

**Demystifying Vision in Autism:** *What do we know? What do we need to know?  
How can we pursue optometric research and care for patients who have Autism  
Spectrum Disorder?*

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**Course Description:**

Unusual sensory processing is common in Autism Spectrum Disorder (ASD) and may contribute to behavioral signs and symptoms of the condition. Understanding vision differences in these patients is difficult due to the core deficits in social interaction and communication. This symposium will review ophthalmic features known to be associated with ASD and current research in vision sensory sensitivities of affected individuals. Other topics will include findings of pilot studies investigating convergence and spectacle wear adaptation in patients with ASD, and clinical observations regarding the link between visual spatial processing challenges and anxiety in this population.

**Learning Objectives**

1. Review common ophthalmic features found in Autism Spectrum Disorder.
2. Identify findings of current research in vision sensory sensitivities of individuals with Autism Spectrum Disorder.
3. Describe at least three modifications of common vision tests to increase testability in patients with ASD.
4. Compare spectacle wear adaptation in children and adolescents with ASD with that in typically developing children and adolescents.

**I. Vision in Autism Spectrum Disorders: What is the Research Telling Us?**

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**A. Ophthalmic features**

1. Sensory symptoms
2. Review of visual sensory symptoms
  - a. Common social symptoms may have visual component
    - i. Unusual socially directed pointing
    - ii. Difficulties interpreting gestures,
    - iii. Unusual eye contact

- iv. Difficulty interpreting facial expressions
    - v. Difficulty following gaze
    - vi. Difficulties with joint attention
  - b. Non-social signs
    - i. Repetitive behaviors
    - ii. Stereotyped behaviors
  - c. Assessment of symptoms - ADOS
- 3. Refractive errors
- 4. Visual acuity
- 5. Contrast sensitivity
- 6. Spatial Grouping
- 7. Reading
- 8. Color vision
- 9. Depth Perception, Stereopsis and Binocular Vision
  - a. Stereoacuity
  - b. Strabismus
  - c. Convergence insufficiency
- 10. Motion perception
- 11. Face and Object Perception
- 12. Visual Search and Attention
- 13. Oculomotor problems
  - a. Lateral glancing
  - b. Ocular motility
  - c. Opto-Kinetic Responses
- 14. Pupil Response

## B. Investigation of Vision Sensory Sensitivities

- 1. Sensory questionnaire
  - a. On-line administration to adults with ASD
  - b. Measure of frequency and severity everyday symptoms
  - c. Autism Spectrum Quotient questionnaire (AQ) - measures number and severity of autistic traits
  - d. Correlation of AQ score to sensory questionnaire
- 2. Qualitative responses in focus groups
  - a. Children and adults with ASD and caretakers
  - b. Descriptive detail and understanding impact
- 3. Specific visual issues - focus group adults with ASD (n =6)
  - a. Fluorescent lighting and colors from artificial lights
    - i. Severe symptoms -headaches and nausea
    - ii. Low frequency visual flicker -capture attention
    - iii. Certain colors (e.g. red) "hurt".
  - b. Repetitive patterns like shelving or grids
- 4. Highlights of focus group
  - a. Importance of having control reduce sensory stress
  - b. Some sensory stimulations provide calm at times
  - c. Application of data

- i. Develop better measures of stressors in working environments
- ii. Develop better coping strategies

C. Acknowledgements - Supported by Autism Speaks, The Wellcome Trust, The Nuffield Foundation, ESRC/MRC, EPSRC, Carers Link East Dunbartonshire

## II. **The Convergence in Children and Adolescents Diagnosed with Autism (CICADA) Study**

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- A. Background
  - 1. Few optometric studies available regarding vision findings for patients with ASD.
    - a. Scharre and Creedon, 1992
    - b. Assessed 2 to 11 yr old children with autism
  - 2. Report of abnormal convergence –Milne and colleagues, 2009
- B. Methods
  - 1. Recruitment
  - 2. Criteria for ASD versus typically developing group
    - a. Social Communication Questionnaire
    - b. Review of ASD documentation by PsyD
  - 3. Supports and modifications for patients with ASD
    - a. Social story
    - b. Visual schedule
    - c. Accepted Responses of nonverbal patients
    - d. Visual supports
  - 4. Eye examination procedures
    - a. Distance VA, Retinoscopy, Cover Test, NPC, Fixation, NSUCO Ocular Motility, Prism Bar Vergence at near, Stereoacuity, MEM, Pupils, Vergence, IOP, Anterior and Posterior segment evaluation, cycloplegic retinoscopy
    - b. Primary outcome measures
      - i. Near point of convergence, fusional vergence, cover test
      - ii. Rating of investigator confidence in accuracy
- C. Results
  - 1. Baseline data and characteristics of ASD group
  - 2. Comparison of convergence findings in ASD and typical groups
  - 3. Comparison of testability of vision tests in ASD and typical groups
- D. Conclusions

- E. Acknowledgement NSU Chancellor's Faculty Research and Development Grant

### **III. Adaptation to Spectacle Wear in Children and Adolescents with Autism Study**

Annette Bade, OD, FAAO

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#### **A. Background**

1. Refractive error distribution in children and adolescents with ASD
2. Patients with ASD commonly have hypersensitivities to tactile sensation or hypersensitivities to changes in visual stimuli.

#### **B. Methods**

1. Patients with ASD and typically developing patients requiring new correction recruited from the CICADA study.
2. Spectacle wear reports were obtained at 1 week, 2 weeks, 4 weeks, 8 weeks, 12 weeks and 16 weeks by phone interview of parents.

#### **C. Results**

1. Comparison - descriptive data between typical and control group
2. Wear time
3. Resistant behavior

#### **D. Conclusions**

1. Implications for practitioners
2. Directions for future research

#### **E. Acknowledgements NSU Health Professions Grant**

### **IV. Visual Spatial-Processing Problems in Patients with ASD - Clinical Observations**

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#### **A. Visual spatial-processing problems**

#### **B. Potential link to anxiety**