond the traditional use of contact lenses for vision correction, offering potential new treatments for eye diseases, along with new approaches to monitoring of medical conditions.

New Technologies Open Exciting New Uses for Contact Lenses

The special issue was assembled by an international expert panel, led by Lyndon Jones, PhD, FCOptom, of University of Waterloo, Ont., Canada. It features 13 papers on new and emerging applications—some still under development, some already available—for contact lens technology:

- *Slowing progression of myopia*. With rising rates of

nearsightedness (myopia) in children worldwide, there is growing interest in the use of contact lenses to prevent or slow progression of this vision defect. Two original research studies suggest that lasting reductions in myopia progression may be possible even with some currently available contact lenses. In the future, lens designs developed specifically for this purpose may be even more effective.

- *Drug and stem cell delivery.* New technologies such as "molecular imprinting" have renewed interest in the possibility of using contact lenses to deliver medications directly to the eye over a period of days to weeks. While many challenges remain, this approach could lead to improved treatments for ocular diseases, achieving higher drug levels in the eye itself. Contact lenses are even being evaluated a new approach to stem cell therapy for patients with ocular surface diseases.
- *Contact lens 'biosensors.'* New technologies may enable the development of contact lenses containing biosensors to monitor patient health. For example, a device to monitor changes in intraocular pressure in patients with or at risk of glaucoma is commercially available now. The special issue also includes a report on biosensing contact lenses that can measure glucose levels in the tear film of the eye, which may one day provide a new approach to continuous monitoring in patients with diabetes.
- *New approaches to vision correction.* Meanwhile, researchers are still working on new designs to further improve vision correction with contact lenses. Studies in the special issue report promising results with new approaches to extending depth of vision for patients with aging-related vision loss (presbyopia) and benefits of "centrally red-tinted contact lenses" for patients with degenerative retinal diseases or extreme light sensitivity (photophobia).

Other technologies in earlier stages of development include

accommodating contact lenses capable of changing change focus, "wearable displays" using contact lenses, and lenses with "photonic modulation" for treatment of seasonal affective disorder. "The advances in contact lens technology, especially imaging and new biocompatible materials, has made such possibilities a reality," comments Anthony Adams, OD, PhD, Associate Editor of *Optometry and Vision Science*. "Researchers are already proposing solutions to the clinical and research challenges posed by these revolutionary new uses of contact lenses, going well beyond vision correction."

More information: journals.lww.com/optvissci/pages/currenttoc.aspx

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