

Reducing the Impact of Diabetic Eye Disease

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Perspective of the Retina Specialist

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Reducing Impact of Diabetic Eye Disease

- **Importance of eye disease in people with diabetes**

How Does Vision Loss Compare with Other Health Problems?

Ocular Disease Utility Value*	Systemic Health State Value

* Based on visual acuity in the better-seeing eye.

Adapted from Brown MM, et al. *Ophthalmology*. 2003;110:1076-1081, ©2003 with permission from the American Academy of Ophthalmology.

How Does Vision Loss Compare with Other Health Problems?

Ocular Disease Utility Value*	Systemic Health State Value
Negligible visual loss (20/20-20/25) 0.88	Breast cancer, after radiotherapy 0.89 Myocardial infarction 0.87
Minimal visual loss (20/30-20/50) 0.81	Colon cancer, poor prognosis 0.80 AIDS 0.79
Moderate visual loss (20/60-20/100) 0.72	Stroke, moderate 0.73 Home dialysis for 8 years 0.72
Severe visual loss (20/200-No Light Perception) 0.61	Tuberculosis: hospitalized for 3 mos 0.60 Ulcerative colitis, before surgery 0.58

* Based on visual acuity in the better-seeing eye.

Adapted from Brown MM, et al. *Ophthalmology*. 2003;110:1076-1081, ©2003 with permission from the American Academy of Ophthalmology.

How Does Vision Loss Impact Quality of Life?

- **Mobility, both ambulatory and driving¹**
 - Recognition of landmarks, street signs
- **Reading and related close work¹**
 - Activities of daily living (cooking, shopping, check writing, etc)
- **Self Care Abilities²**
 - Reading of medicine bottles, nutritional labels
 - Preparing insulin injections, glucose testing
- **Social participation^{1,2}**
 - Feelings of vulnerability, emotional distress
 - Dependence on others for transportation



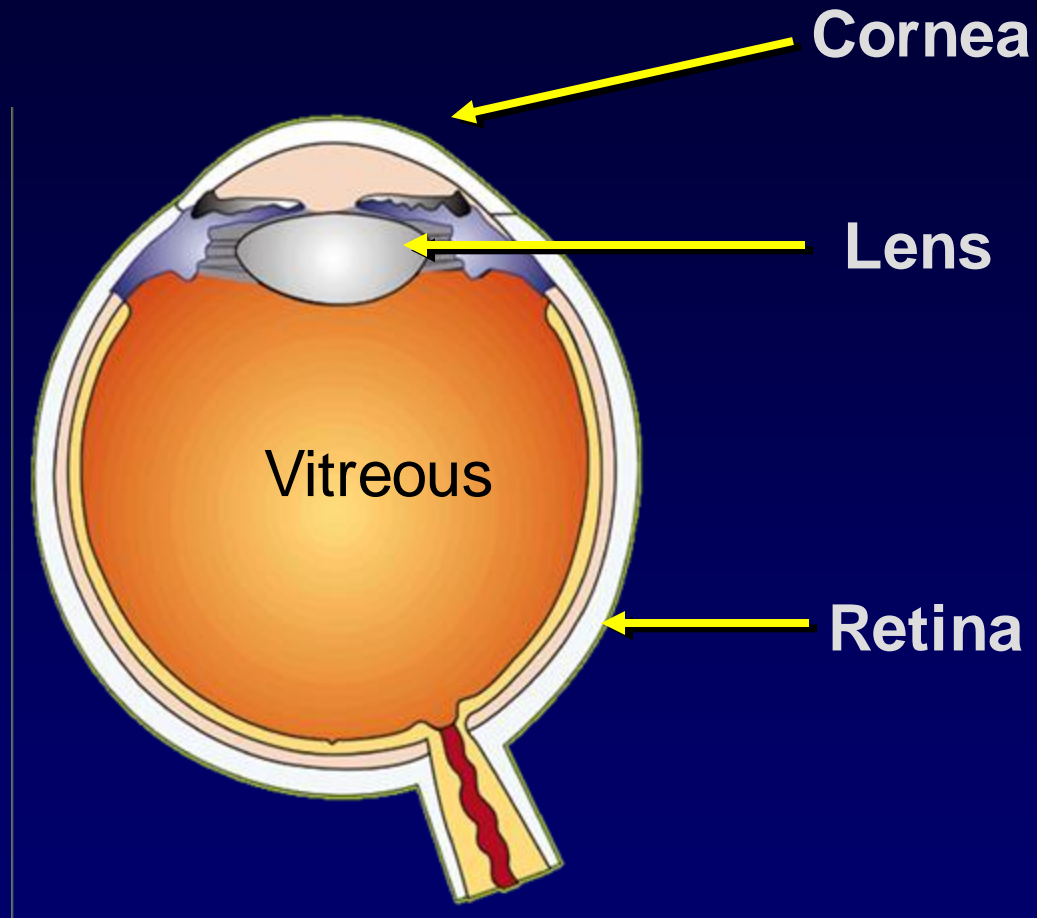
1. Lennie P, Van Hemel SB, eds. *Visual Impairments: Determining Eligibility for Social Benefits*. National Academy of Sciences. 2002.

2. Coyne KS, et al. *Family Practice*. 2004;21:447-453.

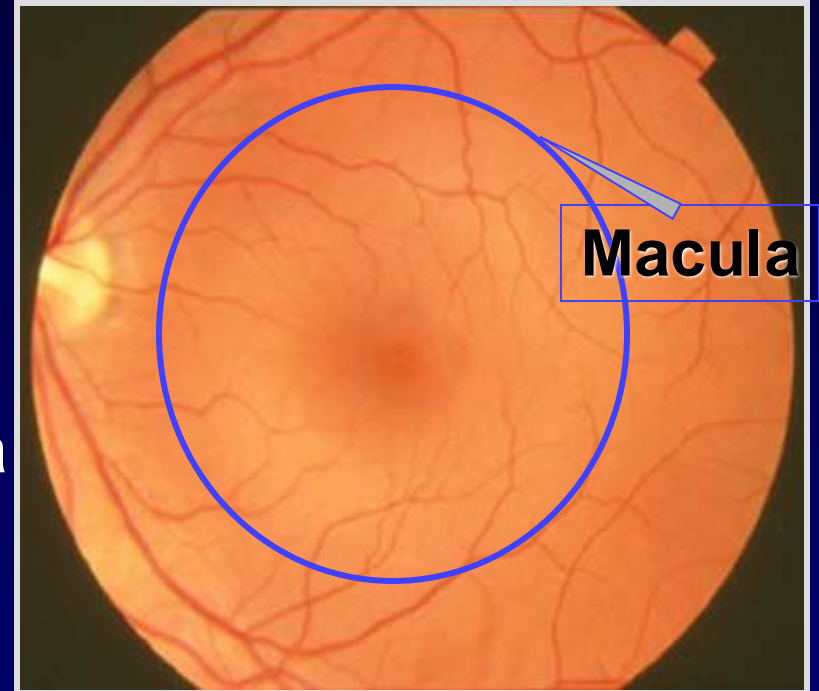
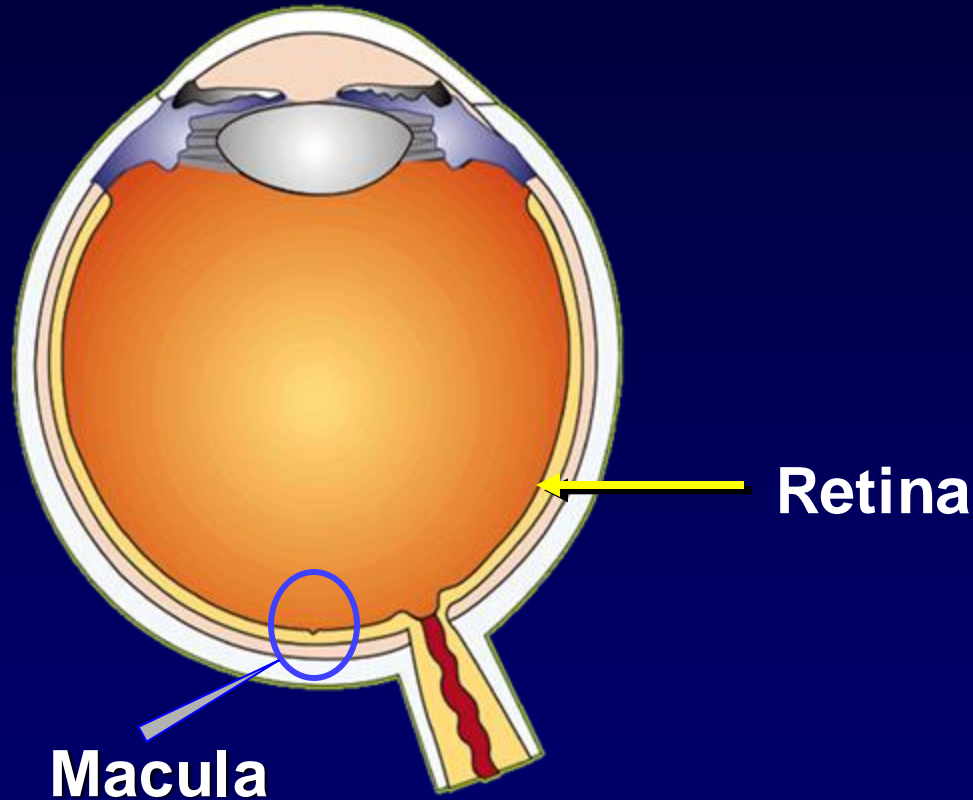
Reducing Impact of Diabetic Eye Disease

- Importance of eye disease in people with diabetes
- **What is diabetic retinopathy?**

Normal Eye

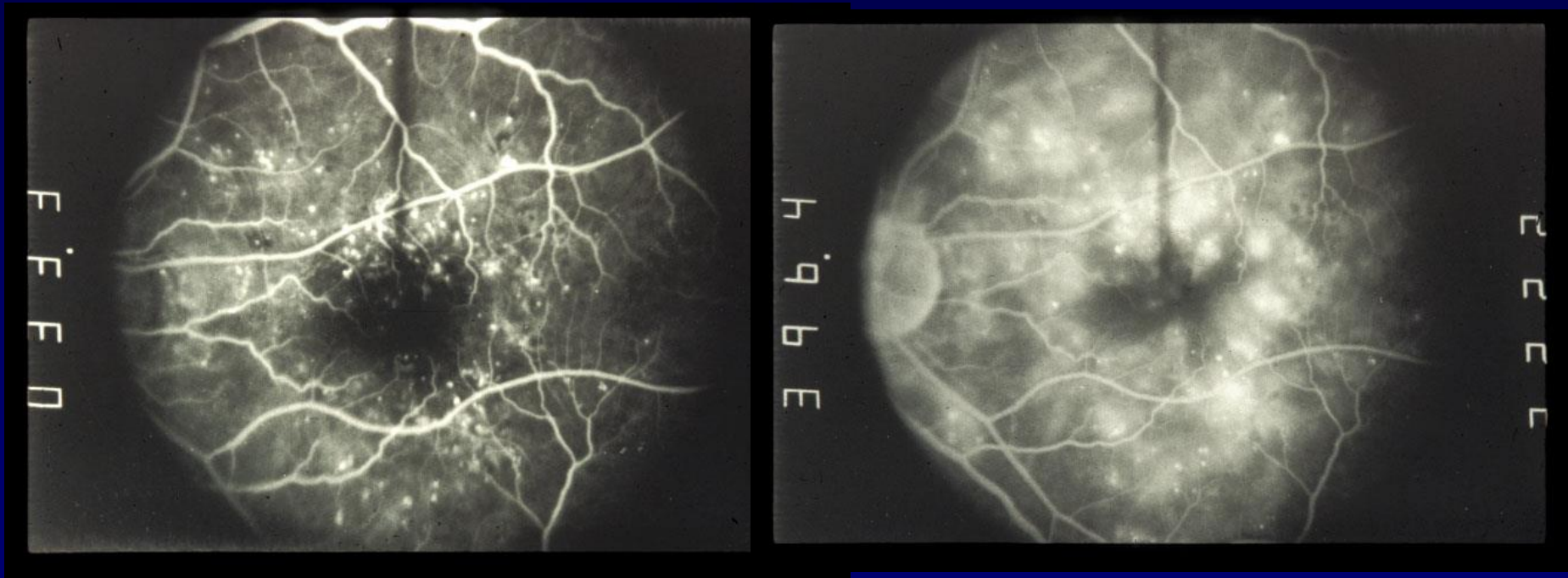


Macula: Center of the Retina



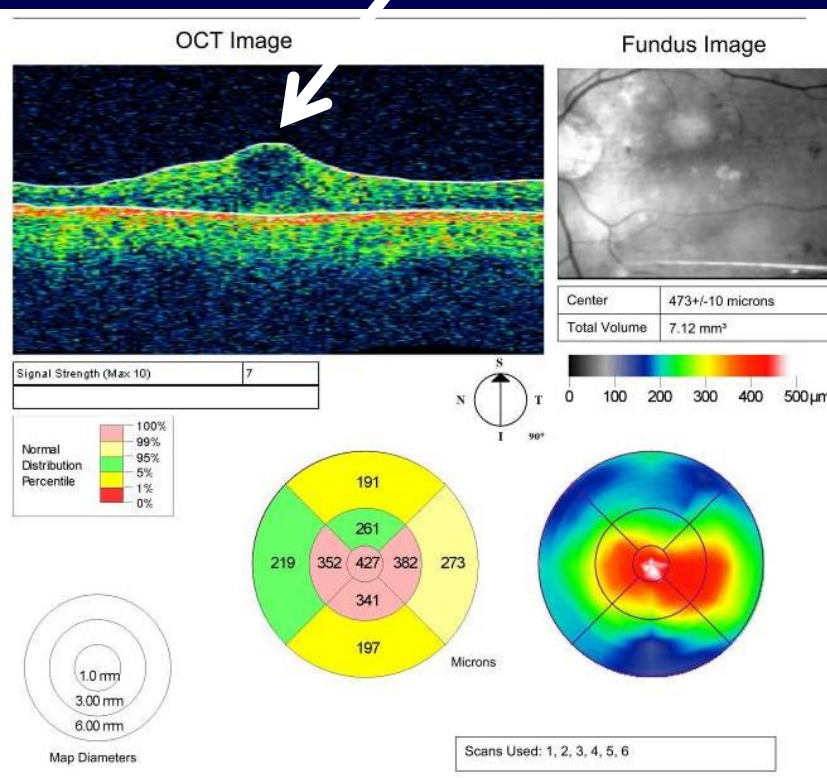
Consequences of Elevated Blood Sugar Levels: Leakage of Capillaries – Macular Edema

*Hyperpermeability easily visualized with
fluorescein angiography*

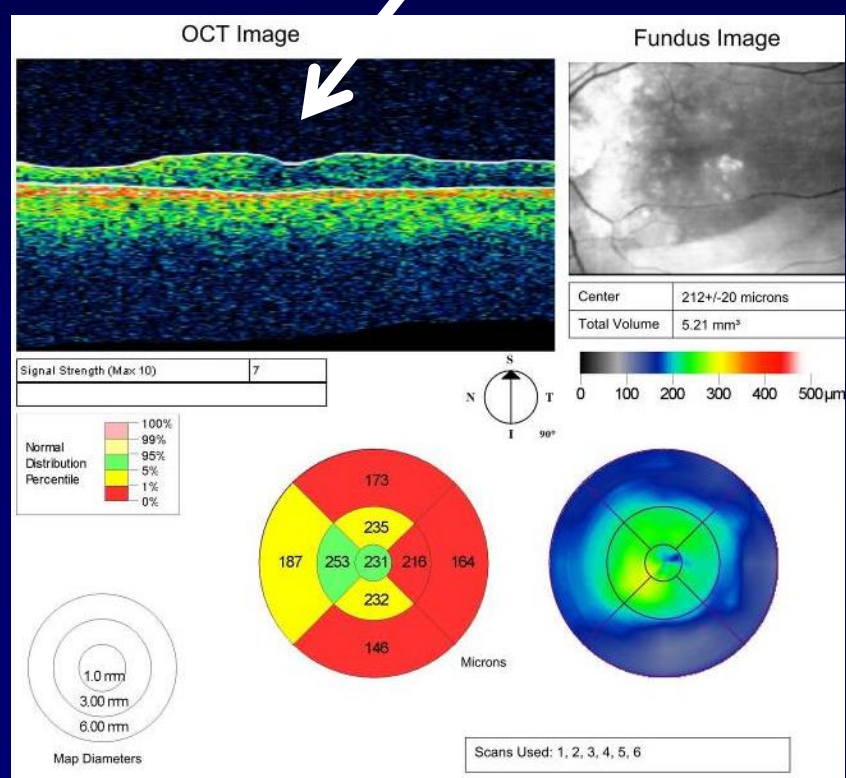


Consequences of Leakage of Capillaries: Macular Edema

*Retinal Thickening Readily Imaged
And Quantified by Ocular Coherence Tomography (OCT)*



Treat
→



Diabetic Macular Edema

- Most common cause of vision impairment or blindness among persons with diabetes

Legally Blind

N C V K D

20/200

C Z S H N

O N V S R

K D N R O

15 letter loss from
20/40, CANNOT
Drive or Read

Z K C S V

20/80

D V O H C

O H V C K

H Z C K O

20/40

N C R H D

S Z R D N

20/20

R D D E N

15 letter loss =
3 line loss, CAN
Drive + Read

Visual Acuity on An Eye Chart Translates into Impaired Vision Function

N C V K D

C Z S H N

O N V S R

K D N R O

Z K C S V

D V O H C

O H V C K

H Z C K O

N C K H D

Z H C S R

S Z R D N

H C D R O

R O O B N

=

or

Marley was dead: to begin with. There is no doubt whatever about that. The register of his burial was signed by the clergyman, the clerk, the undertaker, and the parish council; all of whom were first-hand witnesses. And Scrooge's name was good upon 'Change, to the day of death. —

Old Marley was as dead as a door-nail.

Mind! I don't mean to say that I know of my friend's death. I have just wakened up, in the morning, and he is particularly dead about a door-nail. I might have been inclined, under the circumstances, to regard the deadest piece of iron mongery in the trade. But the wisdom of our country is in the simile; and my unhallowed hands shall not disturb it, or the Country's done for. You will therefore permit me to repeat emphatically, that Marley was as dead as a door-nail.



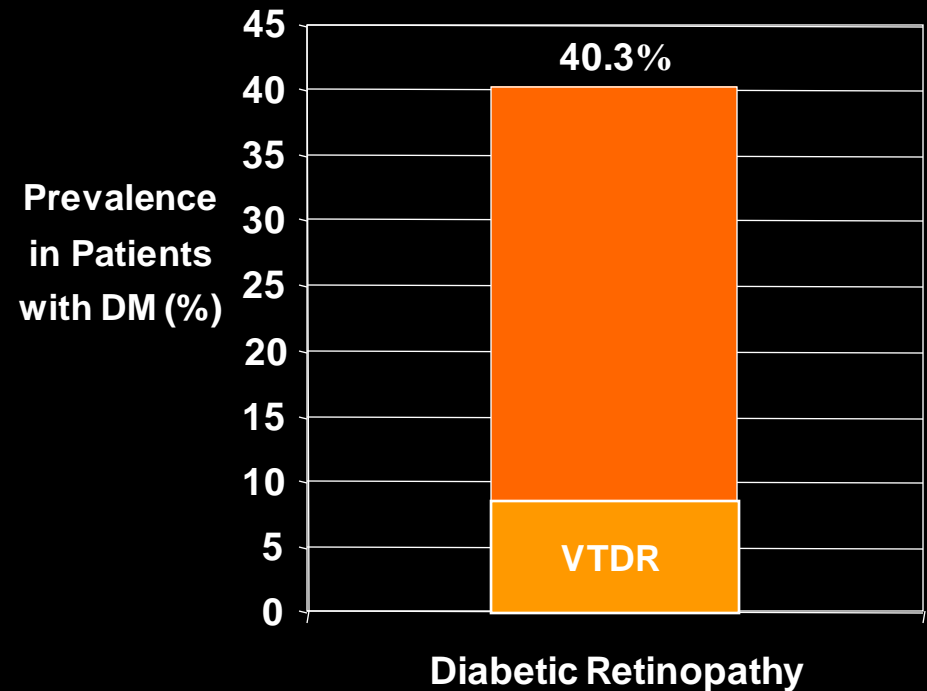
Any 3 line loss of acuity equates to substantial loss of vision related quality of life

Reducing Impact of Diabetic Eye Disease

- Importance of eye disease in people with diabetes
- What is diabetic retinopathy?
- Prevalence

Diabetic Retinopathy (DR): A Major Cause of Vision Loss

- DR is the leading cause of blindness in adults 20-74 yrs
- DR occurs in ~40% of patients diagnosed with diabetes aged ≥ 40 years:
 - 20% of patients with DR have vision-threatening DR[†] (VTDR)



*Pooled analysis of data from 8 population-based eye surveys was used to estimate the prevalence, among persons with DM (T1DM or T2DM), of DR and vision-threatening diabetic retinopathy (VTDR).

† Vision-threatening diabetic retinopathy (VTDR) defined as severe non-proliferative DR, proliferative DR, and/or macular edema.

Kempner JH, et al. *Arch Ophthalmol.* 2004;122:552-563.

Prevalence estimates among U.S. Adults ≥ 40 years With Self-reported and Undiagnosed Diabetes

Population	NHANES Sample Size	% of U.S. population aged ≥ 40 years with diabetes [†] (95% CI)	No. of Adults in the U.S. population aged ≥ 40 years with diabetes [‡]
Diabetes	1,038	100%	20.3 million (18.1-22.7 million)

DME = diabetic macular edema; DR = diabetic retinopathy

*Data previously presented at Retina Society 2012 Annual Meeting, Oct 4-7, 2012, Washington, DC and American Academy of Ophthalmology 2012 Annual Meeting, Nov 10-13, 2012, Chicago, IL.

[†]Estimates include self-reported and undiagnosed diabetes.

[‡]Prevalence estimates were applied to the 2010 Census population to calculate the total number of cases ≥ 40 years in the U.S.

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DR without DME	270	24.0% (20.8–27.3%)	4.9 million (4.1-5.8 million)
DME	55	3.8% (2.7–4.9%)	839,000 (602,000-1,117,000)

DME = diabetic macular edema; DR = diabetic retinopathy

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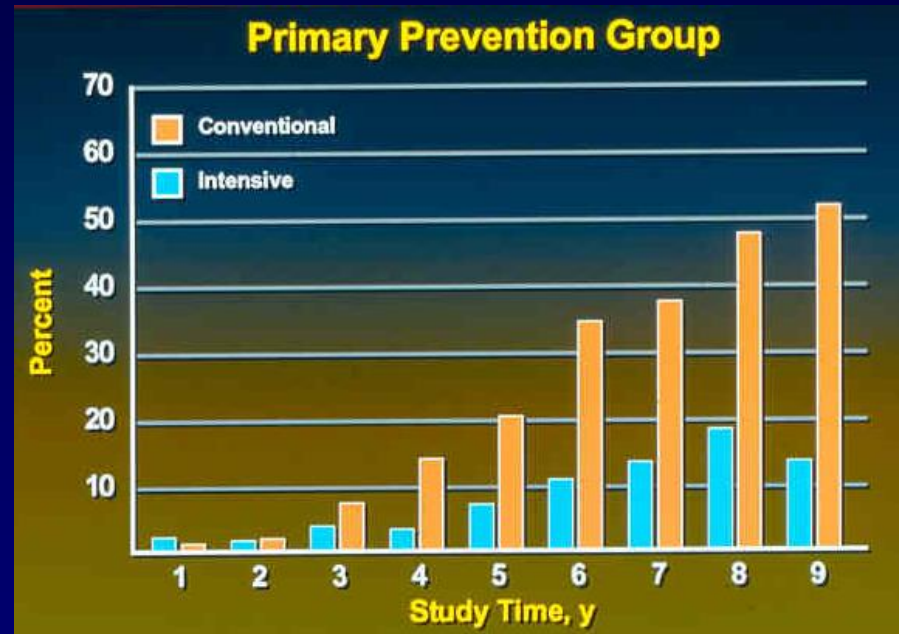
Reducing Impact of Diabetic Eye Disease

- **Importance of eye disease in people with diabetes**
- **What is diabetic retinopathy?**
- **Prevalence**
- **Treatment**

How Can Physicians Best Help?

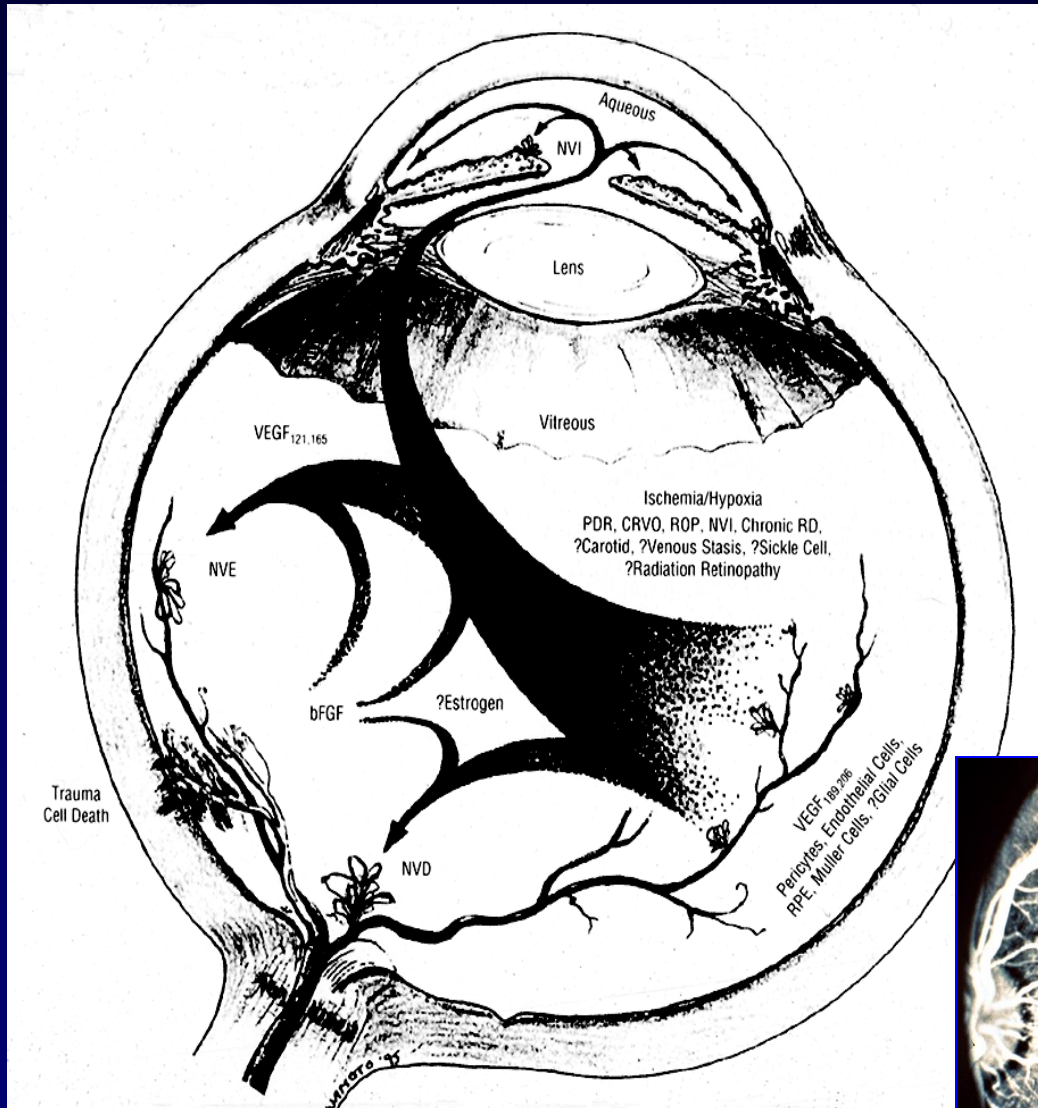
- Manage hyperglycemia
- Manage hypertension
- Manage lipids

DCCT: Percent of patients with ≥ 3 -step progression at each annual visit

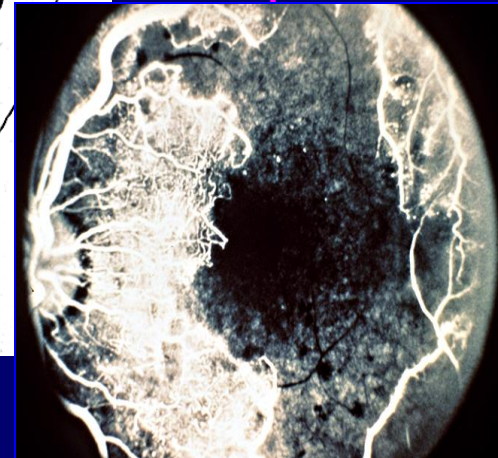


Make sure every person with diabetes is under regular care of doctor who can evaluate the retina

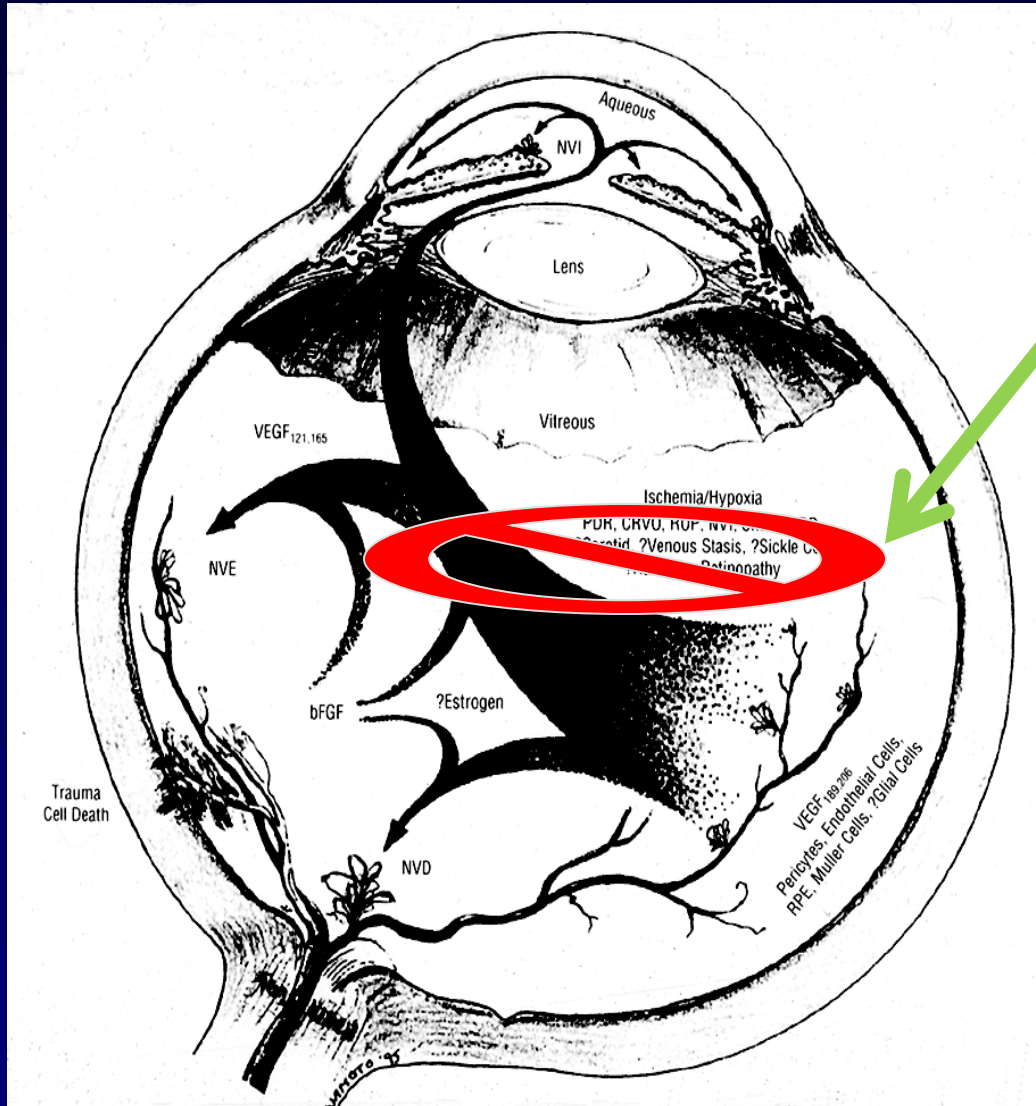
Growth Factors in Diabetic Retinopathy



VEGF, GH,
IGF, FGF,
HGF, PDGF,
TGF, Ang,
ATII
&
many
more...



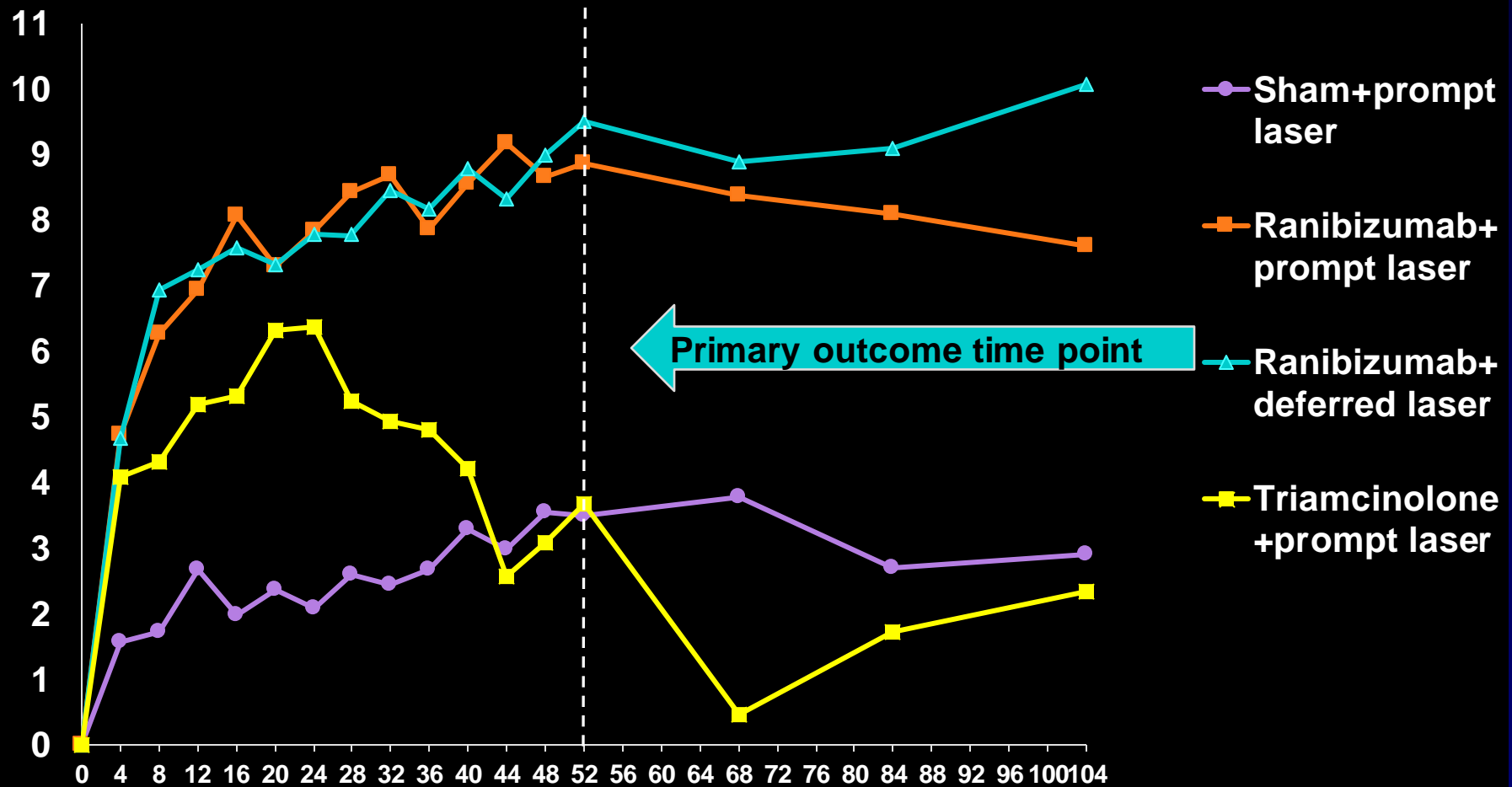
“Anti-”Growth Factor to Treat Diabetic Retinopathy



Intravitreal injection into middle cavity of eye

Positive Effects On:
Angiogenesis (blood vessel growth) and hyperpermeability (blood vessel leakage causing macular edema)

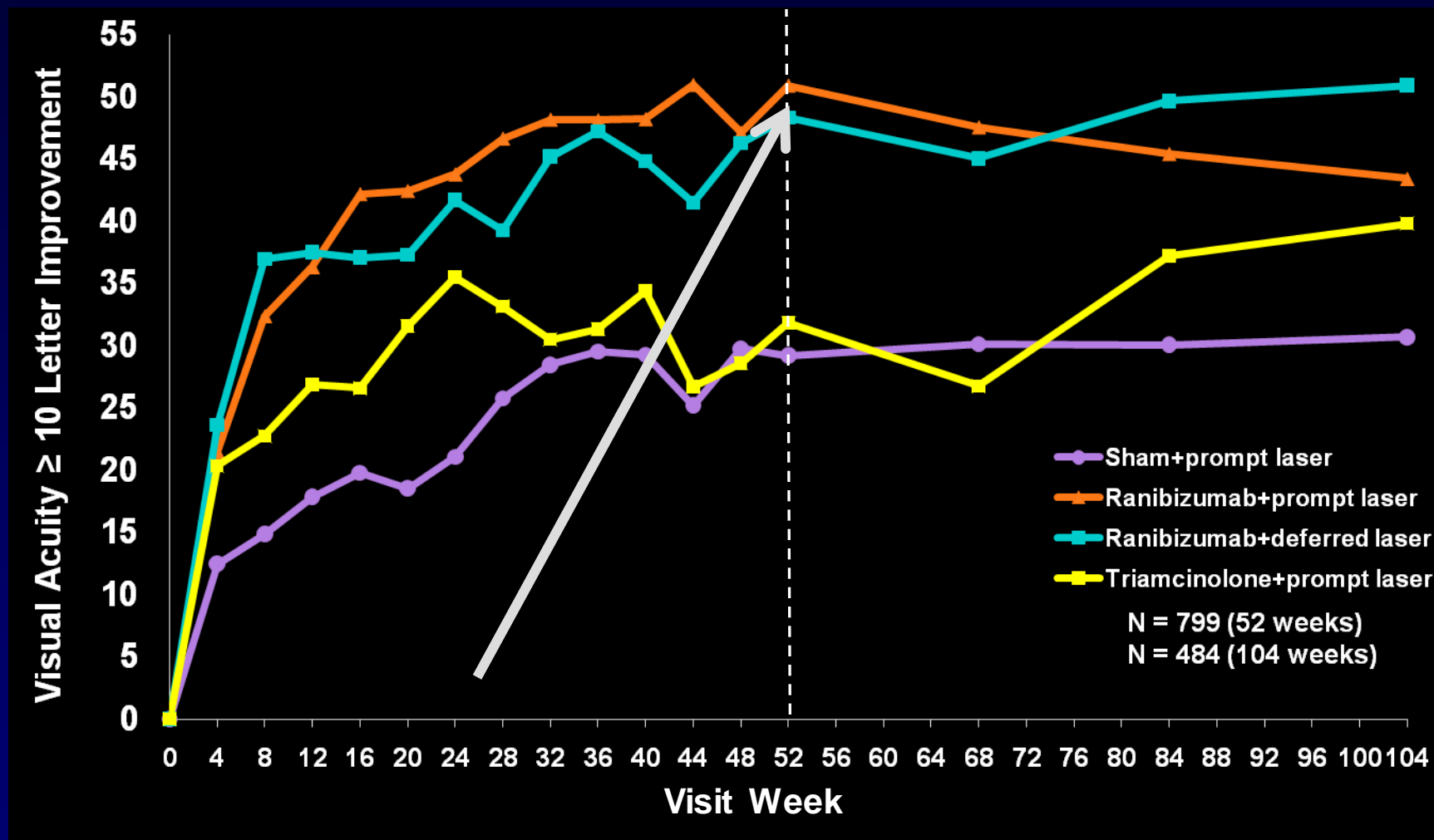
Mean Change in Visual Acuity (Letters)* at Follow-up Visits



* Values that were ± 30 letters were assigned a value of 30

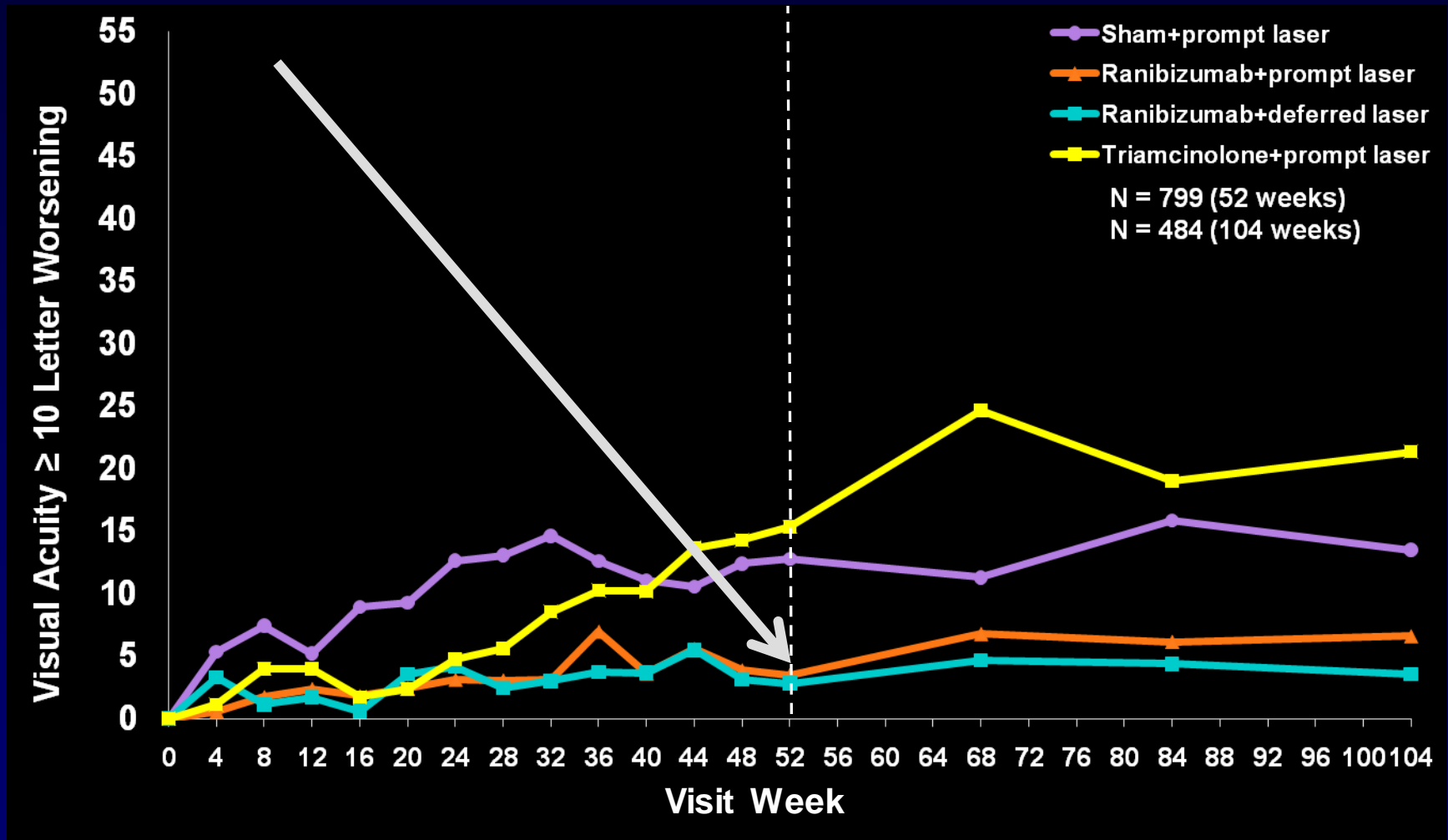
P-values for difference in mean change in visual acuity from sham+prompt laser at the 52-week visit:
ranibizumab+prompt laser <0.001; ranibizumab+deferred laser <0.001; and triamcinolone+prompt laser=0.31.

≥10 Letter Improvement in Visual Acuity at Follow-up Visits



P values for the difference in proportion of 10 letter improvement in visual acuity from sham+prompt laser at the 52-week visit: ranibizumab+prompt laser <0.001; ranibizumab+deferred laser <0.001; triamcinolone+prompt laser = 0.16

≥10 Letter Worsening in Visual Acuity at Follow-up Visits



P values for the difference in proportion of 10 letter worsening in visual acuity from sham+prompt laser at the 52-week visit: ranibizumab+prompt laser <0.001; ranibizumab+deferred laser =0.001; triamcinolone+prompt laser = 0.75

Reducing Impact of Diabetic Eye Disease

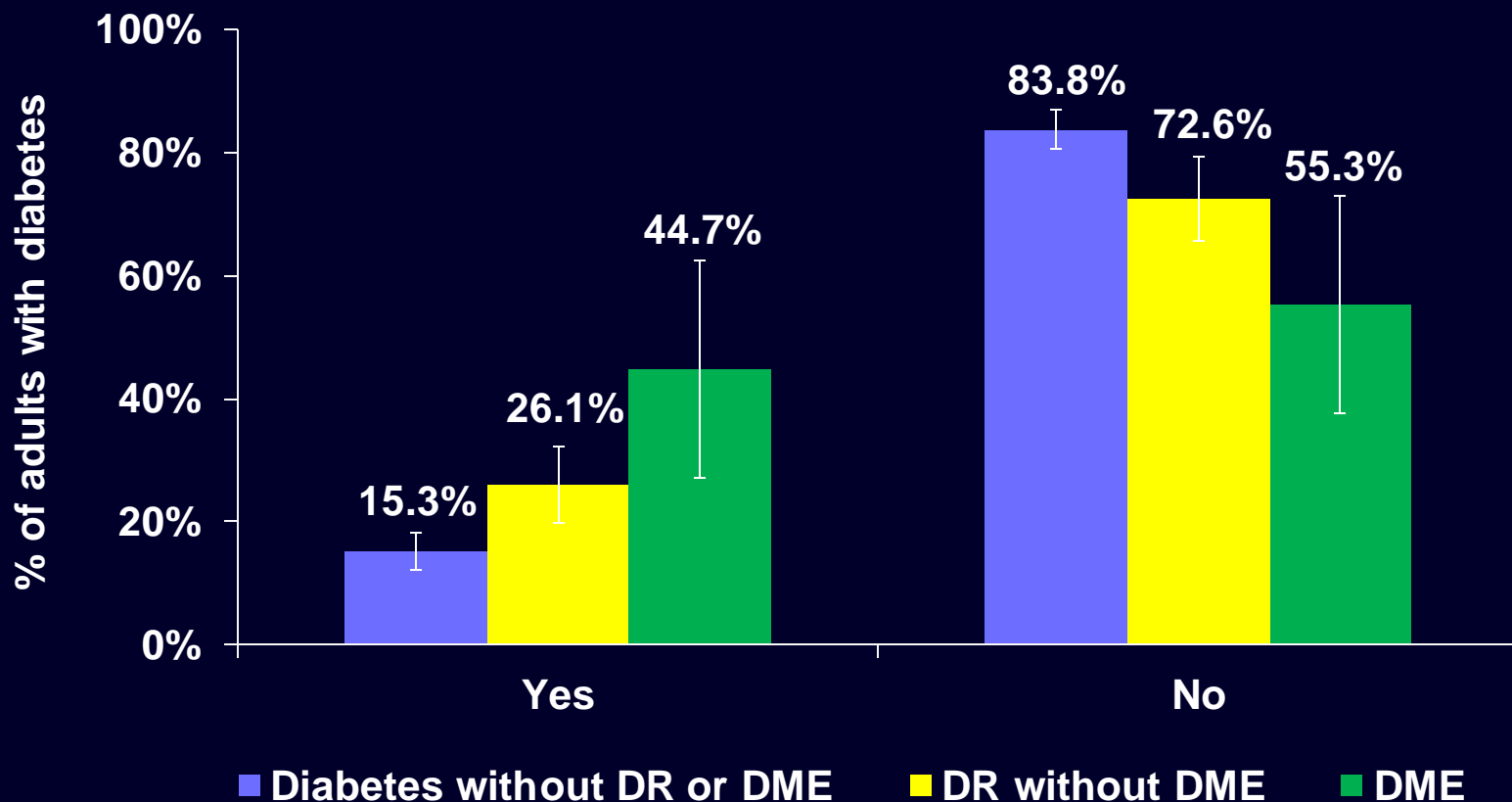
- Importance of eye disease in people with diabetes
- What is diabetic retinopathy?
- Prevalence
- Treatment
- Limitations to getting treatment

Methods: Definitions of Study Outcomes

- **Among those with self-reported diagnosis of diabetes:**
 - **"Have you been told by a doctor that diabetes has affected your eyes or that you had retinopathy?"**
 - **"When was the last time you saw a diabetes nurse educator, or dietitian or nutritionist for your diabetes?"**
 - **"When was the last time you had an eye exam in which the pupils were dilated? This would have made you temporarily sensitive to bright light."**

Awareness of Eye Diseases for U.S. Adults ≥ 40 years With Self-reported Diabetes

Have you been told by a doctor that diabetes has affected your eyes or that you had retinopathy?

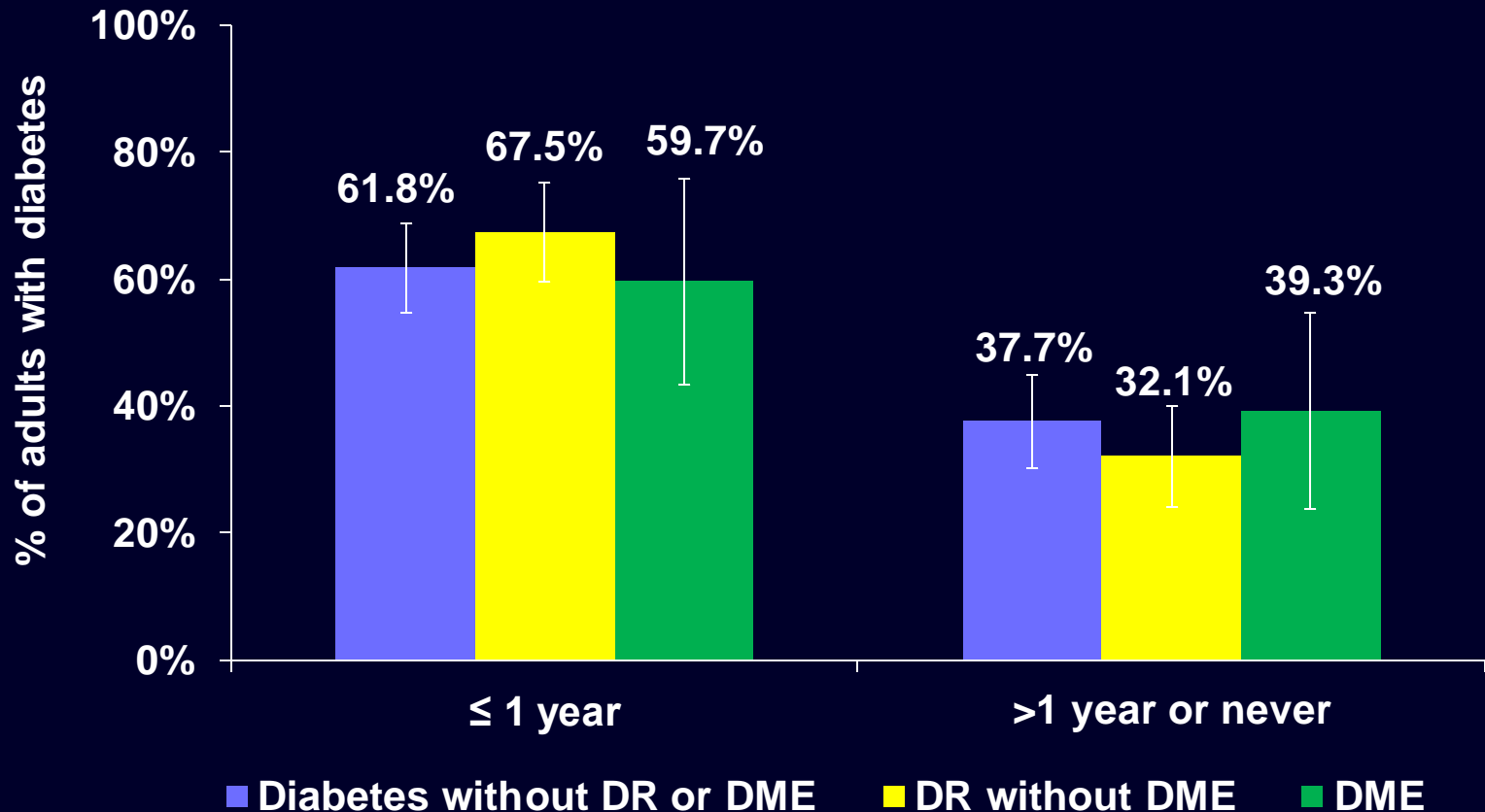


Error bars represent 95%CI's. If the total for each cohort does not equal 100%, the difference represents subjects who responded as "don't know" to this question (not shown).

Percentages reported are weighted; data for participants who responded "yes" for self-reported diabetes

Pupil Dilation Exam for U.S. Adults ≥ 40 years With Self-reported Diabetes

When was the last time you had an eye exam in which the pupils were dilated?



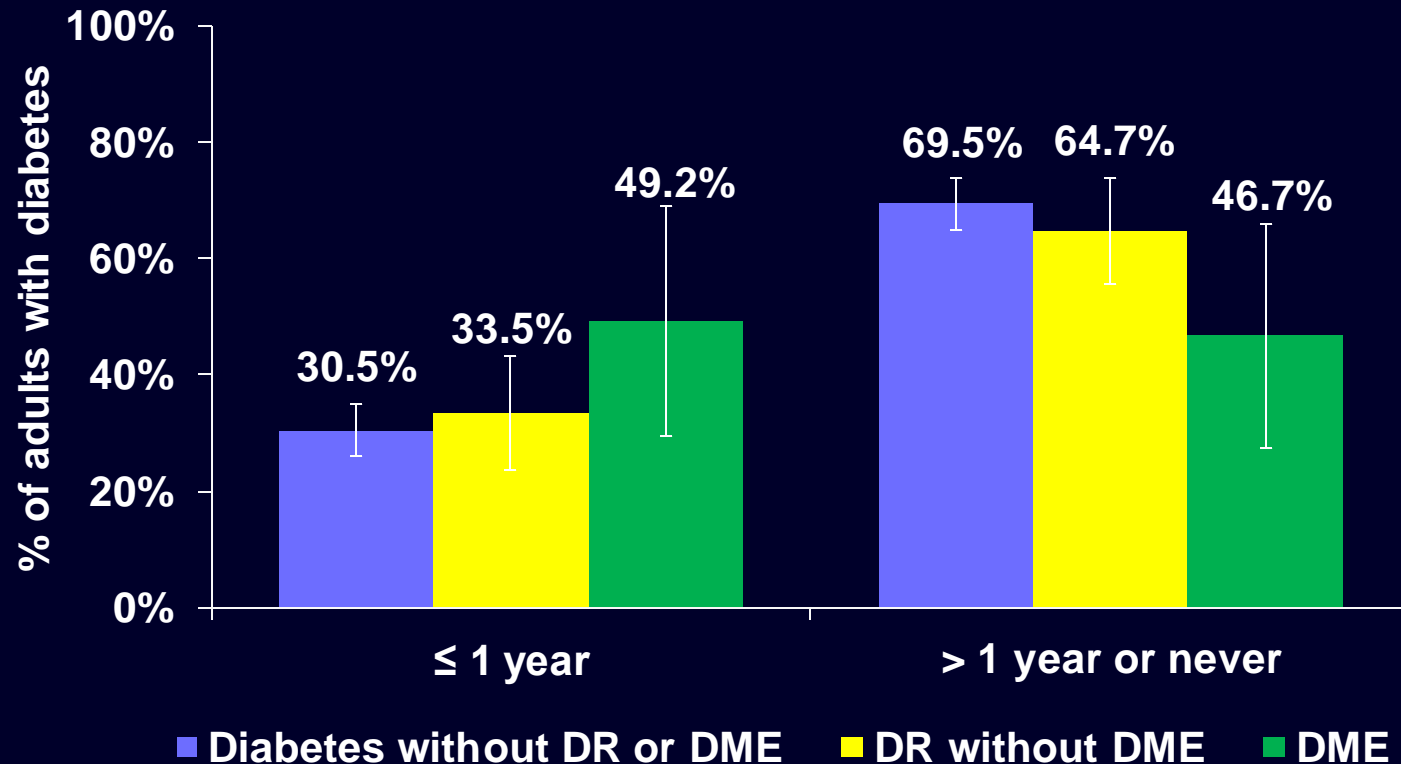
■ Diabetes without DR or DME ■ DR without DME ■ DME

Error bars represent 95% CI's. If the total for each cohort does not equal 100%, the difference represents subjects who responded as "don't know" to this question (not shown).

Data for participants who responded yes for self-reported diabetes

Visits to Diabetes Specialist for U.S. Adults ≥ 40 years With Self-reported Diabetes

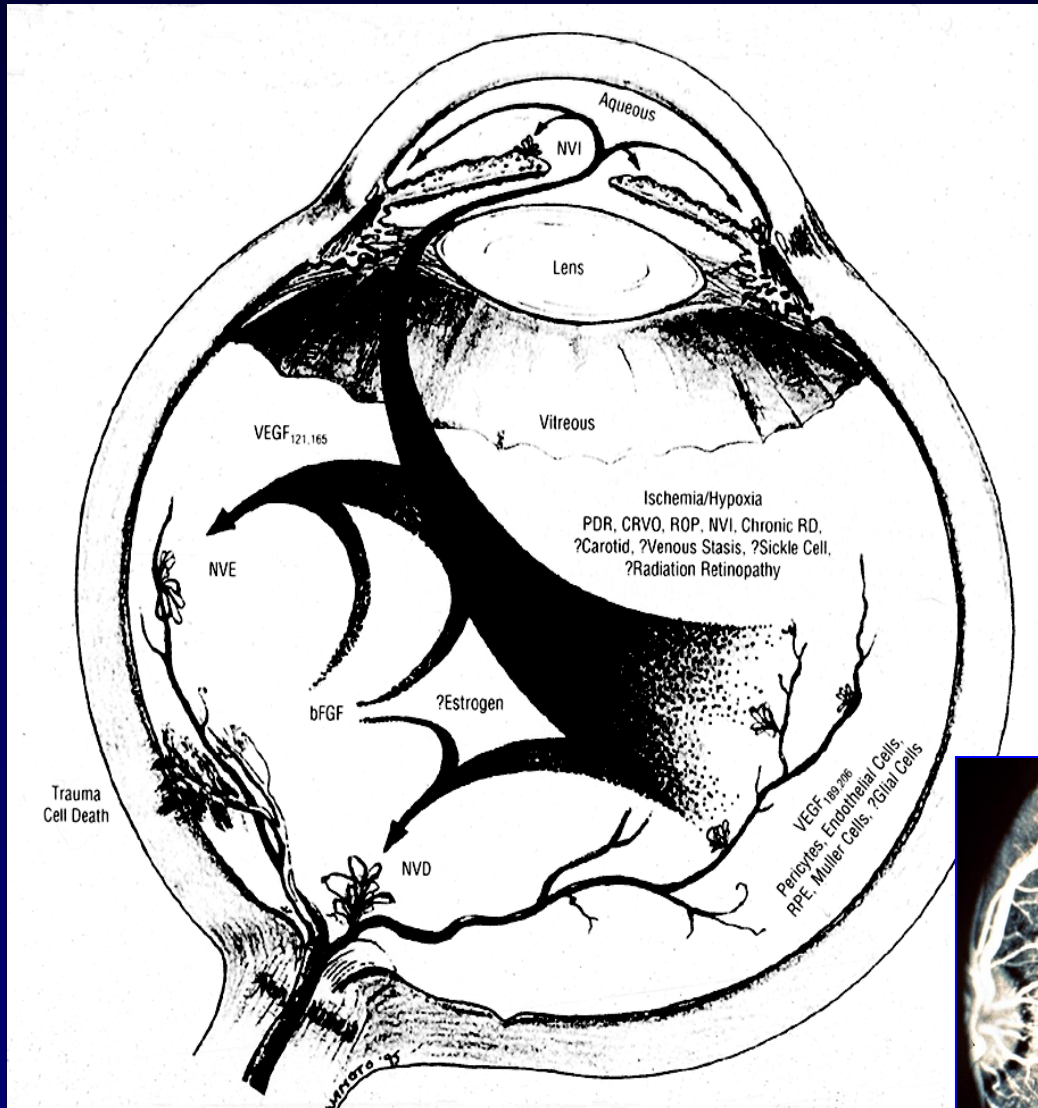
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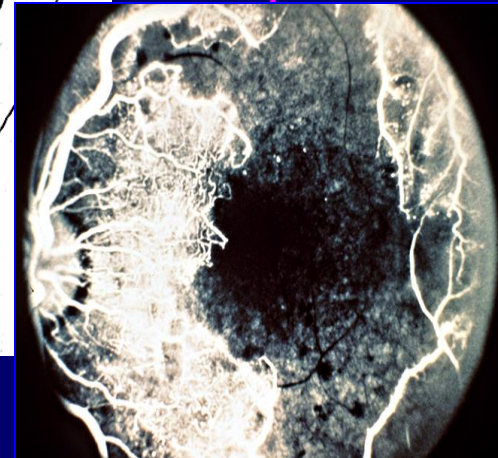
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Data for participants who responded yes for self-reported diabetes

Growth Factors in Diabetic Retinopathy



VEGF, GH,
IGF, FGF,
HGF, PDGF,
TGF, Ang,
ATII
&
many
more...



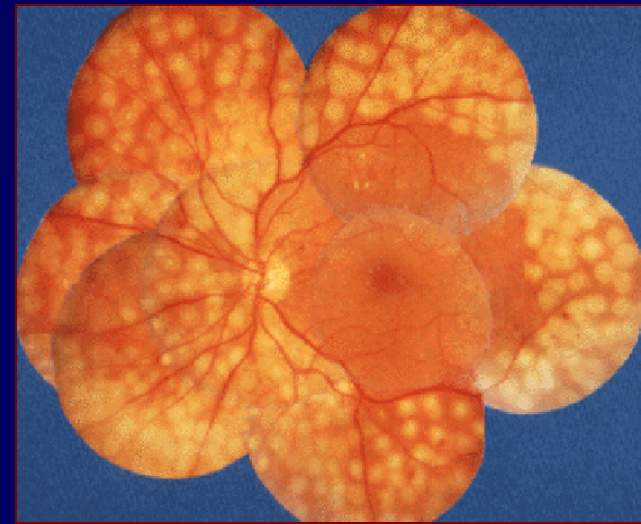
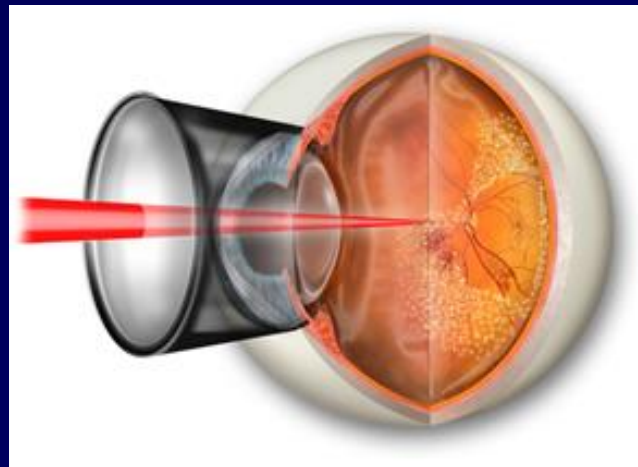
Panretinal Photocoagulation

- **Diabetic Retinopathy Study**

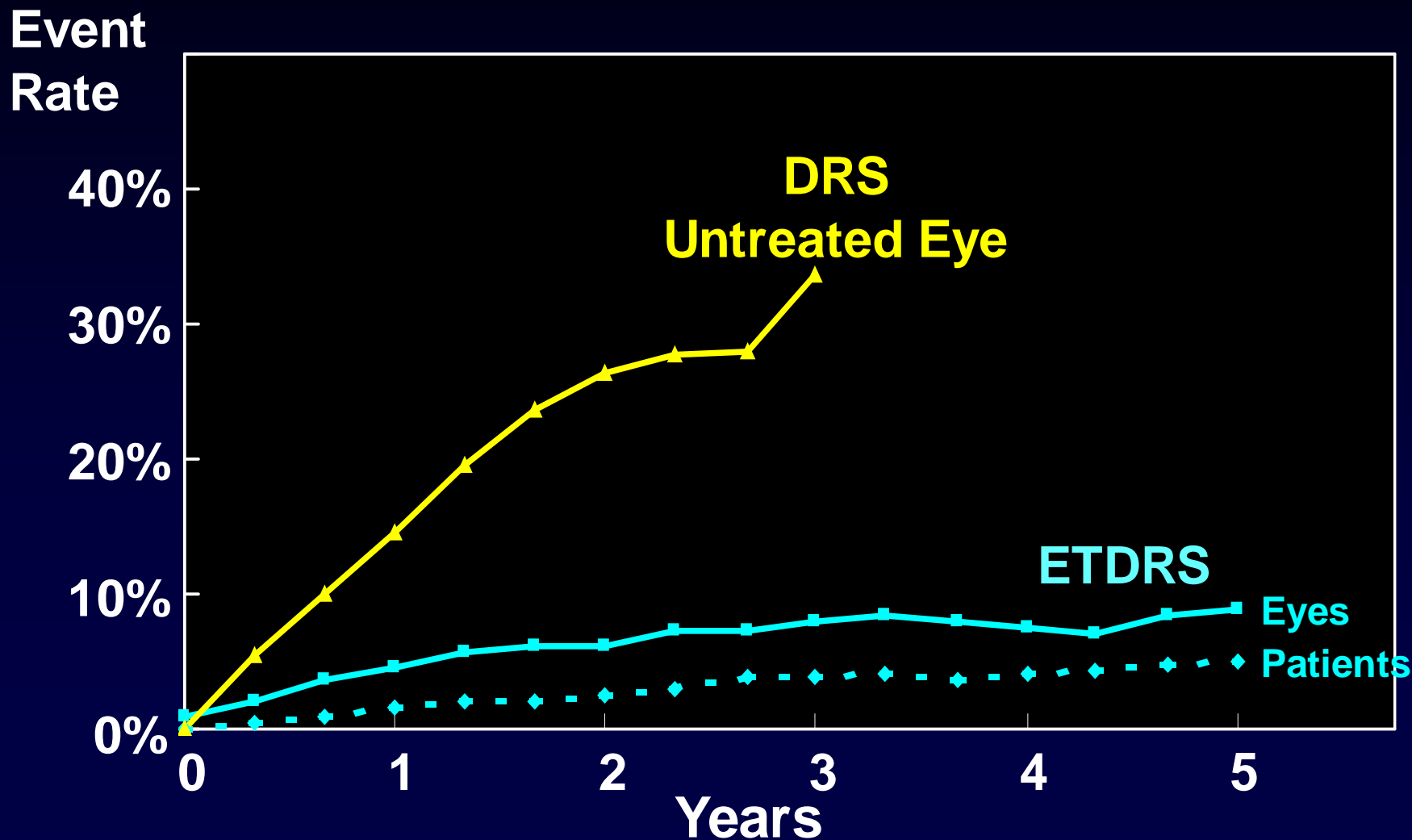
- Demonstrated that scatter photocoagulation reduced the risk of severe vision loss by $> 50\%$ compared to no treatment in eyes with high-risk PDR

- **Risks**

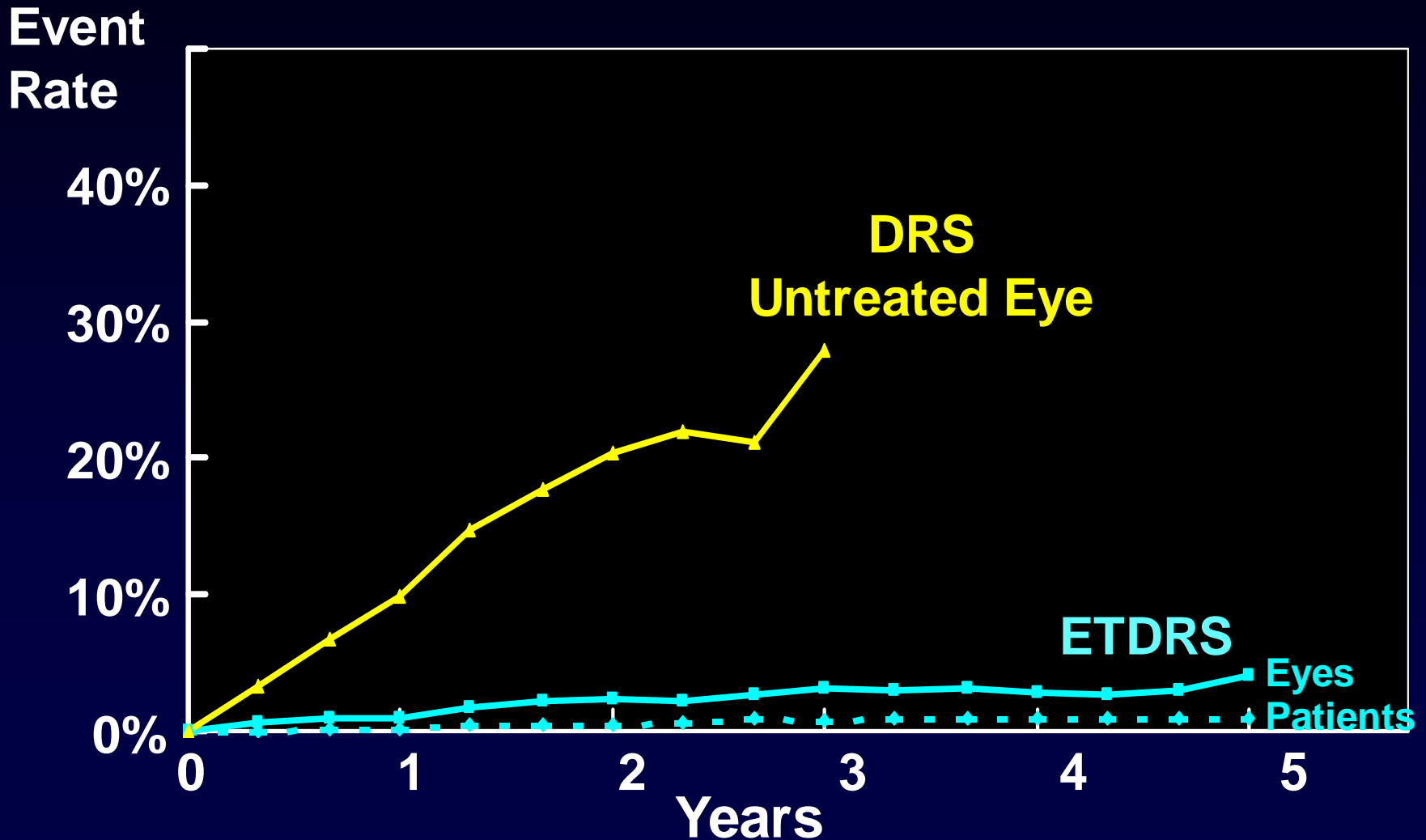
loss of
side &
night
vision



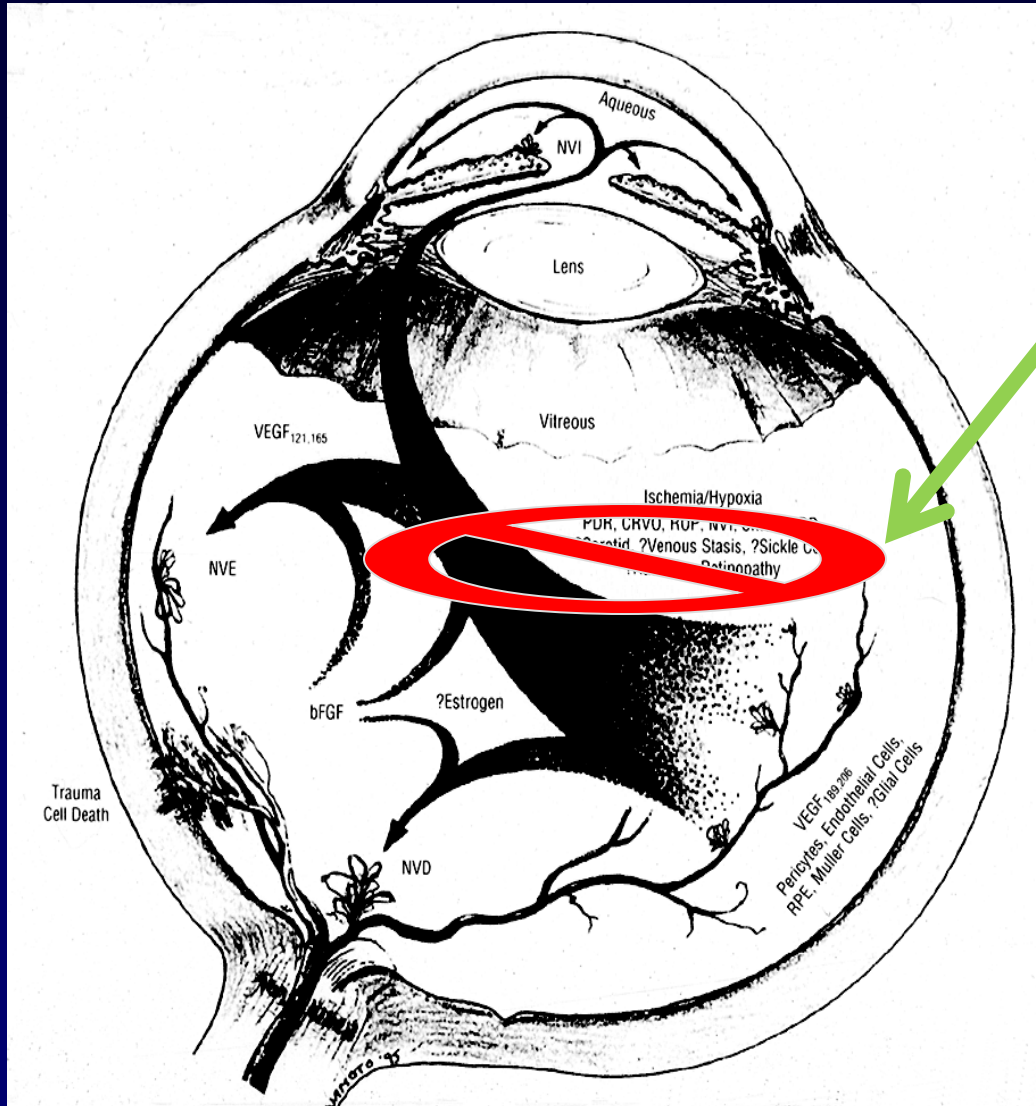
Risk of Visual Acuity 20/200 or Worse Eyes With Proliferative Retinopathy



Risk of Visual Acuity 5/200 or Worse Eyes With Proliferative Retinopathy



“Anti-”Growth Factor to Treat Diabetic Retinopathy



Intravitreal injection into middle cavity of eye

Positive Effects On:
Angiogenesis (blood vessel growth) and hyperpermeability (blood vessel leakage causing macular edema)

Reducing the Impact of Diabetic Eye Disease

We've Come a Long Way . . .

We Have a Long way to Go!

Thank You