Optical-Based Intraocular Pressure Sensor

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Technology description

UCSD researchers have developedan optical-base, passive, wireless intraocular pressure sensor that detects small changes in pressure fluctuation. The device may be (1) integrated with intraocular lens, (2) integrated with glaucoma drainage device, (3) independently implanted at the surface of the iris, or (4) free standing in the anterior chamber, such as capsule bag.
Glaucoma is a condition in which intraocular pressure (IOP) causes damage to the optic nerve and progressively leads to permanent loss of vision. The diagnosis and monitoring of glaucoma requires regular measurements of patients' IOP. The standard ocular tonometry techniques currently used in a clinical practice provide only a snapshot of the IOP profile and usually with readings taken weeks or months apart. More recently, there have been implantable sensors under development that enable long term and continuous IOP monitoring. However, each has drawbacks in one or more of the following concerns: signal readout, size, sensitivity, power consumption, special instrumentation requirement, and/or complex fabrication processes.

Application area

(1)Monitor IOP of patient at risk or suspect of having glaucoma. Transmission of data to data center,
(2)Monitor IOP to establish target IOP for individual patient, and IOP data can be used to adjust intervention to achieve therapeutic goals.
(3)Post ocular surgery IOP monitoring in patients with glaucoma, such as a cataract surgery.
(4)As a research tool to aid and improve glaucoma studies or drug development in animal models.
(5)Other applications requiring continuous tracking of changes in intraocular pressure such as during clinical trial.

Advantages

(1)Data acquisition and processing using a cell phone at the convenience of the user allowing accurate and frequent monitoring of IOP. No need of specialized equipment such as a spectrometer or detection unit.
(2)Biocompatible, passive, and sensitive.
(3)Ease of mass production at low cost while avoiding potential complications due to implanting environment due to simplicity of the design and material choice.

(4) IOP data can be transmitted and processed, and incorporated into in-time-patient care remotely and wirelessly.

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