Macular Pigment and Clinical Relevance to Visual Function and Disease Management

I. **Macular Pigment (MP)**
   a. Chemical Structure
   b. Factors Affecting Serum Levels
   c. Retinal Spatial Distribution and Absorbance Spectrum

II. **Hypothesized roles of MP**
   a. Protection
   b. Neural Efficiency
   c. Optical

III. **Central Retinal Conditions Related to MP**
   a. Diabetic Macular Edema
   b. Cystoid Macular Edema
   c. Retinitis Pigmentosa
   d. Macular Telangiectasia Type II
   e. Central Serous Chorioretinopathy
   f. Age-Related Macular Degeneration

IV. **Studies of Eye Disease and MP**
   a. Eye Disease Case Control Study (EDCC)
   b. Age-Related Eye Disease Study (AREDS)
   c. Lutein Antioxidant Supplement Trial (LAST)
   d. Carotenoids in Age-Related Eye Disease Study (CAREDS)
   e. Lutein Xanthophyll Eye Accumulation (LUXEA)
   f. Taurine, Omega-3, Zinc, Antioxidant and Lutein (TOZAL)
   g. Age-Related Eye Disease Study II (AREDS2)
   h. Carotenoids in Age-Related Eye Disease Study II (CAREDS2)
   i. Diabetes Visual Function Supplement Study (DiFUSS)
   j. Lutein for Vision in Albinism (LUVIA)
   k. Maculopathy Optic Nerve Nutrition Neurovascular/Heart Disease study (MONTRACHET)
   l. Lutein Influence on Macula of Persons Issued from AMD Parents study (LIMPIA)

V. **Relationship between Mild Traumatic Brain Injury and MP**
   a. Dietary Supplementation
   b. Serum-based Identification
   c. Ophthalmic Imaging

VI. **Studies of Visual Performance and MP**
   a. UM-SL Graduate Work
      i. A Novel Device to Measure Spatial Distribution of Macular Pigment

ii. Macular Pigment Spatial Distribution Effects on Glare Disability
iii. Influence of MPOD Spatial Distribution on Intraocular Scatter
iv. A Comparison of Methods to Describe Macular Pigment Optical Density Spatial Distribution
v. Foveal Macular Pigment Optical Density Predicts Parafoveal Glare Disability
vi. MPOD Spatial Distribution Influences on Higher Order RMS Wavefront Error and Intraocular Scatter

b. Review of Air Force Research Laboratory work with Macular Pigment
   i. Macular Pigment and Visual Performance in Photostress Recovery, Disability Glare and Visual Discomfort
   ii. Macular Pigment and Visual Performance in Low Light Levels
   iii. How Much Macular Pigment is Enough**?**

c. Everybody Else…
   i. Contrast Sensitivity
   ii. Glare Disability
   iii. Visibility
   iv. Discomfort
   v. Temporal Vision
   vi. Mesopic Vision
   vii. RMS Wavefront
   viii. Cone Sensitivity
   ix. Chromatic Sensitivity
   x. mfERG
   xi. fMRI

VII. Supplementation and MP

a. Dietary Supplementation
b. Commercial Supplementation
c. Observable Safe Limits (OSL)

VIII. Take Home Points for MP

IX. What's now?

a. Identified risk factors for age-related maculopathy
b. Well-established link for visual performance, retinal health and cognitive function
c. Systemic disease relationships with L/Z
d. Early evidence between L/Z supplementation and mTBI

X. What's next?

a. Serum-based testing

b. Patient-tailored health plans
c. Impaired dark adaptation
d. Risk calculator
e. Healthy skepticism with reasoned cynicism

Course Description: Macular pigment (MP) has been widely studied in the biochemical and physiologic domains for years and emerging research is showing a MP confluence of effects that bridge the areas of cognitive function, optical enhancement and retinal health. Burgeoning clinical techniques have allowed early detection, treatment and management of a growing number retinal and central nervous system conditions. Additionally, this course will review aspects of visual function enhancement associated with MP and discuss supplementation strategies that can decrease ocular symptoms related to other vascular, inflammatory and neurological diagnoses. Clinical case studies and published research projects will be reviewed in the context of current clinical care modalities.

Cope Category: Retinal Disease

Course Objectives (3/credit hour)-

Objective 1: Identify the 3 hypothesized roles of macular pigment

Objective 2: Describe 4 measured of visual performance related to macular pigment optical density

Objective 3: List 3 retinal conditions associated with macular pigment optical density