"OVS PRESENTS:
Age-Related Macular Degeneration"

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Disclosure Statement
Nothing to disclose

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OVS PRESENTS:
Age-Related Macular Degeneration

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Based on August 2014 OVS Feature Issue: AMD

Highlights and Course Overview

1. Vision Function, Quality of Life, Low Vision
   Questions/clicker and PANEL 1

2 & 3. Retina and Animal Models
   Questions/clicker and PANEL 2

4. Treatment, Management, & Risk Factors
   Questions/clicker and FINAL PANEL 3: All Instructors

1. Vision Function, Quality of Life, Low Vision

Quality of Life: AMD

Mark Swanson OD MSPH FAAO
Professor of Optometry
University of Alabama in Birmingham
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Divergence in the Lived Experience of People with Macular Degeneration
McCloud, Christine; Khadka, Jyoti; Gillham, Jagjit Singh; Pena, Adrienne; Komadtf
Optometry & Vision Science
August 2014, Volume 91, Issue 8, p 966-974
**What Patients Can Tell You**

Divergence in the Lived Experience of People with Macular Degeneration (McCloud et al OVS 91:96)

- Most of visual disability with AMD is associated with exudative AMD
- Visual disability with advanced macular degeneration is associated with psychological distress, depression, limited self care and loss of independence
- Anti-VEGF is a game changer for disease treatment, it has resulted in 50% reduction in incidence of blindness in Denmark due to AMD
- Has it resulted in a change in the life experience of AMD patients?

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**1. Vision Function, Quality of Life, Low Vision**

AMD and lighting: precision walking & curb negotiation

Susana Chung OD PhD FAAO
Professor of Optometry
School of Optometry
University of California, Berkeley
California

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**Divergence in the Lived Experience of People with Macular Degeneration**

- Before Anti-VEGF potential for treatment and cure was considered “false hope”
- Qualitative study identified four major themes among AMD patients
  - Cautious optimism
  - Endurance
  - Adaptation
  - Profound Loss

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**Alexander MS, et al. Effect of Ambient Light and Age-Related Macular Degeneration on Precision Walking**

Effect of Ambient Light and Age-Related Macular Degeneration on Precision Walking
Alexander, M. Scott; Lajoie, Kim; Neima, David R.; Strath, Robert A.; Robinovitch, Stephen N.; Mangold, Daniel S.
Optometry & Vision Science
August 2014 - Volume 91 - Issue 8 - p 990-999
Compared with controls, AMDs step with less accuracy and precision in reduced lighting conditions while walking.
Could lead to increased incidence of falls.
Remedy: visually enhancing public environments, e.g. high-contrast strips, enhanced lighting.

Rationale & Approach

"Color Vision Deficits in Intermediate Age-Related Macular Degeneration."
Laura E. Downie, Ada S. Cheng, and Algis J. Vingrys; OVS 2014:91:932-938

- Can color vision be used to detect AMD patients?
  Cone thresholds in L-, M- & S-cone contrast space
  10 people having AMD (age 69-78)
  10 age similar controls (age 67-78)
  4 young normals (age 18-36)

Tests
1. 3 degree foveal spots
2. 600 msec duration: 30 s per threshold
3. considered effects of lens changes by simulating cataract in 4 young observers
1. Vision Function, Quality of Life, Low Vision

Dark adaptation in patients with AMD

Algis Vingrys OD PhD FAAO
Professor of Optometry
Department of Optometry
University of Melbourne
Australia

Twelve-Month Natural History of Dark Adaptation in Patients with AMD
Jackson, Gregory R; Clark, Mark E; Scott, Ingrid U; Walter, Laura E; Quillen, David A.; Brigell, Mitchell G.
Optometry & Vision Science: August 2014 - Volume 91 - Issue 8 - p 925-931

Clinically relevant findings

NO change in AREDS fundus grade or VA (ETDRS)
5 of 26 (19%) AMD subjects showed increased delay (RI) after 12 months (3.4 to 13 mins)
1 subject (4%) got faster (by 11 mins)
Indicates that a DA assay is abnormal in 77% AMD cases & can be used to monitor patients

Take home messages:
1. Need to combine structure & function to give fuller account of AMD on retina
2. DA can be used for this purpose but takes a long time (7-45 mins per eye) to achieve outcome
3. Need for a fast reliable assay of vision in AMD

Rationale & approach

“12-month natural history of dark adaptation in patients with AMD.”
Gregory Jackson, Mark Clark, Ingrid Scott, Laura Walter, David Quillen, Mitchell Brigell
OVS 2014;91.925-931

To see if dark adaptation can be used to monitor AMD as an end-point for clinical trials

Measure recovery index (RI) following bleach in groups of AMD patients
26 people having AMD
6 age similar controls
Patients followed at 0, 6 & 12 months with
1. retinal photos & AREDS grade
2. RI of DA
3. EDRS VA.

PANEL 1

- Vision Function, Quality of Life, Low Vision
2 & 3. Retina & Animal Models

Erica Fletcher OD PhD FAAO
Professor of Anatomy
University of Melbourne
Australia

Laura Downie OD PhD FAAO
Department of Optometry
University of Melbourne
Australia

In vivo imaging and early AMD

- **Rationale:** Can adaptive optics scanning laser ophthalmoscopic imaging detect photoreceptor changes in people of high genetic risk of AMD?

- **Approach:** N=40, >50yrs
  Calculated genetic risk and performed a range of imaging.

2 & 3. Retina & Animal Models

Retina
Cone Structure and Genetic Relative Risk for AMD

Erica Fletcher BScOptom MS PhD FAAO
Associate Professor of Anatomy & Neuroscience
University of Melbourne
Australia

Cone Structure in Subjects with Known Genetic Relative Risk for AMD
Land, Megan E; Cooper, Robert F; Young, Jonathan; Berg, Elizabeth; Kitchner, Terri; Xiang, Gun; Stobbs, Arab; Ivacic, Lynn C; Stepien, Kimberly E; Page, C. David; Carroll, Joseph; Connor, Thomas; Brilliant, Murray
Optometry & Vision Science
August 2014 - Volume 91 - Issue 8 - p 939-949

In vivo imaging and early AMD: Results

- High genetic risk did not predict the drusen.

- Reduced cone density.

- In vivo imaging useful for identifying early changes in photoreceptors.
2 & 3. Retina & Animal Models

Retina:
Reticular Pseudodrusen in AMD

Laura Downie OD PhD FAAO
Department of Optometry
University of Melbourne
Australia

Reticular Pseudodrusen in Age-Related Macular Degeneration
Hogg, Ruth Esther
Optometry & Vision Science:
August 2014 - Volume 91 - Issue 8 - p 854-859

"Reticular pseudodrusen in age-related macular degeneration"
Ruth E. Hogg
Royal Victoria Hospital, Belfast, Ireland, UK. Optom Vis Sci 2014;91(8): 854-9

- Rationale
  - Review of Reticular Pseudo-Drusen (RPD) in AMD
  - sub-retinal deposits located internal to the RPE
  - contrast to typical drusen (deposits between Bruch’s membrane and RPE)

RPD Drusen

FAF
Color
OCT

Adapted Hogg, Optom Vis Sci 2014;91(8): 854-9

- Clinical take home messages
  - Better RPD detection using multiple imaging modalities
    - color photography 38% sensitivity
    - SD-OCT and FAF/IR
  - Risk factors for RPD
    - smoking
    - higher body mass index
    - female
  - Strong relationship between RPD and development of late AMD
    - neovascular versus geographic atrophy is uncertain
    - RPD located outside macular area gives higher risk for progression to late AMD
  - Future developments for differential diagnosis
    - adaptive optics and phase-variance OCT

2 & 3. Retina & Animal Models

Animal Models : AMD

Erica Fletcher BScOptom MS PhD FAAO
Associate Professor of Anatomy & Neuroscience
University of Melbourne
Australia

Studying Age-Related Macular Degeneration Using Animal Models
Fletcher, Erica L; Jobling, Andrew J; Greferath, Ursula; Mills, Samuel A; Waugh, Michelle; Ho, Tracy; de Jongh, Robb U; Phipps, Joanna A; Vessey, Kirstan A
Optometry & Vision Science:
August 2014 - Volume 91 - Issue 8 - p 878-886
Mechanisms leading to early AMD

- Early signs of AMD can be modelled in animal models.
- Genetic and environmental influences.
- Changes in Bruch’s membrane
  — Lipid transport

Understanding the mechanisms of early AMD

- Immune regulators
- Oxidative stress

4. Treatment, Management, & Risk Factors

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Nutrition and Age-Related Macular Degeneration: Research Evidence in Practice
Drawne, Laura E; Valler, Peter R Optometry & Vision Science: August 2014 - Volume 91 - Issue 8 - p 821-831
4. Treatment, Management, & Risk Factors

Nutrition and AMD: Evidence-Based Studies

Laura Downie PhD FAAO
Department of Optometry
University of Melbourne
Australia

• Clinically relevant take home messages
  Evidence-based recommendations
  
  **Case Scenario 1**: Early AMD in a non-smoker
  
  **Case Scenario 2**: Intermediate AMD in a smoker
  - Smoking is the most important modifiable risk factor for AMD (Thornton et al., Eye [Lond] 2005;19:935-44)
  - Position on replacing beta-carotene with lutein + zeaxanthin in AMD nutritional supplements is controversial (AREDS2 study group, JAMA Ophthalmol, 2014)
    - beta-carotene should be avoided in current smokers and asbestos workers due to potential risk of lung cancer
  
  Important to comprehend the research limitations regarding nutrition and AMD, when providing advice to web-savvy patients.

“Nutrition and age-related macular degeneration: research evidence in practice”
Laura E Downie and Peter R Keller
Optom Vis Sci 2014;91(8):821-31

• Rationale
  - Evaluates evidence for the role of nutrition in modifying the natural history of AMD

• Approach
  - Part 1: Framework for evidence-based care
    - Types of evidence
      - Clinical trial design
    - Classification of AMD
      - Five-stage (Beckman Initiative)
  - Part 2: Evidence-based clinical application
    - Case scenarios

<table>
<thead>
<tr>
<th>AMD Classification</th>
<th>Definition</th>
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<tbody>
<tr>
<td>No aging changes</td>
<td>No drusen and no pigment abnormality</td>
</tr>
<tr>
<td>Normal aging</td>
<td>Only drusen (106μm) and no pigment abnormality</td>
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<tr>
<td>Early AMD</td>
<td>Medium drusen (106-214μm) and no pigment abnormality</td>
</tr>
<tr>
<td>Intermediate AMD</td>
<td>Large drusen (&gt;214μm) and/or any pigment abnormality</td>
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<tr>
<td>Late AMD</td>
<td>Neovascular AMD and/or Geographic atrophy</td>
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(Adapted from Ferris et al., Ophthalmology 2013;120:844-51)

4. Treatment, Management, & Risk Factors

Smoking and AMD

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Smoking Deception and Age-Related Macular Degeneration
Swanson, Mark W.
Optometry & Vision Science:
August 2014 - Volume 91 - Issue 8 - p 865-871
Smoke Gets in Your Eyes
Smoking Deception and Macular Degeneration (Swanson MW OVS 91:85)

- Smoking in US peaked in mid 1960's, slightly less than 20% of US population currently smokes, varies substantially globally.
- Most but not all studies show an increase in ARMD prevalence and severity with smoking.
- Minimal smoking cessation counseling by professionals increases quit rates.
- Smoking status is required as documentation for PQRI and EHR meaningful use.

4. Treatment, Management, & Risk Factors
Self-monitoring of AMD


Smoking Deception and Macular Degeneration

- All studies of smoking and AMD have relied on self-report, they typically divide groups in current, former and never smokers.
- This study looked at smoking deception which is failing to self identify as a smoker.
- How you ask matters.
- About 1 in 20 reported non-smokers had biochemical markers associated with smoking.
- Higher likelihood among reported former smokers.

- The instrument currently recommended for self-assessment.
- “Simple and easy”.
- High false-negative: fail to detect the presence of early retinal lesions.
- Difficult to administer the test properly.
- The redundancy of multiple grid lines encourages perceptual filling-in, masking retinal distortion and small scotomas.

Good tests for self-assessment

- Less or no redundancy of information.
- Robust to modest amounts of image degradation and minimal effects due to normal aging.
- Easy to administer and for patients to understand.
- High sensitivity and specificity.
- Can be put on portable electronic devices such as an app.

Erica Fletcher OD PhD FAAO
Susana Chung OD PhD FAAO

Laura Downie OD PhD FAAO
Mark Swanson OD PhD FAAO
Algis Vingrys OD PhD FAAO

Full Panel 3.
Comments/Questions

Moderator: Tony Adams

PANEL 2

4. Treatment, Management, & Risk Factors

We thank you