Clinical fitting success of the Softcon E.W. lens and the CSI-T lens for extended wear use

J Greg Toland
Pacific University

Patrick J. Wands
Pacific University

Recommended Citation
https://commons.pacificu.edu/opt/746
Clinical fitting success of the Softcon E.W. lens and the CSI-T lens for extended wear use

Abstract
Ten Subjects (twenty eyes) were fitted with a pair of CSI-T lenses and a pair of A. 0. Softcon E.W. lenses. One-half of the subjects were initially fit with the Softcon E.W., and after a period of extended wear, each subject was refit with the other lens. When each subject was able to wear both lenses on an extended wear basis, they were asked to choose which lens they preferred, and were then monitored while wearing this lens for five to six months. This paper indicates the selections made and problems encountered among subjects wearing these two extended wear lenses.

Degree Type
Thesis

Rights
Terms of use for work posted in CommonKnowledge.
Copyright and terms of use

If you have downloaded this document directly from the web or from CommonKnowledge, see the “Rights” section on the previous page for the terms of use.

If you have received this document through an interlibrary loan/document delivery service, the following terms of use apply:

Copyright in this work is held by the author(s). You may download or print any portion of this document for personal use only, or for any use that is allowed by fair use (Title 17, §107 U.S.C.). Except for personal or fair use, you or your borrowing library may not reproduce, remix, republish, post, transmit, or distribute this document, or any portion thereof, without the permission of the copyright owner. [Note: If this document is licensed under a Creative Commons license (see “Rights” on the previous page) which allows broader usage rights, your use is governed by the terms of that license.]

Inquiries regarding further use of these materials should be addressed to: CommonKnowledge Rights, Pacific University Library, 2043 College Way, Forest Grove, OR 97116, (503) 352-7209. Email inquiries may be directed to: copyright@pacificu.edu

This thesis is available at CommonKnowledge: https://commons.pacificu.edu/opt/746
Clinical Fitting Success of the Softcon E.W. Lens and the CSI-T Lens for Extended Wear Use

J. Greg Toland
Patrick J. Wands

James E. Peterson, O.D.
Faculty Advisor
Pacific University College of Optometry

February 1985
ACKNOWLEDGEMENT

We wish to extend our deep appreciation to Dr. James Peterson for his help and many hours of overtime throughout the project.

Also, special appreciation is given to Kerry Pearson, a fellow classmate, for his help in providing following up care during the study.

Sincere appreciation is also extended to American Optical and Syntex Ophthalmics for their generous support in providing the lenses used in this study.
ABSTRACT

Ten Subjects (twenty eyes) were fitted with a pair of CSI-T lenses and a pair of A. O. Softcon E.W. lenses. One-half of the subjects were initially fit with the Softcon E.W., and after a period of extended wear, each subject was refit with the other lens. When each subject was able to wear both lenses on an extended wear basis, they were asked to choose which lens they preferred, and were then monitored while wearing this lens for five to six months. This paper indicates the selections made and problems encountered among subjects wearing these two extended wear lenses.
INTRODUCTION

In the past, interest in extended wear lenses has centered mainly on therapeutic applications such as correction of aphakia and relief of pain, but now optometrists must consider extended wear soft contact lenses as a viable alternative in order to better serve the public.

There is sometimes much confusion over the terms "extended wear", and "continuous wear". "Extended wear" means longer than the usual twelve to sixteen hours of daily wear, with the lenses being removed only periodically for routine cleaning, enzyming and disinfection. The actual time interval that each patient wears the lenses should be based on the practitioners preferred regimen for that patient, and can vary from several days to weeks. "Continuous wear" lenses means that a lens can be worn from the time of it's dispensing until a replacement lens is needed. Unfortunately, this is often times the assumption made by the public about extended wear and thus warrants proper education.

Today with improved lens materials especially designed for extended wear use, and the ever increasing number of F.D.A. approved lenses for cosmetic extended wear applications, many more patients can be introduced to extended wear. It is, however, not for everyone as certain basic physiological requirements cannot always be met or maintained with every patient attempting extended wear.

The normal cornea is in a relatively dehydrated state to
maintain it's transparency and oxygen is necessary to accomplish this. Without this oxygen, normal corneal metabolism is interrupted, which effects the corneal hydration mechanism and water is then taken into the cornea resulting in edema. The critical level of oxygen tension that is required by the cornea to avoid edema is 11.4mm to 19mm Hg or between 1.5% and 2.5% as reported by Polse and Mandell. More recently, DeCarle suggests a 5% to 8% oxygen level as being the minimal level necessary for normal corneal hydration, while work of Mandell and Farell has yielded values of 23mm to 37mm Hg. One of the first symptoms of hypoxia is corneal swelling, and edema of greater than 6% causes vertical striae at Descemets membrane. Greater swelling could cause folds and/or a decrease in visual acuity. During sleep oxygen that is available to the cornea is roughly one-third the amount available when the eye is open and exposed to the atmosphere. Also, lid closure increases the temperature of the cornea, which in turn leads to an increased metabolic rate and along with an acidic shift in tear osmolarity, even further increases the demand for oxygen. Thus it is important that the oxygen transmissibility of an extended wear lens be adequate enough to maintain the physiological needs of the normal healthy cornea. Yet it must also be of a durable nature while not compromising clear, comfortable and constant vision.

Today's extended wear lenses are basically available in three categories:

1) Low water content (38%).
2) Medium water content (50%-60%).
3) High water content (70% and above).
High water content lenses are immediately very comfortable because the material is highly hydrophylic, but they are also fragile and susceptible to dehydration and calcium deposits. Low and medium water content lenses are usually less fragile and are easier to handle. Because they are of less water content, they can be made thinner which helps to provide the needed oxygen transmissibility lost with decreased water content. They generally produce stable visual acuity, but are susceptible to protein deposits.

Because there are many cosmetic extended wear soft lenses available today, it is not always economically feasible to purchase and fit each type of lens. It is the purpose of this study to evaluate and monitor the ocular effects of two different types of extended wear soft contact lenses, as well as to gain experience in the proper selection, fitting and follow up care involved with extended wear contact lens patients.

METHODS

The subject pool (see TABLE 1) was comprised of individuals responding to an advertisement in a local daily newspaper. None of the subjects chosen had any previous contact lens wear and were selected based on the following clinical criteria:

1) Phakic eyes only.
2) Spectacle visual acuity of 20/20 or better.
3) No known ocular allergy.
4) No evidence of ocular pathology.
5) No evidence of dry eye.
6) Astigmatism of less than 2.50 D.
<table>
<thead>
<tr>
<th>NAME</th>
<th>AGE</th>
<th>SEX</th>
<th>VOCATION</th>
<th>REF ERROR (ODDS)</th>
<th>LENS 1</th>
<th>LENS 2</th>
<th>PREFERRED CHOICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>46</td>
<td>F</td>
<td>HAIRDRESSER</td>
<td>-3.75-1.50 x 110</td>
<td>-4.00</td>
<td>-3.50</td>
<td>A.O. Softcon</td>
</tr>
<tr>
<td>2</td>
<td>60</td>
<td>M</td>
<td>REAL ESTATE AGENT</td>
<td>-.75-1.25x120</td>
<td>-1.50</td>
<td>-1.25</td>
<td>CSI-T Lens</td>
</tr>
<tr>
<td>3</td>
<td>33</td>
<td>M</td>
<td>SOCIAL WORKER</td>
<td>-1.50</td>
<td>-1.50</td>
<td>-1.25</td>
<td>CSI-T Lens</td>
</tr>
<tr>
<td>4</td>
<td>36</td>
<td>F</td>
<td>NURSE</td>
<td>-1.25-75x90</td>
<td>-1.50</td>
<td>-1.50</td>
<td>CSI-T Lens</td>
</tr>
<tr>
<td>5</td>
<td>21</td>
<td>M</td>
<td>CORRECTIONS OFFICER</td>
<td>-2.25-2.25x90</td>
<td>-3.00</td>
<td>-3.00</td>
<td>A.O. Softcon</td>
</tr>
<tr>
<td>6</td>
<td>32</td>
<td>M</td>
<td>COMPUTER PROGRAMMER</td>
<td>-1.50-25x20</td>
<td>-1.50</td>
<td>-1.25</td>
<td>A.O. Softcon</td>
</tr>
<tr>
<td>7</td>
<td>34</td>
<td>M</td>
<td>ASSISTANT PLANT MANAGER</td>
<td>-.50-50x80</td>
<td>-1.25</td>
<td>-1.25</td>
<td>CSI-T Lens</td>
</tr>
<tr>
<td>8</td>
<td>29</td>
<td>F</td>
<td>STUDENT</td>
<td>-2.25-75x45</td>
<td>-2.25</td>
<td>-2.50</td>
<td>A.O. Softcon</td>
</tr>
<tr>
<td>9</td>
<td>18</td>
<td>M</td>
<td>STUDENT</td>
<td>-1.75-1.25x105</td>
<td>-2.50</td>
<td>-2.75</td>
<td>A.O. Softcon</td>
</tr>
<tr>
<td>10</td>
<td>21</td>
<td>F</td>
<td>HAIRDRESSER</td>
<td>-2.50-1.00x110</td>
<td>-3.00</td>
<td>-3.50</td>
<td>A.O. Softcon</td>
</tr>
</tbody>
</table>

AVE 33 YRS
-2.25
-2.00 SPH.EQ

Makeup of Subject Pool Including Refractive Error and Fitting Sequence
7) Good personal hygiene.
8) No past ocular medical history.
9) Personal cooperation.

When a subject met the above criteria, a standard refraction including keratometry, and an extensive slit lamp exam was performed. Pachometry was considered, but was thought to be too variable to provide useful information in this study. Once the base line refraction, keratometry and slit lamp exams were completed, the subjects were fit with trial lenses based on manufacturers suggested fitting criteria\textsuperscript{14,15} (see Table #2 for available lens parameters).

For the two lenses, the fitting technique is basically the same. The lens of first choice for the Softcon E.W. is the 8.4 mm base curve. The CSI-T manufacturer recommends the 9.6 mm base curve with a 13.3 mm diameter or the 8.9 mm base curve with the 14.8 mm diameter as the lens of first choice for the majority of patients. The CSI-T lenses then, have more parameter choices; however, only the 13.80 mm diameter lenses were needed in order to achieve an optimal fit in this study.

The lenses were allowed 30-40 minutes to equilibrate after application. Each lens fit was judged by the following criteria:

**LOOSE LENS**
- excessive movement
- lower lid sensation
- decentration
- edge stand off
- fluctuation in vision
### TABLE 2

<table>
<thead>
<tr>
<th>Material</th>
<th>CSI-T</th>
<th>SOFTCON E.W.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Material</strong></td>
<td>2,3-DIHYROXYPROPYL METHACRYLATE AND METHYL METHACRYLATE CROSS LINKED WITH ETHYLENE GLYCOL DIMETHACRYLATE</td>
<td>2-HYDROXYETHYL-METHACRYLATE AND PROVIDNONE USP</td>
</tr>
<tr>
<td><strong>Generic Name:</strong></td>
<td>CROFILICON A</td>
<td>VIFILICON A</td>
</tr>
<tr>
<td><strong>Water Content</strong></td>
<td>38.50%</td>
<td>55.00%</td>
</tr>
<tr>
<td><strong>Diameter</strong></td>
<td>13.80mm</td>
<td>14.00mm</td>
</tr>
<tr>
<td><strong>Base Curve</strong></td>
<td>8.30mm, 8.60mm</td>
<td>8.10mm, 8.40mm, 8.70mm</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td>PLANO TO -7.00D.</td>
<td>PLANO TO -7.00D.</td>
</tr>
<tr>
<td><strong>Center Thielmess</strong></td>
<td>.03mm to .05mm</td>
<td>.10mm to .25mm/ HIGH PLUS .25mm to .64mm</td>
</tr>
<tr>
<td><strong>Optical Zone</strong></td>
<td>8.70mm</td>
<td>7.5mm</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>$45.00 (each)</td>
<td>$30.00-35.00 (each)</td>
</tr>
</tbody>
</table>

Individual Lens Parameters of the CSI-T and Softcon E.W. Lenses

*Discounts given if bought in lots—price may vary.*
TIGHT LENS

- trapped bubbles
- distorted retinoscopy reflex
- circumcorneal indentation
- blanching of conjunctival blood vessels

One-half of the subjects were fit with the CSI-T lens and the other half fit with the Softcon E.W. The subjects did not know which lens they received. Each subject wore the lenses on a daily wear basis for a minimum of 4 days. At the end of the 4 day period, the subjects were reevaluated for possible problems. If no problems were present then each subject was allowed to begin extended wear with evaluations made the morning after, 3 days later, 2 weeks later and 2 months later.

During the period of extended wear, each subject was instructed to remove the lenses when they felt it was necessary, but not to exceed 2 weeks of extended wear. Comfort drops (Clerz II) were to be administered at bedtime and upon awakening as well as anytime during the day the subject felt they were required.

Cleaning consisted of a surfactant (Pliagel) and an enzymatic cleaner (Allergan). Unless otherwise instructed, all subjects were given chemical disinfection systems (Softmate Barnes-Hind).

Upon each follow up, normal clinical parameters were checked (i.e., over refraction, extensive biomicroscopy and visual acuity). The following clinical parameters were graded on all subjects prior to contact lens wear and upon dismissal from the study:
At the end of 2 months, the subjects were refit with the other lens in the study. They were allowed to wear this lens for 2 months and then were asked to choose which lens they liked best. Subjects then filled out a questionnaire on the lenses, were given the lenses that they chose and were then followed for a 5 month period of extended wear care.

RESULTS

Of the eleven beginning subjects in the study, six were female and five were male (see Table 1). Average subject age was 33 years with an average spherical equivalent refractive error for the right eye of -2.25 D, and the left, -2.00 D. Ten of these were successfully fit and began extended wear while one female was released from the study due to a recurring corneal ulcer of unknown cause.

Five of the subjects were fit with the Softcon E.W., and the remaining five with the CSI-T lens. The fitting sequence is recorded in Table 1. 60% of the subjects chose the Softcon E.W. while the remaining 40% chose the CSI-T lens as the lenses that they liked best. It is interesting to note the 70% ended up
choosing the second lens fit as their lens of choice. Each subject then listed which lens they preferred as to the following categories listed in Table 3. Slit lamp observations showed no significant differences between the lenses in terms of edema, vascularization, injection, iritis, endothelial count or blink rate.

Using standard fluorescein techniques, the CSI-T lens was seen to show slight inferior superficial abrasions on two occasions. Slight superficial punctate staining was noted with each brand of lens. Inspection of the upper tarsal plate on 2 subjects wearing the Softcon E.W. lens revealed mild injection with mild papillary or follicular hypertrophy.

Tear break up time, (T.B.U.T.) for four subjects was slightly diminished, possibly due to lens coatings. Softcon E.W. presented more problems with coatings than did the CSI-T lens.

DISCUSSION

The Softcon lens, although it has a higher water content, was noted as being less comfortable, yet it was the lens of overall choice. The overriding statistics, as shown by the questionnaire, were the lenses ease of insertion, removal and handling. Many patients reported fear of damaging the CSI-T lens, because of its apparent thinner, fragile nature. However, at the end of the study only three lenses were replaced because they had torn. Two were Softcon E.W. and one a CSI-T.

When cleaning the two lenses, subjects reported that the CSI-T lens would "fold up" more easily and thus was harder to
**TABLE 3**

PREFERENCES OF 10 SUBJECTS TOWARD CSI-T LENS AND SOFTCON E.W. LENS

<table>
<thead>
<tr>
<th>PATIENT #</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>CSI-T</th>
<th>A.O.</th>
<th>ND**</th>
</tr>
</thead>
<tbody>
<tr>
<td>INITIAL COMFORT</td>
<td>ND</td>
<td>CSI</td>
<td>CSI</td>
<td>CSI</td>
<td>AO</td>
<td>ND</td>
<td>CSI</td>
<td>AO</td>
<td>CSI</td>
<td>AO</td>
<td>50%</td>
<td>30%</td>
<td>20%</td>
</tr>
<tr>
<td>COMFORT AFTER EX. WEAR</td>
<td>ND</td>
<td>CSI</td>
<td>CSI</td>
<td>CSI</td>
<td>AO</td>
<td>AO</td>
<td>CSI</td>
<td>AO</td>
<td>CSI</td>
<td>AO</td>
<td>50%</td>
<td>40%</td>
<td>10%</td>
</tr>
<tr>
<td>UNCOMFORTABLE</td>
<td>ND</td>
<td>AO</td>
<td>AO</td>
<td>AO</td>
<td>CSI</td>
<td>CSI</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>20%</td>
<td>30%</td>
<td>50%</td>
</tr>
<tr>
<td>EASIEST TO: INSERT</td>
<td>AO</td>
<td>AO</td>
<td>CSI</td>
<td>AO</td>
<td>AO</td>
<td>AO</td>
<td>ND</td>
<td>CSI</td>
<td>AO</td>
<td>ND</td>
<td>20%</td>
<td>60%</td>
<td>20%</td>
</tr>
<tr>
<td>REMOVE</td>
<td>AO</td>
<td>CSI</td>
<td>AO</td>
<td>AO</td>
<td>AO</td>
<td>AO</td>
<td>AO</td>
<td>AO</td>
<td>AO</td>
<td>ND</td>
<td>10%</td>
<td>80%</td>
<td>10%</td>
</tr>
<tr>
<td>HANDLE</td>
<td>AO</td>
<td>AO</td>
<td>AO</td>
<td>AO</td>
<td>AO</td>
<td>AO</td>
<td>ND</td>
<td>AO</td>
<td>AO</td>
<td>AO</td>
<td>---</td>
<td>90%</td>
<td>10%</td>
</tr>
<tr>
<td>CLEAN &amp; CARE</td>
<td>ND</td>
<td>ND</td>
<td>AO</td>
<td>AO</td>
<td>AO</td>
<td>ND</td>
<td>AO</td>
<td>ND</td>
<td>AO</td>
<td>ND</td>
<td>---</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>CLEAREST VISION:</td>
<td>CSI</td>
<td>CSI</td>
<td>CSI</td>
<td>ND</td>
<td>AO</td>
<td>ND</td>
<td>CSI</td>
<td>CSI</td>
<td>ND</td>
<td>CSI</td>
<td>60%</td>
<td>10%</td>
<td>30%</td>
</tr>
<tr>
<td>REQUIRED MORE: REMOVAL FOR CLEANING</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>CSI</td>
<td>ND</td>
<td>AO</td>
<td>ND</td>
<td>ND</td>
<td>AO</td>
<td>10%</td>
<td>20%</td>
<td>70%</td>
</tr>
<tr>
<td>USE OF COMFORT DROPS</td>
<td>CSI</td>
<td>AO</td>
<td>CSI</td>
<td>AO</td>
<td>ND</td>
<td>CSI</td>
<td>AO</td>
<td>CSI</td>
<td>AO</td>
<td>CSI</td>
<td>50%</td>
<td>40%</td>
<td>10%</td>
</tr>
<tr>
<td>CLEAREST VISION UPON AWAKENING</td>
<td>AO</td>
<td>ND</td>
<td>ND</td>
<td>CSI</td>
<td>AO</td>
<td>ND</td>
<td>CSI</td>
<td>CSI</td>
<td>ND</td>
<td>CSI</td>
<td>40%</td>
<td>20%</td>
<td>40%</td>
</tr>
<tr>
<td>OVERALL PREFERENCE</td>
<td>AO</td>
<td>CSI</td>
<td>CSI</td>
<td>CSI</td>
<td>AO</td>
<td>AO</td>
<td>CSI</td>
<td>AO</td>
<td>AO</td>
<td>AO</td>
<td>40%</td>
<td>60%</td>
<td>---</td>
</tr>
<tr>
<td>TORE LENS</td>
<td>ND</td>
<td>AO</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

*Number in parenthesis indicates the number of lenses torn

**ND = No Difference
properly clean.

In terms of visual clarity, both on a daily wear and extended wear schedule, the overall preference was for the CSI-T lens. There was no major acuity difference between the two lenses, but the CSI-T lens consistently demonstrated sharper subjective vision.

At the end of six months extended wear, while wearing their lens of choice, all subjects reported greater comfort and visual clarity with use of the comfort drops at bedtime and immediately upon awakening. In theory, comfort drops help remove debris from under the lens, as well as to rehydrate it. If this regimen was interrupted, less stable acuity and discomfort was reported.

Lenses could be worn two weeks (sometimes more) with no evidence of epithelial sacrifice. Epithelial staining presented more often with the CSI-T lens, notably in the inferior limbal region. This may have been due to removal techniques prior to staining with flourescein.

Upper tarsal plate involvement was minimal in both subjects who reported with complications. It was believed that both the subjects had had some type of an allergic reaction to either the disinfection system or enzyming system being used. For these two subjects, another cleaning/disinfection system was substituted (Septicon) and upon follow up, tarsal plate involvement was markedly diminished.

Within eight hours of application the surface of a contact lens is 90% coated. This may help to explain why subjects had a reduced tear B.U.T. over the lens. These coatings become
thicker and smoother under extended wear conditions until the entire lens maybe covered with a thick uniform coating.\textsuperscript{16}

A specific deposit type seen in two subjects with the Softcon E.W. lens were "jelly bumps". These deposits are hard, discrete, whitish deposits which penetrate the lens matrix. They were first thought to be composed of calcium, but recent evidence suggests that they are of a lipid nature.\textsuperscript{17,18} Decreased lens comfort and diminished vision was reported by these two subjects. Further investigation revealed poor surfactant cleaning techniques. The CSI-T lens didn't present any deposit problems.

CONCLUSION

In the end, all subjects reported that they were happy with their lenses and could maintain successful extended wear. Even though it was recommended not to exceed two weeks of extended wear, several subjects actually wore their lenses past the 30 day manufactures suggested wearing schedule with no recorded pathology or decrease in vision.

The Softcon E.W. was preferred for ease of insertion, removal and ease of handling. For these reasons then, it maybe the lens of first choice for the "first time" contact lens wearer. With an experienced contact lens wearer, who desires extended wear, preference may be given to the CSI-T lens for greater comfort and clear vision. Either lens would be an asset in practice.
REFERENCES


13. IBID


15. CSI-T Soft Contact Lens Fitting Guide, Syntex Ophthalmics, Inc. P.O. Box 39600 Phoenix, Arizona 85069-9600.
References (continued)

