

September 15, 1982

Dear Bob:

The history of the Hydracon lens goes back to 1963. At that time Dr. David Ewell, owner of Kontur Kontakt Lens Co., then one of the U.S. largest hard lens manufacturer, obtained from Dr. Wichterle some sheet hema and some hard lens material and the formula for Elthylene glycol monomethacrylate which is what hema was called then. This material was obtained by Dr. Ewell's brother who was visiting Prague. After WWII Dr. Wichterle was commissioned by the Macro-Molecular Institute of Prague to learn how to spin-caste glass spectacle lenses. He soon learned that glass and non-hydrophylic plastics would not produce a good optical surface by casting. Interestingly hema had been used in the U.S.A. since 1931 in storage batteries as a semi-permeable membrane which was unknown at that time to Dr. Wichterle.

Between the years of 1963 and 1968 Dr. Ewell was unimpressed with his attempts to manufacture hema lenses from Wichterle's sheets of stock. By 1969 Dr. Ewell had learned to caste hema and distill out the yellow inhibitor. By 1970 all common monomers and additives were tried. He applied for a patent on the pyrillidone additive in 1970 and received it in 1972. He never used the pyrillidone additive because electron microscope studies on lenses revealed that pockets of the additive would leach out of the lens and leave areas for virus and spores to culture. This was later found out to be a error in slide preparation. Therefore, the hydracon hema chemistry was kept simple without additives.

The Hydracon geometry was derived by Dr. Ewell in trial and error fittings of his own eyes, those of his colleagues, etc. Originally he had six different base curves, mostly derived from his investigative patients personal preference. He tried diameters from thirteen to seventeen and ended up with fifteen millimeters fairly early on. He also tried hema water content from 38 to 85 percent. The 55 percent water content was settled upon because the low water lenses from 38 to 49 percent created too much Edema and were noticeably less comfortable in the eye than the 55 percent. The extreme high water content lenses produced even more problems than the low water content in that parameter changes were in evidence revealing that the lenses were less stable in produceability and reliability. Also the strength was reduced and destruction by protein buildup was excessive.

Therefore, a 55 percent water content lens with a 15 millimeter diameter and a uniform lens thickness with three base curves was found to be best. Subsequently it has been found that the 8.6 mm base curve will fit virtually everyone. It is now believed by Hydracon that the 55 percent water content virtually eliminates the concept of a base curve in that the oxygen transmission is so high that it is difficult to fit the lense too tight. The combination of a soft material and a very thin edge allows the lens to fit the <sup>cornea</sup> sclera in a draping fashion creating good lens centration and comfort in a wide variety of patients. Some of the latest research begins to reveal what Hydracon has known empircally in that average lens thickness is more important than simply a thin center alone. Also it has been reported that extreme high water content can pose a water barrier to oxygen transmission.

The question has been asked as to why some of the other 55 percent water content lenses are less successful. The answer may be many things, for example the Hydrocurve 55 lens is actually 49 percent water. Edge thicknesses vary from .30 mm in some brands of lenses to a virtual knife edge in other brands. Hydracon philosophy is that of a thin edge with a medium length bevel. (Example Hydrocurve has a very long bevel and Sauflon has no bevel.)

If you have any additional question, please do not hesitate to contact.

Best regards,



Randy

Footnote: Dr. Ewell's concept of the soft lens was that Doctors should be making lenses for their own patients and that the FDA's original classification of the soft lens as a drug was wrong. He therefore became the teacher and was either directly or indirectly responsible for many of the lenses on the market today. He is regarded by most as the grandfather of soft lenses in the United States. Dr. Ewell continued throughout the 1970s to manufacture/<sup>and improve</sup> fit soft lenses for his own patients and was only recently convinced by his colleagues to mount a serious campaign for FDA approval which has been achieved.