

SENSIMED Triggerfish® provides an automated recording of continuous ocular dimensional changes over 24 hours.

Technical white paper

The “hyper” oxygen permeability characteristics (Dk/t) of the SENSIMED Triggerfish® Sensor.

Background

Continuous IOP monitoring presents special challenges from a technological standpoint. It still remains an important and unmet clinical need. The SENSIMED Triggerfish® Sensor is designed to capture ocular dimensional changes utilizing a technological breakthrough in miniature electronics incorporated in an extended wear silicone contact lens. This novel approach makes it possible to record changes over a 24 hour period. Circumferential dimensional changes at the corneoscleral area are detected and the information is transmitted to a recorder via a wireless telemetry system. Since diurnal and nocturnal variations can be important in prescribing effective treatment for glaucoma patients, comparisons of day time and night time recordings are of particular interest. It is therefore vital to use a lens material which will facilitate a successful recording session for up to 24 hours without compromising the oxygenation of the cornea and patient comfort.

Materials and Characteristics

The material chosen was pure silicone with an oxygen plasma surface treatment to create a highly hydrophilic interface between the Sensor and all tissues in contact.

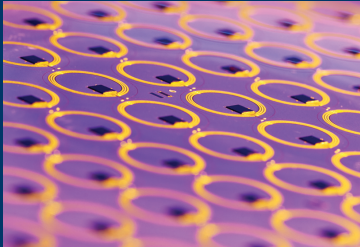
The oxygen permeability coefficient of a material is normally measured in Dk units [10^{-11} (cm³ O₂ x cm)/(cm² x s x hPa)]. This value (expressed as Dk) when divided by the thickness of a sample i.e. the lens, provides the specific Dk/t value for the lens in question. The pure silicone used has an exceptionally high Dk of 292 units and the harmonic mean thickness of the Sensor (t) is 325µm.

Therefore, the Dk/t for the lens is **119 Dk/t units** which is consistent with, or greatly exceeds recommended performance to avoid corneal hypoxia in extended wear with mainstream ocular correction lenses^{1,2}.

An accepted classification for comparing the oxygen permeability of different contact lenses is the Benjamin Classification which proposed low, medium, high, super and hyper categories³. Using this classification the SENSIMED Triggerfish® Sensor qualifies for **HYPER** oxygen transmissibility.



The SENSIMED Triggerfish® Sensor is supplied in a sterile individual vial.



SENSIMED Triggerfish® micro-sensors ready to be embedded into the silicone contact lens.

Conclusion

The SENSIMED Triggerfish® Sensor provides a level of oxygen permeability equal to or greater than the recommended boundaries of extended wear to avoid corneal hypoxia. This means the cornea is as protected as possible from metabolic stress during the monitoring period. In addition, surface treatment of the pure silicone lens with oxygen plasma makes this diagnostic sensor equally safe and comfortable.



Silicone dispensing during the SENSIMED Triggerfish® Sensor molding process.

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3. Benjamin WJ. EOP and Dk/L : The quest for hypertransmissibility. *J. Am Optom Assoc* 1993;64;196