# Let's not wait for injections: Targeted, safe and effective Macular Pigment supplementations protects and enhances vision in patients with AMD

John Nolan, PhD john@nowscience.ie

## **Description:**

This course will teach the eyecare professional how to use targeted nutrition to enrich macular pigment, enhance visual function and potentially reduce risk of retinal diseases, including age related macular degeneration (AMD). This course will also demonstrate the importance of measuring contrast sensitivity when assessing visual function. The presenter will describe the current prevalence of ocular diseases specific to the retina, and describe the challenges relating to retinal ocular disease for our growing and ageing population. Also, the state-of-the-art in terms of published scientific clinical studies will be summarised, in a way that the eye care professional can advise patients on how to assess patients visual function and recommend lifestyle and nutritional strategies for optimising visual function for patients with and at risk of retinal disease. We will also discuss the importance of quality in terms of study types, publications, and stability of eye formulations.

### Learning Objectives:

- 1. To summarise retinal ocular disease and impact on vision and patient quality of life
- 2. To summarise the cost of manging eye disease, relating to direct and indirect costs
- 3. To understand the essential nutrients of the macula that can reduce risk of ocular disease macular carotenoids for AMD
- 4. To understand the role of the macular carotenoids for the eye, with specific knowledge relating to:
  - a. Dietary sources versus supplements
  - b. Safety Stability Efficacy enhanced bioavailability
- 5. To understand the macular carotenoid mechanisms of action
  - a. Antioxidant
  - b. Anti-inflammatory
  - c. Optical
- 6. Understanding levels of evidence and evidence-based clinical trial carotenoid data with respect to visual function outcomes
- 7. Methodology to measure visual function
- 8. What is now possible in clinic and the Implementation of scientific clinical trial data into current practice, using cutting edge measurement technology and carotenoid formulations

### Learning and Teaching Methods:

- 1. Lecturing PowerPoint
- 2. Demonstration
- 3. Evidence-based Science
- 4. Interaction

## Ocular Disease, Macular Health, Carotenoid Nutrition and Visual Function

#### Macular carotenoids and macular disease

- 1. The lecture will describe the role of the macular carotenoids for ocular disease; AMD
  - a. Source
    - Nature -- the presence of macular carotenoids in nature
    - Food the presence of macular carotenoids in food
    - Supplements –the presence of the macular carotenoids in food supplements
  - b. Biological selectivity the lecture discuss the biological selectivity of the carotenoids in their target tissues
- 2. Chemistry of macular carotenoids
  - a. Antioxidant capacity the antioxidant activity of the macular carotenoids, uniquely at the retina, will be explained
  - b. Optical capacity the optical properties of the macular carotenoids, uniquely at the retina, will be explained
  - c. Anti-inflammatory capacity the potential role of the macular carotenoids as anti-inflammatory agents in retinal and neural tissue will be explained.
- 3. Associations with environment and lifestyle factors the link between nutrition and carotenoids with environment and lifestyle factors will be discussed
  - a. Association with risk factors for AMD the link between nutrition and carotenoids with risk factors for AMD will be discussed

### Measurement of visual function and visual performance

- 1. The lecture will present the state of the art concerning the assessment of visual function for retinal disease
  - a. Visual acuity methodologies used to assess visual function will be explained
  - b. Contrast sensitivity methodologies used to assess contrast sensitivity will be explained
  - c. Application of macular carotenoids for visual function

- d. Aspects of visual performance shown to benefit from macular carotenoids:
- e. Not just visual acuity!
- f. Contrast sensitivity

#### **Evidence-based science**

- 1. The lecture will describe the scientific evidence and summarise the Levels of evidence as follows:
  - a. The importance of the level of evidence and the totality of science will be taught
  - b. Summary of the evidence Key trials
  - c. AREDS NIH study published in 2013. This study set the current recommended formulation for patients diagnosed with intermediate and advanced AMD based on risk of disease progression. The AREDS & AREDS2 studies established some practice guidelines for the management of AMD patients, however due to the secondary supplementation of all groups in AREDS 2, some confusion as to final results will be discussed
  - d. MOST This study evaluated vision improvement as it relates to MPOD in patients diagnosed with early AMD and compared three different supplement formulations over a 3-year period.
  - e. CREST This study had two parts: the first looking at vision improvement as it relates to MPOD in young and healthy eyes against a true placebo in a double blinds study over a 12-month period; the second looking at vision improvement as it relates to MPOD in early AMD patients when comparing all three carotenoids in an AREDS-based formulation to the AREDS established formulation over a 2 year period.
  - f. COAST This study identified how to optimize the bioavailability of the macular carotenoids.
- 2. Measurement of visual function and visual performance
  - a. Visual acuity methodologies used to assess visual function will be explained
  - b. Contrast sensitivity methodologies used to assess contrast sensitivity will be explained

### How can we enhance Bioavailability of Ocular nutrition?

1. Source of macular carotenoids:

- a. Formulations
  - i. Standard
  - ii. Micro-micellular
- 2. Comparing foods versus food supplements:
  - a. Clinical studies
  - b. Understanding nutritional devolution and challenges with micronutrient deficiencies
- 3. Stability of macular carotenoids:
  - a. Laboratory studies
  - b. Clinical studies
  - c. What should the eyecare professional look for

### Implementation of scientific studies into clinical practice

- 1. Methodology available
  - a. The lecture will conclude by discussing methodologies that are available that can be used in clinical practice to help the doctor assess vision and retinal health
    - Risk assessment
    - Visual function assessment
  - b. Feasibility -The feasibility (time) of using these tests will be discussed
  - c. Identification of patients
  - d. How can patients be identified that will benefit from nutrition and lifestyle optimization
  - e. New technologies available to support doctors to make assessments
    - i. What is ready and what is not!
- 2. Best practice
  - a. What is the current best practice to be implemented in everyday practice for preventative care using nutrition and lifestyle data in the clinic.

### **Essential Background for reference -**

Vision is an intricate and complex process that occurs in the visual system, between the retina and different areas of the brain. It provides the necessary elements to interpret the surrounding environment. The visual system carries out a number of complex tasks, including the reception of light and the formation of monocular neural representations. The processing of this visual information, which enables the brain to understand the environment, is known as visual function. Visual function can be described, and therefore measured, through its most important attributes: visual acuity, contrast sensitivity, dark adaptation, visual fields, colour vision, and stereopsis. Conventionally, and for practicality reasons, visual acuity (VA) has been considered the metric of vision. The use thereof has crossed different disciplines for the purpose of giving visual function a universal language, not only in science, but in the military, law, and other areas. Unfortunately, this practicality for using only one assessment for visual function has also been a wrong practice in medicine. In general, a regular vision check-up only includes VA as a measure of visual function. However, the measurement of visual function through all its metrics provides a more integral and realistic description of vision. Using only one parameter to classify vision as "good", "standard", or "bad" creates a communication barrier between patients and doctors, across disciplines, and between research studies.