

Non-Invasive Blood Glucose Monitoring Systems

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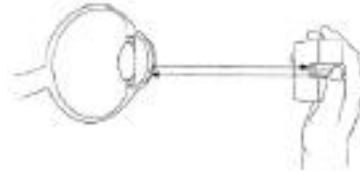
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- Diabetes is a group of diseases characterized by a lack of the hormone insulin, which results in abnormally high levels of glucose in the blood. The three main types of diabetes are type 1, type 2, and gestational. For diabetics either the pancreas produces too little or no insulin, or the cells do not respond to the insulin that is produced. This causes a build-up of glucose in the blood, which passes into the urine where it is eventually eliminated. Traditionally, diabetics have to closely monitor their blood glucose level by pricking a finger and placing a drop of blood on reagent strip which is then evaluated by a glucose monitor.
- Current research is focusing on continuous and non-invasive monitoring of physiological glucose, due to the dangers and inconveniences of traditional monitoring systems.
 - Current commercially available non-invasive systems.
 1. Glucowatch: A low electric current pulls glucose through the skin. Glucose is accumulated in two gel collection discs in the AutoSensor. The AutoSensor measures the glucose and a reading is displayed.
 2. Diasensor: An infrared beam shines on the skin and is able to painlessly measure sugar in the blood
- Current Research has found that by shining light through human interstitial fluids at translucent dermal

positions such as ocular aqueous humor in the eyes, information about the glucose levels can be obtained optically .



Using daily, disposable contact lenses embedded with newly developed boronic acid containing fluorophores it is possible to create glucose level sensing contact lenses.

- By doping strategically designed fluorescent probes into commercially available contact lenses. The probes are completely compatible with the new lenses and can readily detect glucose changes up to several mM glucose
- The lenses have a 90% response time of about 10 min, allowing the continuous and noninvasive monitoring of ocular glucose. A significant improvement over blood sampling between 4 and 6 times daily
- It is believed that the doped contact lens approach and findings, are a notable step forward towards the continuous and non-invasive monitoring of physiological glucose.
- References:
 - <http://cfs.umbi.umd.edu/cfs/reprints/C-lens-JoF%20Note%20CFS-2003.pdf>
 - <http://cfs.umbi.umd.edu/cfs/reprints/lens-3-JoF-2004-special%20issue%20paper.pdf>