

BAUSCH & LOMB PUREVISION® LENSES – THE DYNAMICS OF OXYGEN FLOW

Background:

The silicone hydrogel class of lens material delivers natural levels of oxygen to the cornea. This class of materials will provide substantial advantages over conventional hydrogel lenses in terms of oxygen delivery to the cornea during closed eye wear.¹

Corneal swelling is the clinical result that matters when it comes to patient outcomes. In clinical studies, PureVision® lenses allowed 97% of available oxygen to reach the cornea, and demonstrated overnight corneal swelling equivalent to no lens at all.⁶

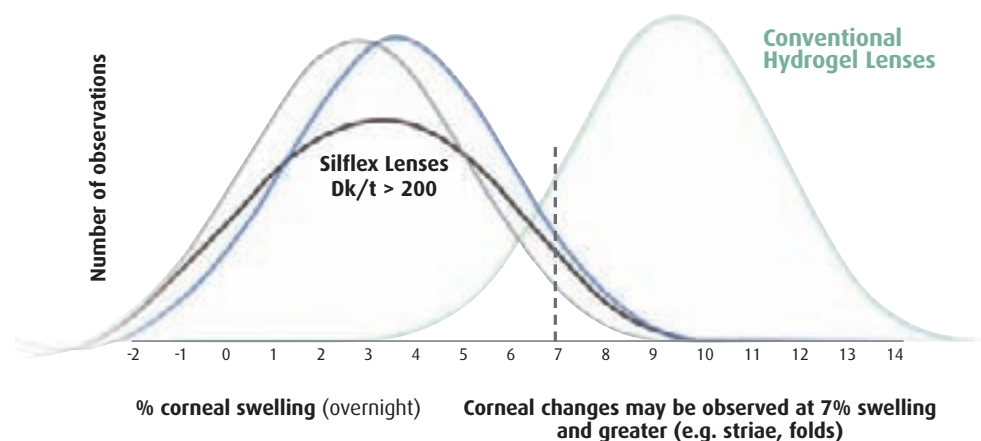


Fig 1. In vivo results showed no statistical difference between patients wearing no lenses, a 100% silicone elastomer lenses and PureVision contact lenses.⁶

The amount of oxygen supplied to the cornea with silicone hydrogel lenses reaches a point of diminishing returns.² Once the oxygen transmissibility of a lens reaches 90 Dk/t, the cornea's physiologic response to the lens plateaus as natural levels of oxygen are approached.³

For example, a 58% difference in Dk/t between lotrafilcon A (175) and balafilcon A (101) only results in a 1% increase in corneal oxygen consumption.^{1,2,5}

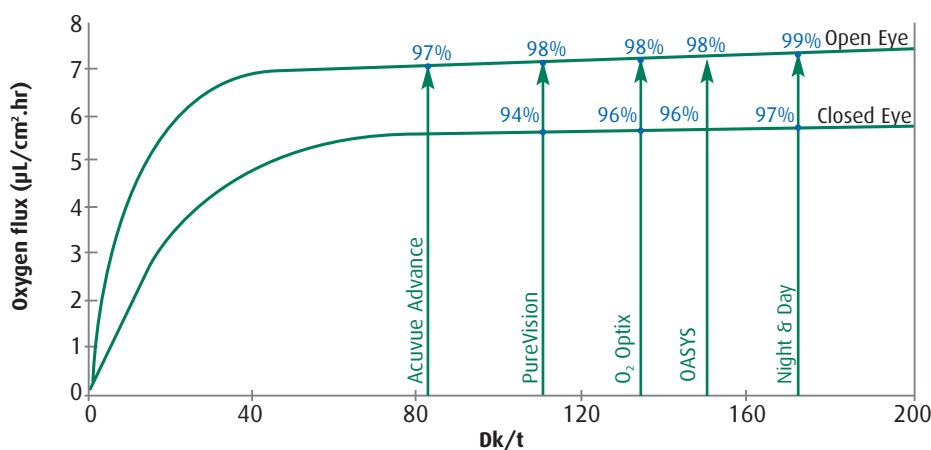


Fig 2. The relationship between oxygen flux and Dk/t is non linear

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Dk/t is a measure of oxygen transmissibility

The Dk/t value offers a numerical guideline used to predict on-eye performance. However, the amount of oxygen provided to the cornea is not linear with this calculation, i.e., twice the Dk/t does not equal twice the amount of oxygen delivered to the cornea.¹ The Dk/t coefficient gives a measure of the ease with which oxygen can diffuse through a lens; however, oxygen passage through a contact lens is also dependent on the partial pressure difference across the lens.

Oxygen flux is the true index of the amount of oxygen that passes through a unit area of lens in a given time.¹

Corneal swelling is the clinical result that matters when it comes to patient outcomes. The amount of oxygen diffused in vivo through the lens ultimately determines the level of corneal swelling and determines the true oxygen performance.

- Additionally, the amount of oxygen supplied to the cornea *reaches a point of diminishing returns* for lenses with hyper-transmissibility:²
- When oxygen transmissibility of a lens reaches 90 Dk/t, the cornea's physiologic response to the lens plateaus as atmospheric levels of oxygen are approached.³
- When comparing leading silicone hydrogel lenses, a 58% difference in Dk/t between lotrafilcon A (175) and balafilcon A (101) only results in a 1% increase in corneal oxygen consumption.^{2,4,5}

1. Brennan, Noel A. A Model of Oxygen Flux Through Contact Lenses. *Cornea* 2001;20 (1): 104-108. The specific brands of lenses shown in Figure 1 herein were not a part of the Brennan et al. paper.

2. Hom, Milton. Ten Reasons to Fit Silicone Hydrogel Contact Lenses. *Optometric Management* May 2005: 81-84. Dk/t for balafilcon A is corrected herein; the author used 112.

3. Hill, R.M. Still Higher Dk/t Values Part 1. Can the Cornea Tell the Difference? *International Contact Lens Clinic*, 1997: 148-149.

4. The data used in this statement is not represented in the chart shown in Figure 1 of this document.

5. PureVision lenses Dk/t at -3.00D = 112 (Non-Edge Corrected), 101 (Edge Corrected). Polarographic Method (Boundary Corrected).

6. The illustrations represent results from a series of overnight corneal swelling clinical studies of adapted daily wear soft lens patients. For these investigations, patients wore conventional hydrogel lenses (Dk/t ranged from 24 to 40), 100% silicone elastomer lenses (Dk/t > 200), PureVision lenses, or no lens. A -3.00D lens was used for the overnight corneal swelling lens comparisons. Corneal swelling measurements were made following closed eye conditions for approximately 8 hours.