Advances in the Treatment of Diabetic Retinopathy:
Paradigm shifts in patient care and education

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Presenters

Neyal J. Ammary-Risch, M.P.H., MCHES
Director, National Eye Health Education Program (NEHEP), National Eye Institute (NEI)

Emily Y. Chew, M.D.
Deputy Director, Division of Epidemiology and Clinical Applications, NEI

Judy E. Kim, M.D.
Professor of Ophthalmology, Medical College of Wisconsin, Vice-Chair, DRCR.net, Member, NEHEP Planning Committee
What is the National Eye Health Education Program (NEHEP)?

• NEHEP was established by the National Eye Institute (NEI) of the National Institutes of Health (NIH) to serve as an extension of activities in vision research so science-based information can be applied to preserving sight and preventing blindness.

• **Goal:** To ensure that vision is a public health priority through the translation of eye and vision research into public and professional education programs.
What is the Diabetic Retinopathy Clinical Research Network (DRCR.net)?

• Is a collaborative network dedicated to facilitating multicenter clinical research of diabetic retinopathy, diabetic macular edema, and associated conditions.
• Supports the identification, design, and implementation of multicenter clinical research initiatives focused on diabetes-induced retinal disorders.
• Emphasizes clinical trials; however, epidemiologic outcomes and other research may be supported as well.
Diabetes in the United States

- 29.1 million Americans have diabetes—9.3 percent of the U.S. population.
- Of these, 8.1 million do not know that they have the disease.
- An estimated 86 million adults have prediabetes.
- One out of four people with prediabetes do not know they have it.
- Diabetes is the 7th leading cause of death in the United States.

Diabetic Retinopathy

Damage to the blood vessels in the retina due to diabetes.
## Diabetic Retinopathy Prevalence and Projections*

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2030</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetic</td>
<td>7,700,000</td>
<td>11,300,000</td>
<td>14,600,000</td>
</tr>
<tr>
<td>Retinopathy</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Includes adults age 40 and older in the United States with diabetic retinopathy.

Projections for Diabetic Retinopathy by Ethnic Group in 2030 and 2050 (in millions)

Source: https://nei.nih.gov/eyedata/diabetic
AN OVERVIEW OF DIABETIC RETINOPATHY

Emily Y. Chew, M.D.
Early Treatment of Diabetic Retinopathy Study (ETDRS) Classification of Diabetic Retinopathy
Diabetic Retinopathy

Five pathologic processes:
• Formation of microaneurysms (outpouchings of the small vessels)
• Excessive vascular permeability (leakage)
• Vascular occlusions (closure of blood vessels)
• Proliferation of new vessels (± hemorrhage)
• Contraction of new blood vessels: Scarring, retinal detachment
Classification of Diabetic Retinopathy

Nonproliferative:
- No apparent retinopathy (no abnormalities)
- Mild nonproliferative: Microaneurysms only
- Moderate nonproliferative: More than just microaneurysms but less than severe nonproliferative diabetic retinopathy (NPDR)
- Severe nonproliferative (the stage before new vessels develop, so-called proliferative diabetic retinopathy)
Microaneurysm Formation

- Earliest clinical sign of retinopathy
- Minimal impact on vision at this stage
Excessive Vascular Permeability (leakage from blood vessels)
Macular Edema (swelling of the center of the retina)

- With increasing number of microaneurysms
- Signs: **Hard exudates**
  - Mainly lipids
  - Yellow lesions
  - Accompanies retinal edema or swelling

Decreased vision: 20/60
Excessive Vascular Permeability (leakage from blood vessels)  
Fluorescein Angiography (injection of dye)
Vascular Occlusions (blockage of vessels) Representing Increasing Lack of Oxygen

Hemorrhage

Venous beading
Abnormal vessels (IRMA)

Increasing hemorrhages
Venous abnormalities and abnormal vessels
Proliferation of New Vessels

Proliferative diabetic retinopathy (PDR):

- Early
- High-risk
- Advanced

High-risk PDR
Proliferation of New Vessels

Neovascularization Elsewhere (NVE)
Proliferation of New Vessels

New vessels on the disc

Scar Tissue

Advanced proliferative diabetic retinopathy

Contraction of scar tissue with new vessels
Overview of Diabetic Retinopathy

• Clinical Classification
• Global Burden of Diabetic Retinopathy
• Clinical Trials Prior to DRCR.net
• Medical Therapies
Global Burden of Diabetic Retinopathy (DR)  
35 studies = 22,896 patients

Among those with diabetes:
- 34.6% with any DR (93M)
- 6.95% with proliferative DR (17M)
- 6.81% with diabetic macular edema
- 10.2% with vision-threatening DR (28M)

Global Burden of Diabetic Retinopathy
35 studies = 22,896 patients

Among those with diabetes, increased risk of diabetic retinopathy:

• Longer duration of diabetes
• Poorer glycemic control
• Poorer blood pressure control
• Poorer control of blood cholesterol levels

Diabetic Retinopathy
National Institutes of Health-supported Clinical Trials

- No Retinopathy
- Mild NPDR
- NPDR
- Early PDR
- High-Risk PDR
- Severe PDR

DCCT / UKPDS
ETDRS
DRS
DRVS

NPDR: Nonproliferative diabetic retinopathy
PDR: Proliferative diabetic retinopathy
Treatments for Diabetic Retinopathy

Standard therapies:
• Laser photocoagulation
• Surgical intervention (vitrectomy)
• Medical therapies delivered into the eye (intravitreal injections)
• Systemic medical therapies involving blood sugar, blood pressure, and cholesterol control
Rates of Severe Vision Loss (SVL)* in Diabetic Retinopathy Study (DRS 1971–1976)

Laser reduced the rate of SVL by 50% (two types of lasers: Argon and Xenon).

*SVL: < 5/200 on two visits 4 months apart
Laser Photocoagulation for Proliferative Diabetic Retinopathy

Immediately after laser

1 year later
Success of Laser Treatment for Diabetic Retinopathy (risk of SVL* reduced by 95%)

* SVL: < 5/200 on two visits 4 months apart
Focal Laser Photocoagulation in the Early Treatment Diabetic Retinopathy Study (ETDRS 1980–1989)

Focal laser photocoagulation reduced the risk of moderate vision loss (going from 20/20 to 20/40) in eyes with macular edema by 50%.

Standard care until the onset of anti-VEGF* therapies

* VEGF: Vascular endothelial growth factor
Focal Laser Photocoagulation for Diabetic Macular Edema

Hard exudate
Prior to laser

Laser burn
Immediately after laser

4 months after laser

Standard care until the onset of anti-VEGF* therapies

* VEGF: Vascular endothelial growth factor
Surgical Intervention: Pars Plana Vitrectomy
Vitrectomy for Vitreous Hemorrhage and Traction Associated with Proliferative Diabetic Retinopathy

Images courtesy of Dr. Harry Flynn
Vitrectomy for Vitreous Hemorrhage Associated with Proliferative Diabetic Retinopathy

Before surgery (vitrectomy)  After surgery (vitrectomy)

Images courtesy of Dr. Harry Flynn
Vitrectomy for Severe Scarring of Proliferative Diabetic Retinopathy

Scarring from proliferative diabetic retinopathy

Before surgery (vitrectomy)  After surgery (vitrectomy)

Images courtesy of Dr. Harry Flynn
Medical Management Recommendations

Intensive medical control:

- Blood glucose
- Blood pressure
- Blood lipids
Diabetes Control and Complications Trial (DCCT 1983–1989) in Type 1 Diabetes Study of Glycemic Control

DCCT Patients
N=1,441

Subgroup

Primary Prevention
(no retinopathy at baseline)

Randomization

Intensive Glycemic Control
N=348

Conventional Glycemic Control
N=378

Secondary Intervention
(has retinopathy at baseline)

Randomization

Intensive Glycemic Control
N=363

Conventional Glycemic Control
N=352
DCCT Study Design Study Question

Primary Prevention
• Will intensive insulin therapy prevent the development and subsequent progression of retinopathy?

Secondary Prevention
• Will intensive insulin therapy prevent the progression of retinopathy?
Diabetes Control and Complications Trial
Hemoglobin A1C (a measure of glucose control)

HgbA1C mg%

Years

Conventional

Intensive
DCCT Results Primary Intervention – (no retinopathy) Development and Three-Step Progression of Diabetic Retinopathy Along the ETDRS Severity Scale
DCCT Results Secondary Intervention – (has retinopathy)
Three-Step Progression of Diabetic Retinopathy Along the ETDRS Severity Scale

Percentage with Event

Years

Conventional

Intensive
DCCT Summary (for Type 1 diabetes)

Results of intensive therapy:
• Reduction in retinopathy
  ▪ Clinically important retinopathy (34%–76%)
  ▪ Photocoagulation (34%)
  ▪ First appearance of retinopathy (27%)
DCCT Summary

Results of intensive therapy:
• Reduction in other 2° complications:
  - Kidney function
    – Microalbuminuria (35%)
    – Clinical albuminuria (45%)
  - Neuropathy
    – Clinical neuropathy (60%)
EDIC/DCCT Study

Epidemiology of Diabetes Intervention & Complications Study

• Extension of the DCCT study after the clinical trial was finished
• Natural history study of DCCT patients
• Beneficial effects persist for an additional 4–25 years
UK Prospective Diabetes Study
(Type 2 diabetes 1977–1994; N=3,867)
Summary: Glycemic and Blood Pressure Control

Intensive Glycemic Control
- Reduced microvascular complications by 12%
- Reduced progression of retinopathy by 25%

Intensive Blood Pressure Control (140 vs. 180 mmHg)
- Reduced microvascular complications by 37%
- Reduced progression of retinopathy by 34%
- Reduced moderate vision loss by 47%

Legacy Effect (metabolic memory) in UKPDS 10 Years After the UKPDS Clinical Trial Stopped

<table>
<thead>
<tr>
<th>Type 2 Diabetes*</th>
<th>UKPDS (UK Prospective Diabetes Study)</th>
</tr>
</thead>
</table>
| Intensive Glycemic Control | **Outcome:** Self-reports of vitreous hemorrhage, retinal photocoagulation, or renal failure  
Continued to be **reduced significantly by 24%** in those previously assigned to tight glycemic control vs. standard glycemic control |

* Newly diagnosed (within the past year)

Actions to Control Cardiovascular Risk in Diabetes (ACCORD) Eye Study (Type 2 diabetes 2003–2009)  
Three medical therapies (n=10,251):  

- Intensive glycemic control  
  - A1C < 6% vs. 7.0%–7.9%  
- Treatment to increase high-density lipoprotein cholesterol and lower triglycerides using Fenofibrate 200 mg plus statin vs. placebo + statin  
- Intensive blood pressure control  
  - SBP < 120 mmHg vs. SBP < 140 mmHg
The mean difference during the trial was 1.1%.
ACCORD Eye Study Design (n=2,856)

Baseline and Year 4 comprehensive eye exams:
- Visual acuity measurements
- Fundus photography of seven standard stereoscopic fields
- Central grading of the fundus photographs using the Early Treatment Diabetic Retinopathy Study (ETDRS) classification of diabetic retinopathy

Primary Analysis – DR Progression

<table>
<thead>
<tr>
<th>Effect</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycemia</td>
<td>0.67</td>
<td>(0.51, 0.87)</td>
<td>0.0025</td>
</tr>
<tr>
<td>Lipid (Fenofibrate)</td>
<td>0.60</td>
<td>(0.42, 0.87)</td>
<td>0.0056</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>1.23</td>
<td>(0.84, 1.79)</td>
<td>0.29</td>
</tr>
</tbody>
</table>

Odds ratio < 1 (and 95% CI not including 1) means that the treatment was beneficial.

ACCORD Eye Study Conclusions

• Intensive glycemic control and combination of Fenofibrate and Simvastatin reduced the proportion whose retinopathy progressed by about one-third.
• No effect on visual acuity.
• No statistically significant effect of intensive blood pressure control.
ACCORDION Eye Study Retinopathy
Three-Step Progression of Diabetic Retinopathy at 8 Years

<table>
<thead>
<tr>
<th>Effect</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>( P )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycemia</td>
<td>0.42</td>
<td>(0.28, 0.63)</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Lipid</td>
<td>1.13</td>
<td>(0.71, 1.79)</td>
<td>0.60</td>
</tr>
<tr>
<td>BP</td>
<td>1.21</td>
<td>(0.61, 2.40)</td>
<td>0.59</td>
</tr>
</tbody>
</table>

Odds ratio < 1 (and 95% CI not including 1) means that the treatment was beneficial.
ACCORDION Eye Study Conclusions

• **Intensive glycemic control** continued to demonstrate beneficial effects 4 years following cessation of the randomized trial.
  - Effects were consistent across subgroups.
• **Fenofibrate and Simvastatin** showed no beneficial effect after stopping Fenofibrate.
• No statistically significant effect of **intensive blood pressure control**.
Summary

• We have highly effective therapies from evidence-based studies.
• The medical therapies are very powerful and durable.
• The treatments using the standard laser have reduced the risk of severe vision loss.
• Laser treatment remains an important part of therapy.

MANAGEMENT OF DIABETIC MACULAR EDEMA AND PROLIFERATIVE DIABETIC RETINOPATHY: Findings from DRCR.net Trials and Paradigm Shift
Objectives

- Review findings from DRCR.net clinical trials for diabetic macular edema and proliferative diabetic retinopathy:
  - Protocol I
  - Protocol T
  - Protocol S
- Discuss paradigm change in management of diabetic retinopathy.
Laser Photocoagulation


Optical Coherence Tomography (OCT)

OCT image showing macular edema with fluid in the retina and under the retina
Vascular Endothelial Growth Factor (VEGF)

- Elevated in active PDR
- Overexpression is associated with DME
- A central mediator of angiogenesis and vascular permeability
- A target for therapy
Anti-VEGF Agents

- Aflibercept (Eylea)
- Bevacizumab (Avastin)*
- Ranibizumab (Lucentis)

* Use of Avastin in the eye is off-label.
Laser Photocoagulation
Intravitreal Injection of Anti-VEGF Agents
Diabetic Retinopathy Clinical Research Network (DRCR.net)

- A collaborative network to facilitate multicenter clinical research on diabetic retinopathy, diabetic macular edema, and associated conditions
DRCR.net Protocol I

Intravitreal Ranibizumab or Triamcinolone Acetonide in Combination with Laser Photocoagulation for DME

- Sham + Prompt Laser
- Ranibizumab (Lucentis) 0.5 mg + Prompt Laser
- Ranibizumab (Lucentis) 0.5 mg + Deferred Laser
- Triamcinolone 4 mg + Prompt Laser
## Protocol I

<table>
<thead>
<tr>
<th>Objective</th>
<th>To evaluate the safety and efficacy of intravitreal anti-VEGF treatment in combination with immediate or deferred focal/grid laser photocoagulation and intravitreal corticosteroids in combination with focal/grid laser compared with focal/grid laser alone in eyes with center-involved DME.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Eligibility Criteria</td>
<td>Diabetic macular edema involving the center of the macula (optical coherence tomography central subfield thickness ≥ 250 microns) responsible for visual acuity of 20/32 or worse.</td>
</tr>
<tr>
<td>Protocol Status</td>
<td>Total enrolled (3/07–12/08): 691 subjects/854 eyes at 52 sites</td>
</tr>
</tbody>
</table>
Mean Change in Visual Acuity (VA) at Follow-up Visits

*P*-values for difference in mean change in VA from sham + prompt laser at the 104-week visit: Ranibizumab + prompt laser = 0.03; Ranibizumab + deferred laser < 0.001; and triamcinolone + prompt laser = 0.35.
Mean Change in Visual Acuity (VA) at Follow-up Visits

*P*-values for difference in mean change in VA from sham + prompt laser at the 104-week visit: Ranibizumab + prompt laser = 0.03; Ranibizumab + deferred laser < 0.001; and triamcinolone + prompt laser = 0.35.
Mean Change in Visual Acuity Through 5-year Follow-up in the Lucentis Groups

## Median Number of Injections Prior to 5 Year

<table>
<thead>
<tr>
<th></th>
<th>Lucentis + Prompt Laser (N=124)</th>
<th>Lucentis + Deferred Laser (N=111)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Median no. (range) of injections in Year 1</strong></td>
<td>8 (7–11)</td>
<td>9 (6–11)</td>
</tr>
<tr>
<td><strong>Median no. in Year 2</strong></td>
<td>2 (0–5)</td>
<td>3 (1–6)</td>
</tr>
<tr>
<td><strong>Median no. in Year 3</strong></td>
<td>1 (0–4)</td>
<td>2 (0–5)</td>
</tr>
<tr>
<td><strong>Median no. in Year 4</strong></td>
<td>0 (0–3)</td>
<td>1 (0–4)</td>
</tr>
<tr>
<td><strong>Median no. in Year 5</strong></td>
<td>0 (0–3)</td>
<td>0 (0–3)</td>
</tr>
<tr>
<td><strong>Median no. (range) of injections before the 5-year visit</strong></td>
<td>13 (9–24)</td>
<td>17 (11–27)</td>
</tr>
</tbody>
</table>
What has been learned from Protocol I for diabetic macular edema treatment?

- Intravitreal Lucentis with or deferred laser is more effective in increasing vision compared with laser in eyes with DME involving the central macula.
- Visual benefit from intravitreal Lucentis was maintained for up to 5 years of follow-up despite the decreasing number of injections needed.
- Intravitreal anti-VEGF (Lucentis) therapy should be considered for patients with DME and decreased visual acuity.
DRCR.net Protocol T

Comparative Effectiveness Study of Intravitreal Aflibercept, Bevacizumab, and Ranibizumab for DME

Background

- Eylea and Lucentis: FDA approved for DME.
- Avastin: Not FDA approved for intraocular use.
  - Repackaged into aliquots ~1/500 of systemic dose in cancer treatments.
- Medicare allowable charges vary.
Protocol T
Objective and Treatment Arms

To compare the efficacy and safety of intravitreal Aflibercept, Bevacizumab, and Ranibizumab when given to treat center-involved DME in eyes with visual acuity of 20/32 to 20/320.

2.0 mg/0.05mL Aflibercept (Eylea)
1.25 mg/0.05mL Bevacizumab (Avastin)
0.3 mg/0.05mL Ranibizumab (Lucentis)

660 eyes from 89 sites were equally randomized to each group
Follow-up Schedule

Baseline to 1 Year
- Visits every 4 weeks
- Primary outcome at 1 year

1 Year to 2 Years
- Visits every 4 to 16 weeks
- Depends on disease status and treatment

- Injection every 4 weeks until stable.
- Starting at the 6-month visit, laser treatment was administered if DME persisted and was not improving.
## Comparison of Anti-VEGF for DME: Number of Injections

<table>
<thead>
<tr>
<th></th>
<th>Eylea</th>
<th>Avastin</th>
<th>Lucentis</th>
<th>Global P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. of Injections: Median</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>9</td>
<td>10</td>
<td>10</td>
<td>0.045†</td>
</tr>
<tr>
<td>Year 2</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>0.32</td>
</tr>
<tr>
<td>Over 2 Years</td>
<td>15</td>
<td>16</td>
<td>15</td>
<td>0.08</td>
</tr>
</tbody>
</table>

† Pairwise comparisons (adjusted for multiple comparisons): Eylea-Avastin: $P = 0.045$, Eylea-Lucentis: $P = 0.19$, Avastin-Lucentis: $P = 0.22$. 
Comparison of Three Anti-VEGF for DME: The Need for Laser Treatment

<table>
<thead>
<tr>
<th></th>
<th>Eylea</th>
<th>Avastin</th>
<th>Lucentis</th>
<th>Global P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>At least one focal/grid laser</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>37%</td>
<td>56%</td>
<td>46%</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Year 2</td>
<td>20%</td>
<td>31%</td>
<td>27%</td>
<td>0.046</td>
</tr>
<tr>
<td>Over 2 Years</td>
<td>41%</td>
<td><strong>64%</strong></td>
<td>52%</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>
What did we learn from Protocol T for diabetic macular edema? At 2 years:

- Vision gains were seen with all three drugs.
What did we learn from Protocol T for diabetic macular edema? At 2 years:

- When initial vision loss is mild (20/32 to 20/40), there is little difference between the three drugs.
What did we learn from Protocol T for diabetic macular edema? At 2 years:

- When initial vision loss is greater (20/50 or worse), Eylea and Lucentis are more effective.
What did we learn from Protocol T for diabetic macular edema?

- Anti-VEGF agents (Avastin, Eylea, Lucentis) with or without deferred laser are effective in improving vision in eyes with central DME with vision loss.
- Depending on the initial visual acuity, different anti-VEGF agents may be considered.
DRCR.net Protocol S

Prompt panretinal photocoagulation vs. intravitreal Ranibizumab with deferred panretinal photocoagulation for proliferative diabetic retinopathy

Background

• Current treatment for PDR is panretinal photocoagulation (PRP):
  ▪ Inherently destructive
  ▪ Adverse effects on visual function
• Some eyes with PDR that have DME now receive anti-VEGF as standard care for DME.
Study Objective and Treatment Groups

To determine if visual acuity outcomes at 2 years in eyes with PDR (with or without concurrent DME) that receive anti-VEGF therapy with deferred PRP are non-inferior to those in eyes that receive prompt PRP therapy.

- **Prompt PRP**
- **0.5 mg Lucentis with deferred PRP**

Eyes in both groups could receive ranibizumab for DME treatment.
Mean Change in Visual Acuity

2-Year Adjusted Mean Difference: +2.2 letters
95% Confidence Interval: (-0.5, +5.0)

(Meets pre-specified non-inferiority criterion: lower bounds of the 95% CI of -0.5 letters was greater than the non-inferiority limit of -5.0 letters)

Outlying values were truncated to 3 SD from the mean.
Peripheral Visual Field Outcomes: 2-Year Visit

<table>
<thead>
<tr>
<th>Humphrey Visual Field</th>
<th>30-2 + 60-4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lucentis Group</strong></td>
<td>(N=58)</td>
</tr>
<tr>
<td><strong>PRP Group</strong></td>
<td>(N=57)</td>
</tr>
</tbody>
</table>

Cumulative Point Score Change from Baseline

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Difference (P-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lucentis</strong></td>
<td>-23</td>
<td>372 dB (P &lt; 0.001)</td>
</tr>
<tr>
<td><strong>PRP</strong></td>
<td>-422</td>
<td></td>
</tr>
</tbody>
</table>

Anti-VEGF treatment is less likely to cause peripheral vision loss.
### Complications of PDR

<table>
<thead>
<tr>
<th>Complication</th>
<th>Lucentis Group (N=191)</th>
<th>PRP Group (N=203)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any retinal detachment</td>
<td>6%</td>
<td>10%</td>
<td>0.08</td>
</tr>
<tr>
<td>Neovascular glaucoma</td>
<td>2%</td>
<td>3%</td>
<td>0.50</td>
</tr>
<tr>
<td>Iris neovascularization</td>
<td>1%</td>
<td>1%</td>
<td>0.96</td>
</tr>
<tr>
<td>Vitreous hemorrhage</td>
<td>27%</td>
<td>34%</td>
<td>0.09</td>
</tr>
<tr>
<td>Vitrectomy surgery</td>
<td>4%</td>
<td>15%</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Eyes treated with anti-VEGF are less likely to have surgery for PDR-related complications.
What did we learn from Protocol S for proliferative diabetic retinopathy?

- Treatment with intravitreal anti-VEGF (Lucentis) was not worse than laser (PRP) for vision outcome at 2 years.
- Superior mean visual field outcomes.
- Decreased need for vitrectomy surgery.
- Anti-VEGF treatment may reduce the need for PRP.
Paradigm Shift

1976

2016

Era of intravitreal injections with anti-VEGF agents
New Treatments Mean Better Outcomes…

• But we still have a lot to do.
• Only half of people with diabetes get an annual comprehensive dilated eye exam.
• Early detection and treatment are key to preventing vision loss.
• Everyone working with people with diabetes can play a role in eye health education.
What Can You Do?

• Educate people about diabetic retinopathy and diabetes control.
• Encourage people with diabetes to protect their vision by getting a comprehensive dilated eye exam every year and keep their health on TRACK.
NEHEP Diabetic Eye Disease Education Program

Designed to increase awareness about diabetic eye disease and the need for people with diabetes to have a comprehensive dilated eye exam at least once a year to help prevent vision loss and blindness.

Key Program Messages

• Eye diseases have no early warning signs or symptoms.
• Early detection, timely treatment, and appropriate follow-up may prevent vision loss or blindness.
• People with diabetes need a comprehensive dilated eye exam at least once a year.
NEHEP Diabetic Eye Disease Resources

Educational resources to use with patients and in the community

www.nei.nih.gov/NEHEP
Diabetic Eye Disease Resources

- Booklet
- Infographics
- Tip Sheets
- Animations
- Handouts and Brochures
- Infocards
- Consumer Website
- Teaching Tools
Treating Diabetic Retinopathy Fact Sheet

What You Should Know

Diabetic retinopathy occurs when diabetes damages the tiny blood vessels inside the retina—the light-sensitive tissue at the back of the eye. The damage affects blood vessels in the retina, the macula, and the optic nerve. These damaged vessels may leak fluid or blood into the vitreous, the gel-like substance that fills the center of the eye and helps the retina to stay in place. When this happens, it can lead to permanent vision loss and blindness.

How People With Diabetic Retinopathy Can Protect Their Vision

Because diabetic retinopathy often lacks early symptoms, you may not know you have it. Please tell your eye care team about any vision changes you notice. They will perform eye exams at least once a year to help detect the disease in its early stages. Therefore, vision lost due to diabetic retinopathy cannot be repaired. However, with early detection and treatment, you can reduce your risk of blindness by 95 percent. These treatments also help slow down your vision loss, giving you more time to enjoy life to the fullest. Using eye protection when you are outside can help reduce the risk of vision loss in people with diabetes.

Treatment Options for DME

Diabetic macular edema (DME) is the most severe form of diabetic retinopathy, which affects the macula, the central part of the retina responsible for sharp central vision. DME is the leading cause of vision loss in working-age adults.

Treatment Options for PDR

Scleral laser treatment is one of the most common treatment options for PDR. It is a minimally invasive procedure that can be performed as an outpatient procedure. It involves the use of a laser to seal the leaking blood vessels in the retina, which helps reduce the risk of further vision loss. The laser treatment is usually performed on both eyes, and the results can be seen shortly after the procedure. Laser treatment is usually performed by an ophthalmologist or a specialist in ophthalmology.

Other Treatment Options

If there is more than one hole in the retina, a surgical procedure called macular hole surgery may be performed to repair the hole. This procedure involves creating a small opening in the retina and inserting a tiny plug to fill the hole. The plug is made of silicone, a soft, flexible material that is used in dental work. The procedure is usually performed as an outpatient procedure, and the results can be seen shortly after the procedure.

If you are considering DME treatment, talk to your eye care provider about what treatment options are available to you. They can help you make an informed decision about what treatment is best for you.
Social Media Resources

Only half of all people with diabetes get an annual comprehensive dilated eye exam.

This exam is the only way to detect diabetic eye disease before vision loss occurs.

New treatments offer more hope for people with diabetic retinopathy.

Talk with your eye care professional about the best treatment options for you.

Keep your diabetes in control to prevent or slow the progression of diabetic retinopathy.

Adults age 50+ with diabetes are at higher risk for developing diabetic retinopathy.

This disease often has no early symptoms but can be detected with a comprehensive dilated eye exam.

LEARN THE FACTS
About DIABETIC RETINOPATHY

NO EARLY SYMPTOMS
Many people do not know they have diabetic retinopathy when symptoms occur. Early treatment can prevent vision loss.

WHO IS AT RISK?

95% REDUCED RISK OF VISION LOSS
Getting regular eye exams can reduce the risk of vision loss by 95%

YOU CAN PROTECT YOUR VISION.
Get a comprehensive dilated eye exam at least once a year if you have diabetes.

Learn more at:
www.nei.nih.gov/diabetes

NIH National Eye Institute
A program of the National Institutes of Health
QUESTIONS
For More Information

• **Visit:** [www.nei.nih.gov/nehep](http://www.nei.nih.gov/nehep)

• **Contact:**
  
  **Neyal J. Ammary-Risch, M.P.H., MCHES**
  Director, National Eye Health Education Program
  E-mail: ammaryn@nei.nih.gov
  Tel: 301-496-5248

  **Emily Y. Chew, M.D.**
  Deputy Director, Division of Epidemiology and Clinical Applications
  National Eye Institute
  E-mail: echew@nei.nih.gov
Additional Resources

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Thank you!