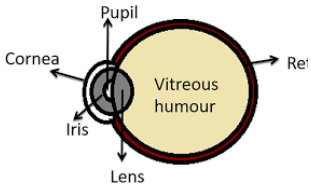
THE MANAGEMENT AND TREATMENT OF VITREOUS PATHOLOGY… WHAT'S NEW?

- A GUIDE TO EVERYTHING VITREOUS-RELATED!
- Timothy Earley, O.D.
- Northeast Ohio Eye Surgeons
- COPE Course # 89339-TD

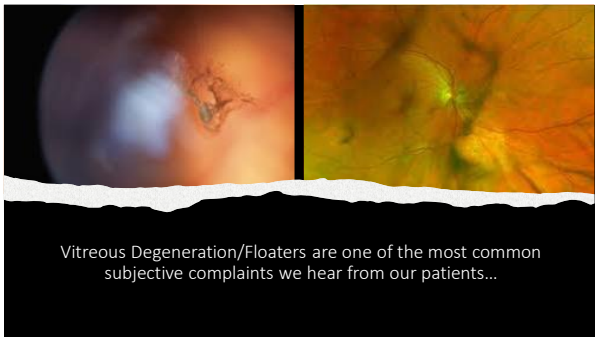
Disclosures:

- Dr. Tim Earley is a paid consultant/KOL for the following industry partners:
- Alcon, Notal Vision, MacuHealth, and LKC Technologies

WHAT DO WE KNOW ABOUT THE VITREOUS?



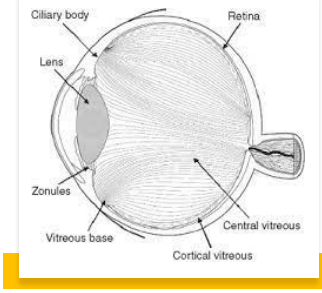
- WE TEND TO KNOW A GREAT DEAL ABOUT THE TISSUES WE TREAT THE MOST (THINK ABOUT THE CORNEA IN DED)
- ARE YOU ACTIVELY MANAGING AND TREATING YOUR PATIENTS' VITREOUS DISEASE?



Vitreous Degeneration/Floaters are one of the most common subjective complaints we hear from our patients…

What is the Vitreous Humor?

- Gel-like liquid between the lens and the retina
- Accounts for 80% of the eye's volume
- Is roughly 2-4x more viscous than water
- Receives the least attention of all ocular tissues on a comprehensive eye exam (I'm just guessing here!)

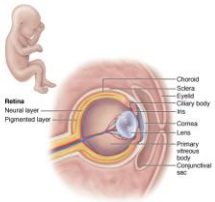


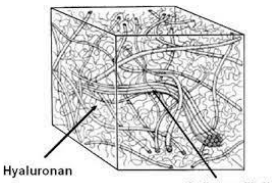
Primary Functions of the Vitreous:

- Maintains the Eye's Shape
  - Holds the Lens and Retina in Place
- Absorbs Shock:
  - Softness prevents injury
- Maintains Proper Oxygen Levels:
  - Aids in Distribution and reduces Oxidative Stress
- Assists in Vision:
  - Transparent; Allows for light flow to the Retina

DID YOU KNOW THAT WE ARE BORN WITH VITREOUS FLOATERS?

REMNANTS OF THE VESSEL THAT EXTENDS FROM THE ONH TO THE DEVELOPING CRYSTALLINE LENS BREAKS APART BEFORE WE ARE BORN – LEADS TO SUBTLE FLOATERS AND . IN SOME CASES, A MITTENDORF DOT!

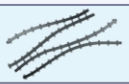




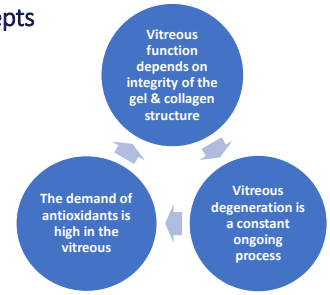
Components of the Vitreous Humor:

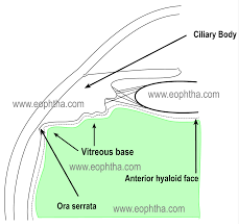
- Water! – 99% of the Tissue
- Collagen
- Salts (Electrolytes)
- Sugars (Glycosaminoglycans) such as Hyaluronan
- Proteins (Vitrosin)

Vitreous Degeneration

NORMAL	EARLY STAGE OF CLUMPS:	LATE STAGE OF CLUMPS AND DEGENERATION:
Loosely spaced network of collagen fibers provides wide spaces for hyaluronan to fill. These components function together to maintain the structure of the vitreous.	The formation of increased ties between collagen fibers reduces the space for hyaluronan to fill in.	Clumps of collagen fibers cast shadows on retina, which are perceived as floaters. Vitreous structure is weakened as collagen network breaks down.
	→ → →	

Key Concepts





RELATIONSHIP TO ADJACENT OCULAR TISSUES:

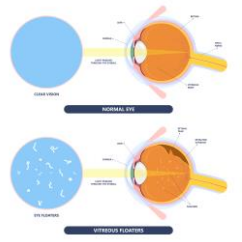
- **MORE TIGHTLY ADHERENT TO:**
- VITREOUS BASE (ORA SERRATA)
- OPTIC NERVE HEAD
- LENS CAPSULE
- MACULA

- THESE TIGHTER ATTACHMENTS CAN LEAD TO TRACTIONAL ISSUES DURING THE NORMAL AGING OF THE VITREAL TISSUE

FLOATERS!!

- PREVALENCE: 76% of respondents in a 2013 study (603 total) reported having floaters
- 33% reported the floaters as causing impairment of vision
- Survey respondents used a smartphone app survey – prevalence was not affected by age, sex, race or eye color
- However, myopes were 3.5x more likely and hyperopes 4.4x more likely to report the floaters as being moderate to severe (vs. those with little to no refractive error)

What Are Floaters?



As we age, changes occur inside the vitreous: **collagen fibers tend to clump together and cast tiny shadows on the retina.**

These shadows cause **small specks or clouds moving through one's field of vision.**

Floaters can have different shapes, such as little dots, circles, lines, clouds or cobwebs. The are often seen more clearly when looking at a plain background, such as a blank wall.

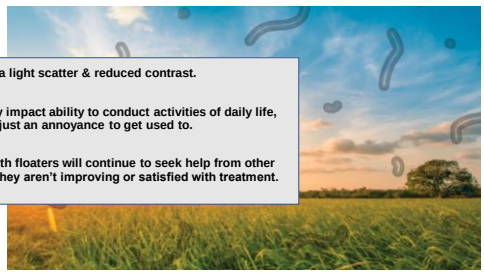
Stages of Vitreous Degeneration

Normal	Fibril degeneration	Extensive liquefaction	Acute posterior vitreous detachment	Complete posterior vitreous detachment
In a healthy state, the vitreous is composed of loosely spaced collagen fibers with plenty of space between.	As we age, and exacerbated by some conditions, the fibers begin to clump together, and can cause floaters. This clumping is called *glycation*.	Now these collagen fibers which were spaced out and helped to maintain the structure of the vitreous, are clumping together, and the vitreous begins to lose its shape and shrink, this is called liquefaction.	This liquefaction or shrinking, of the vitreous can ultimately result in PVD – posterior vitreous detachment.	

SIZE AND SEVERITY INFLUENCED BY:

- AGE OF ONSET
- LOCATION IN THE EYE
- DENSITY
- CAUSES
  - TRAUMA
  - AGING
  - SURGERY (CATARACT, RETINAL, YAG)

Floaters Impact Patient Lives



Cause extra light scatter & reduced contrast.

Can greatly impact ability to conduct activities of daily life, more than just an annoyance to get used to.

Patients with floaters will continue to seek help from other doctors if they aren't improving or satisfied with treatment.

Floater Risk Factors:

- **Age: degeneration due to cumulative oxidative stress, along with natural decline in protective nutrients (Supplement?)**
- **Myopia: eye's elongated shape increases likelihood of vitreous degeneration and sudden onset of PVD**
- **Diabetes: sugar, high levels of inflammation contribute to oxidative stress –increased rate of degeneration**
- **Eye trauma: Injuries/Concussions may cause bleeding into the jelly-like vitreous, leading to blurred vision and floaters**

FLOATERS: TRIAGE THIS COMMON COMPLAINT

- FLOATERS WITH ASSOCIATED FLASHING LIGHTS = TRUE OCULAR EMERGENCY
- SUDDEN ONSET OF FLOATERS WITH NO LIGHT FLASHING – URGENT; WE SEE THE PATIENT IN 1-3 DAYS
- NEED TO HAVE PATIENT ARTICULATE THE ONSET/LOCATION/DURATION OF THE FLOATERS
- CHART REVIEW FOR RISK FACTORS:
  - PREVIOUS RETINAL HOLES/TEARS
  - HIGH MYOPIA
  - PREVIOUS OCULAR TRAUMA

POSTERIOR VITREOUS DETACHMENT

ONE OF THE MOST COMMON VITREAL CASES WE SEE

MAY LEAD TO MORE SERIOUS ISSUES:

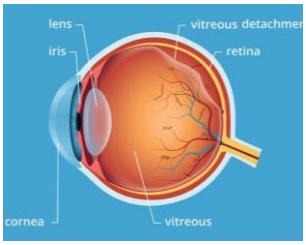
*RETINAL TEARS

*RETINAL DETACHMENT

*VITREOUS HEMORRHAGE

*SUBJECTIVE MENTAL DISTRESS

(SIGNIFICANT FLOATERS HAVE BEEN SHOWN TO CAUSE SUICIDAL IDEATION IN EXTREME CASES)



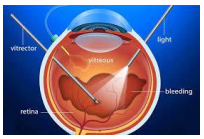
VITREOUS DEGENERATION OR SYNERESIS SEQUELAE:

- FLOATERS/STRANDS
- WEISS' RING
- VITREOUS HEMORRHAGE (INCREASES RISK FOR RETINAL TEARS AND DETACHMENT)
- RETINAL HEMORRHAGE
- ONH HEMORRHAGE
- RETINAL TRACTION (COMMON)
- RETINAL TEAR (8-15% OF SYMPTOMATIC PVDS)
- RETINAL DETACHMENT (INCIDENCE IN GENERAL POPULATION OF 1 IN 10,000 OVER LIFETIME)

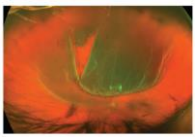
YA GOTTA KNOW WHEN TO HOLD 'EM.....

AND WHEN TO REFER THEM OUT!!!

GET TO KNOW YOUR VITREORETINA SURGEON(S)!



THEY WILL HAVE GUIDELINES FOR TIMELY REFERRAL FOR TREATMENT

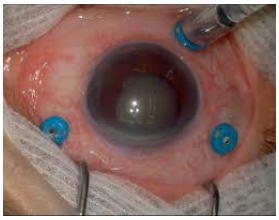


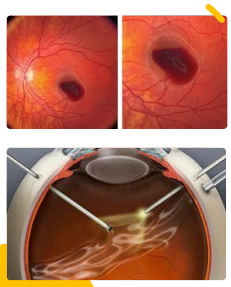
TO TREAT OR NOT TO TREAT...THAT IS THE QUESTION!

- SEVERAL TREATMENTS EXIST
- DEPENDENT UPON LOCATION AND SEVERITY OF FLOATERS
- RISK/BENEFIT CONSIDERATIONS

VITRECTOMY INDICATIONS

- TYPICALLY USED AS A LAST RESORT OR IN SEVERE CASES
- VERY DELICATE SURGERY
- REPLACE VITREOUS WITH A SYNTHETIC SUBSTITUTE
- OFTEN RESERVED FOR NON-RESOLVING VITREOUS BLEEDS AND DENSE CENTRAL FLOATERS
- USED FOR LARGE, DENSE, CENTRAL FLOATERS AFFECTING FIXATION/VA AND IN CASES WITH HIGH-RISK VITREAL/RETINAL ADHESION OR TRACTION

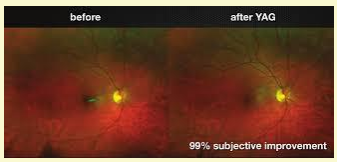




VITREOUS HEMORRAGE IN VISUAL AXIS:

- THREE PORTS TYPICALLY USED
- ONE IS USED TO MAINTAIN CONSISTENT IOP
- ONE USED TO PROVIDE A LIGHT SOURCE
- ONE FOR THE VITRECTOR THAT ACTIVELY REMOVES CELLS/BLOOD LIKE A LITTLE VACUUM!

VITREOLYSIS INDICATIONS:



- USED WHEN FLOATER IS LARGE, CENTRAL, AND IS AFFECTING VISION
- MAY ALLOW PATIENT TO AVOID THE NEED FOR MORE INVOLVED AND RISKY VITRECTOMY
- USES A YAG LASER
- BREAKS LARGE FLOATER INTO TINY FRAGMENTS THAT ARE LESS LIKELY TO CAUSE VISUAL DISTURBANCE

EXAMPLE OF A LARGE, DENSE, CENTRALLY LOCATED FLOATER THAT RESPONDED NICELY TO YAG VITREOLYSIS

- 57 YO Caucasian male
- S/P PRK 19 years prior
- Had a spontaneous PVD with subsequent retinal tear
- Was left with large floater; did not resolve/settle after 8 months
- Had YAG Vitreolysis with near total resolution – patient happy!

SURGICAL INTERVENTION IS GREAT…

BUT WHAT CAN OPTOMETRISTS DO TO TREAT FLOATERS? UNTIL RECENTLY, WE HAD NO OPTIONS.

The Vitreous & Nutrition

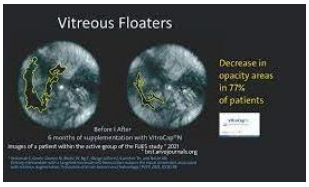
Specific micronutrients are present within the vitreous, which help to maintain optimum health and function.

As with the rest of the body, the vitreous encounters oxidative stress throughout life, which contributes to its structural breakdown.

This oxidative stress, coupled with a natural decline in protective nutrients, contributes to glycation, the clumping of collagen fibers. This results in the loss of transparency & integrity of the vitreous.

Based on the FLIES Study, we know that antioxidant and antiglycation nutrients can be replenished inside the vitreous, improving floater symptoms.

MUCH LIKE THE AREDS STUDY SHOWED US THAT SUPPLEMENTATION CAN BE HELPFUL IN AMD…



- The FLIES Study showed a significant reduction in floaters both subjectively and clinically
- FLIES: Floater Intervention Study
- Goal of FLIES: Supplementation for the reduction of visual disturbances associated with vitreous floaters

FLIES Study Design:

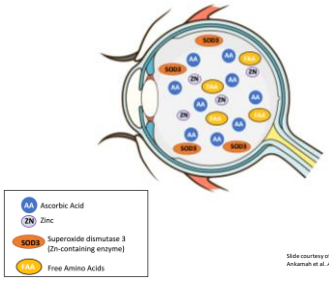
- Enrolled patients age 18 and over with subjective complaints of floaters
- Randomized, single-site, double-blind, placebo-controlled study
- 61 patients were studied over 6 months
- Outcome measure: change in floater disturbance using a subjective questionnaire
- Also compared color fundus photos using a Zeiss VisuCam images at baseline and at 6 months
- Start date 1/2/2017; ended 12/31/2018

A Scientifically Proven Solution

- FLIES is the first trial to investigate nutritional supplementation in floater sufferers in a double-blind, placebo-controlled design.
- **First and only natural, non-invasive solution to treat floaters.**

Ankamah, E., et al. (2021). Dietary Intervention With a Targeted Micronutrient Formulation Reduces the Visual Discomfort Associated With Vitreous Degeneration. Translational vision science & technology, 10(12), 19. https://doi.org/10.1167/tvst.10.12.19

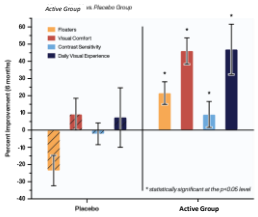
Essential Micronutrients



Micronutrient	Concentration
Ascorbic Acid	2mmol/L
Zinc	1.95µmol/L
L-Lysine	115µM

Slide courtesy of John Nolan, PhD
Ankamah et al. Antioxidants. 2020;7

FLIES Clinical Study Results



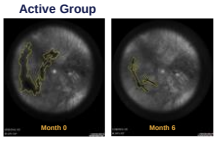
Within six months, 67% of patients recognized improvements in their symptoms.

- **22% decrease in floater area**
- **46% decrease in visual discomfort**
- **9% improvement in contrast sensitivity**
- **47% improvement in daily visual experience**

Ankamah et al. 2021. doi.org/10.1167/tvst.10.12.19

Impact on Floater Area

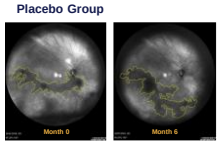
Active Group



Vitreous opacity area **reduced** with intervention
(368.31 cm² to 109.43 cm²) *Active group average 22% decrease*
70% decrease in size

vs.

Placebo Group



Vitreous opacity **increased** with no intervention
(394.12 cm² to 599.09 cm²) *Placebo group average 24% increase*
52% increase in size

Ankamah et al. 2021. doi.org/10.1167/tvst.10.12.19

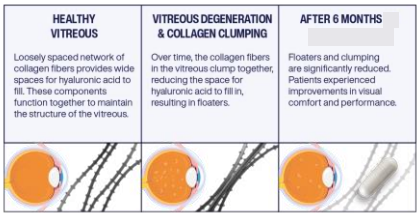
How does it work?

- **Functions to counteract the mechanisms of vitreous degeneration, which create floaters.**

Key Actions are :

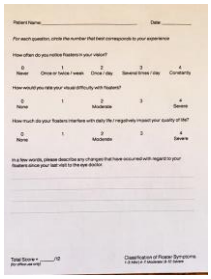
Reduction of collagen glycation
Reduction of oxidative stress within vitreous
Increase of antioxidant protection

How it works:



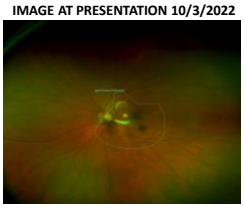
I BEGAN PRESCRIBING VITREOUS SUPPLEMENTS IN SUMMER OF 2022

- Suggested the supplement with a complaint of chronic floaters or a recent onset of visually significant floaters
- Followed patients with a subjective questionnaire at start of supplementation and again at 2-6 months
- 72% of patients (n=18) saw subjective improvements in initial 6 months

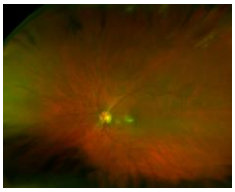


PATIENT WITH RECENT ONSET OF PVD, OS

IMAGE AT PRESENTATION 10/3/2022



SAME EYE ON 11/4/2022 POST SUPPLEMENTATION



Remember, Not All Floaters Are Created Equal!

FUTURE OF SUPPLEMENTATION FOR FLOATERS:

- **RESEARCH IS ONGOING** – New data suggest a possible link between supplementation and increased phagocytosis activity (macrophage activity) in the vitreous space!
- MAKES LOGICAL SENSE THAT DELAYING THE AGING OF THIS TISSUE WITH PROACTIVE AND PREVENTIVE THERAPY IS EFFECTIVE
- PATIENTS WITH POSITIVE OUTCOMES CONTINUE TO TAKE THE SUPPLEMENT (AFTER THE 6 MONTH TIMEFRAME OF THE STUDY)

THANK YOU!!!

Tim Earley, O.D.
Northeast Ohio Eye Surgeons
drtimearley@gmail.com
(330)722-2150