Further Verification of the 'No space – No cells' concept:

New information after analysis of a Ridley Lens that survived 57 years in a patients eye.

Andreas F. Borkenstein, MD*, David J. Apple, MD*
and
W. Ayliffe, MD, D. Reinstein, MD,
G. Kleinmann, MD, B. Zaugg, BS,
E. Assia, MD, G. Auffarth, MD

*David J. Apple Laboratory for Ophthalmic Devices Research
2902 Brownell Avenue, Sullivan's Island, SC 29482, USA
www.davidjapple.com

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Andreas F. Borkenstein, MD

Introduction

Some authors have noticed that a **filling of the capsular bag with any material ranging from a rigid optic design to a soft material may reduce PCO.**
This may occur because the material fills the intralenticular space instead of the opaque material.

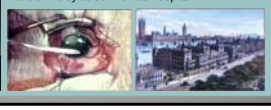
This has been seen in **animal models** and in **laboratory experience**, but has been rarely shown conclusively in clinical studies.

We have recently made several observations of eyes containing **Ridley lenses** that ideally demonstrate that **this** ***'No space - No cells' concept*** **is correct!**

Historic Background

11/29/1949

First cataract-IOL surgery performed by Harold Ridley at St.Thomas hospital.



6 Factors to Reduce PCO

3 Surgery-Related Factors
"Capsular" Surgery

1. **In-the-bag fixation**
2. **Hydrodissection** –
   Enhanced cortical clean-up
   --> Capsular Bend
3. **Small CCC with edge on the IOL surface**

3 IOL-Related Factors
"Ideal" IOL

1. **Biocompatible IOL to reduce stimulation of cellular proliferation**
   a. Silicone: proliferation
   b. Hydrophobic: inert
   c. Hydrophilic: tissue friendly
2. **Maximal IOL optic - posterior capsule contact;**
   angulated haptic; "adhesive" biomaterial to create a "shrink wrap"
   a. Pressure, b. fibrosis, c. adhesion,
   d. angulation, e. thickness
3. **IOL optic geometry:**
   square, truncated edge:
   a. round, b. partial square, c. square
   d. classic, e. frosted, f. Optiedge.

In 1999 Apple et al. suggested 6 factors that were important in reduction PCO.
In this presentation we will focus on the concept of a barrier effect against PCO.
(→ 3. of IOL-related factors).

(Ref. Foldable Intraocular Lenses, Apple D., et al. 2000 Slack Inc. p.152)

Barriers to LEC growth and proliferation

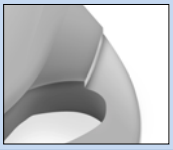
Most authors think in terms "edges", including both the edge of the IOL-optic and also the more recently described "enhanced edge" of "Amon-Apple". The latter is being designed specifically to provide protection against PCO over the haptic-optic junction.

Evolution of the square truncated Optic Edge

1. Harold Ridley, 1949:
2. Tsutomu Hara, 1991:
   a. maintenance of contour of the equatorial capsular bag (later version – Cioni Ring)
   b. prevent invasion of LECs (PCO) onto visual axis.
3. Okihiro Nishi: 1997:
   Square edge studies in rabbits.
4. David Apple: 1997:
   Square edge studies after implantation and analysis of human eyes with rigid and folded PC-IOLs obtained post mortem.

PROTEC™ 360° Edge Design of Advanced Medical Optics

- The 360° Ammon-Apple square edge has uninterrupted contact with the posterior capsular bag even at the haptic-optic junction.
- Unlike traditional single piece designs, designed to prevent cell migration along the haptic
- The frosted edge design minimizes edge glare.



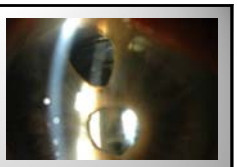
The concept of: *No Space – No Cells*

Less attention has been given to the **concept "No space – No cells"**, namely the idea of **pressure from a bulky in the bag lens on a broad area of the posterior capsule.**
Again an idea which began with Harold Ridley in the 1950s. This idea was studied in the 1990s by the Apple Korps team (Apple, Auffarth, Tetz et al.)

classic lens with space

Ridley lens – NO space

Purpose



We have recently received photographs of the eye of a patient with a Ridley Lens, provided by *Dr. Dan Reinstein (London, UK). This* specimen is very interesting from many viewpoints.

These include:
1. Historical viewpoint: This specimen is a case of a Ridley lens implanted 57 years ago in London by Ridley himself!! This has to be one of his very early cataract-IOL operations.
2. Longest term follow-up of any lens to date: This implant has rested in the eye for 57 years without complications and still counting. This is by far the best example of the concept of "No space-No cells" that exists.
3. We will soon discuss a new lens manufactured by *Advanced Medical Optics AMO*, their Tecnis 1 hydrophobic design validates how this concept can be applied without the need to actually incorporate a bulky "disc-type IOL".

Methods

We reviewed a photographic analysis of 3 human cadaver eyes containing Ridley lenses, published by *Letocha et al.*
Each patients clinical history shows the unusual phenomenon of virtually **NO PCO**.

The new case presented here shows a patient 57 years post-surgery, still with **NO PCO**, alive and well!

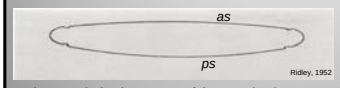
57 years is a "record"!

our case

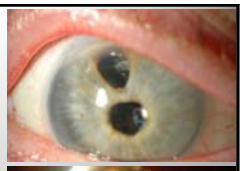
Clinical Findings of an 81 year old patient.

Lens was implanted by Ridley himself in 1952

57 Years Follow-up!



Ultrasound Biomicroscopy of the Anterior Segment:
(***p*** = pupil, ***as***=anterior surface of lens, ***ps***=posterior surface of lens)



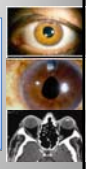
Examination, 2008:

Follow-up by W.Ayliffe and D.Reinstein

- **There was no decentration!**
- **There were delicate fibrills on the anterior capsule but NO PCO!**

Published Cases of Long Term Tolerance of Ridley IOLs

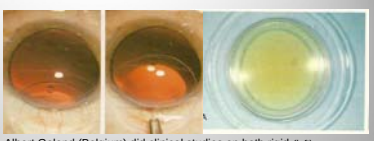
1. Letocha et al. *	3 patients	(42 years) (40 years) (ca. 40 years)
2. Apple D.J. **	1 patient	(30 years)
3. Apple, Reinstein et al.	1 patient	**(57 years)**



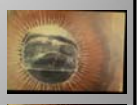
References:
* Letocha et al., Follow-up of 3 patients with Ridley intraocular lens implantation, Journal of Cat and Ref Surgery, Volume 25, Issue 4, Pages 587-591.
**Apple DJ, Sir Harold Ridley and his fight for sight, 2006, Slack Inc.

Some Applications of Ridley's disc-IOL design

In 1985 John Pearce designed the first bifocal IOL using the Ridley lens platform.



Albert Galand (Belgium) did clinical studies on both rigid *(left)* and foldable *(right)* disc - IOLs



This are examples of the "Full size lens", an expansile hydrogel that expands to a full size after implantation in the capsular bag. Proponents of this lens have included S. Sirbser, M. Blumenthal, E. Assia and D.J. Apple.

Results

In all cases the lenses were absolutely **perfectly centered**.
There was no place for the lens to move!

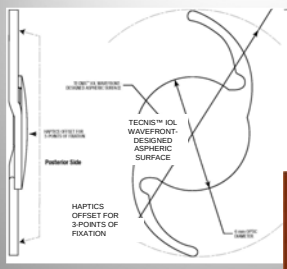
Furthermore, the **visual axes were clear** because of the presence of the intraocular lens which hindered growth of cells from the periphery of the optic towards the center, thus preventing cataract formation.

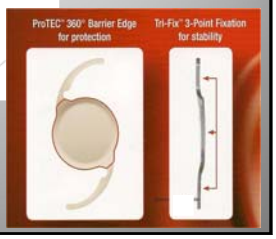
What have we learned from these?

In addition to its historical value, we have verified the validity of **"No space - No cells"**, and more specifically we can demonstrate this concept in a practical way.

Please observe the application of this principle on the recently launched hydrophobic *AMO-Tecnis 1* – design:

AMO -Tecnis® 1-Piece Lens Design

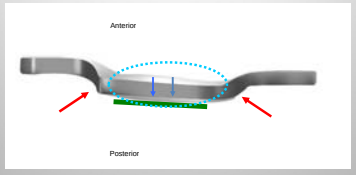




The **"No space - No cells" design** has been cleverly incorporated into the *AMO Tecnis 1 Piece IOL* – shown here, and is termed *Tri-Fix 3-Point Fixation*.

Tecnis® 1-Piece Tri-Fix Lens Design

The *Tecnis 1-Piece Tri-Fix hydrophobic acrylic Lens* is characterized by a special offset haptic design which ensures a **3-point fixation** of the lens in the capsule.



1. The first fixation point is at the posterior pole of the IOL, where the optic is pushed backward *(small blue arrows)* against the posterior capsule *(green line)* thus in effect providing a **"No space – No cells" effect** without the need for a thick Ridley-style optic *(sky blue dotted line)*.

The dotted line outlines the location where the entire lens would rest.

2. In addition the remaining 2 fixation points are as seen in this saggital section of the lens.

The square optic edges *(red arrows)* are designed to limit LEC migration and to minimize PCO.

Conclusions

We have presented 5 cases, including one for the very first time, where **Ridley lenses** have been in place for up to **57 years**, with no evidence of secondary cataract (PCO) formation in any of these eyes.

This is by far the longest documented survival of a "healthy IOL" We have never seen such stellar results in other lens styles.

This is strong and clinically significant evidence that the presence of a disc-shaped IOL filling the capsular bag can block growth of cataractious material.

This verifies the concept of 'No space – No cells'!

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* **David J. Apple Laboratory for Ophthalmic Devices Research**
2902 Brownell Avenue, Sullivan's Island, SC 29482, USA
www.davidjapple.com

The author (AFB) may be reached by e-mail: crustalith@gmx.at