

## ATB - CYCLOPLEGIC REFRACTION

(DD Form 2808, Block 62. 'REFRACTION BY AUTOREFRACTION OR MANIFEST')

[As of: 1 May 2002]

*[Performed by an Optometrist or Ophthalmologist ONLY!]*

### Important notes concerning the new DD Form 2808.

Unfortunately, the new pre-printed wording of block 62, "REFRACTION BY AUTOREFRACTION OR MANIFEST" may be very confusing. It is VERY important that anyone conducting testing for any FDME understand that an 'autorefraction' of any kind is NOT authorized and should NEVER be entered on the DD Form 2808 unless it is in block 60 (Other Vision Test) or in block 73 (Notes) for reference only.

### Autorefraction results should NEVER be entered into block 62!

Highly recommend lining through the entire "...BY AUTOREFRACTION OR MANIFEST" wording and utilize the blank next to the refraction to enter the type of refraction utilized. For example:

By -0.50 S. -0.25 CX 180 (type of refraction here)



**All 'autorefraction' entries on FDME's in block 62 will be returned as incomplete.**

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### Purpose/Indications: Cycloplegic Refraction ("Cyclo"):

Mandatory for all Class 1/1A FDMEs. This measures a patient's refractive error in the absence of accommodation (focusing ability) which is useful in confirming the presence of latent hyperopia ("hidden farsightedness"). This is accomplished through the use of a cycloplegic topical ophthalmic solution; an anticholinergic solution that is used to block the responses of the iris sphincter muscle and the accommodative muscle of the ciliary body to cholinergic stimulation, producing pupillary dilation (mydriasis) and paralysis of accommodation (cycloplegia).

An Optometrist or Ophthalmologist must conduct the cycloplegic refraction in a very specific manner outlined under the step-by-step procedure below. Conduct the cycloplegic refraction after all other eye testing. Note that there is now additional mandatory testing with the cycloplegic refraction as outlined on the last page.

### **Equipment/Supplies: Cycloplegic Refraction.**

- Slit lamp biomicroscope
- Facial tissue(s)
- Mydriatic spectacles (disposable sunglasses)
- Topical anesthetic:
  - (Proparacaine Hydrochloride Ophthalmic Solution, USP, 0.5%)
- Cycloplegic agent:
  - (Cyclopentolate Hydrochloride Ophthalmic Solution, USP, 1.0%)
- Retinoscope (for objective start point or objective verification)
  - (an autorefractor may be used for an objective start point but in no instance will any autorefraction be entered onto an exam form.)
- Phoropter
- Projected Snellen distance visual acuity chart [must be projected IAW AR 40-501, paragraph 4-12, a.(1)]. Projected sources for a cycloplegic refraction include, but are not limited to:
  - Traditional projector with screen
  - Binocular Visual Acuity Tester (BVAT), or similar system
  - Refraction system with projected image (i.e. the Marco Nidek COS-1000 Compact Ophthalmic System, the Marco Nidek EPIC-2100, or similar system)
- Method for keratometry and/or topography (for new mandatory testing)

### **Set-up: Cycloplegic Refraction.**

- Conduct a cycloplegic refraction after completing all other eye testing and verifying any disqualifying parameters from other tests. Highly recommend a brief review of the physical exam form to ensure all other eye testing is complete and that no re-testing is necessary (i.e. meets standards). One more check in the process will only help to ensure the physical is correct when finally forwarded to Fort Rucker for review.
- Highly recommend using a slit-lamp biomicroscope to ensure patient has open anterior chamber angles before instilling any drops.
  - If an angle estimation is less than 0.25:1 (or ¼:1), or a Van Herick angle estimation of '1', perform gonioscopy prior to instilling cycloplegic drops. If corneal epithelial disruption occurs with gonioscopy, confirm angles are open and have patient return in 24 hours for the cycloplegic refraction. If angles are narrow, refer to Ophthalmology for evaluation before proceeding.
- Ask patient about allergies, adverse reactions to any anesthetics (Proparacaine being utilized), or adverse reactions to any preservatives (Proparacaine is preserved with Benzalkonium Chloride, 0.01%).

## Step-By-Step Procedure: Cycloplegic Refraction (“Cyclo”).

- Recommend verifying anterior chamber angles (see Set-Up).
- Verify allergies and possible adverse reactions (see Set-Up).
- Give patient a facial tissue and a pair of mydriatic spectacles. Explain effects from cycloplegic drops (especially temporary loss of focus at near and light sensitivity) and ensure this will not interfere with anything of pending importance (i.e., patient has final exam that evening, patient is not performing any type of flight duties within the following 24 hours, etc.).
  
- Instill drops in this exact order:
  - Instill one (1) drop of topical anesthetic (Proparacaine HCl 0.5%) into each eye. **RECORD THE DROP AND THE TIME** (in block 60 or block 73). Wait one (1) minute. {Some think this is to make the patient more comfortable with the successive drops. Although this is a welcomed side effect, it is not the primary reason. The topical anesthetic helps ease the bonds between the corneal cell junctions which allows increased permeability of the cycloplegic agent.}
  - Instill one (1) drop of cycloplegic agent (Cyclopentolate HCl 1.0%) into each eye. **RECORD THE DROP AND THE TIME** (block 60 or block 73). Wait five (5) minutes.
  - Instill one (1) drop of cycloplegic agent; wait a minimum of 45 minutes. **RECORD THE DROP AND THE TIME** (block 60 or block 73).
  
- Perform a cycloplegic refraction between 45 minutes and 75 minutes after the last drop instillation (the minimum wait time of 45 minutes ensures all iris colors are in maximal cycloplegia before refraction).
  - If the cycloplegic refraction cannot be performed between 45 and 75 minutes, there are two courses of action:
    - Instill another drop of Cyclopentolate HCl 1.0% in each eye and wait a minimum of 30 minutes more;
    - **-or-** Patient can return after a minimum of 48 hours to repeat the drop series and cycloplegic refraction.
  
- Enter the ‘best corrected visual acuity’ in block 61 next to the pre-printed “Corr. to 20/ “ entries for each eye. [See ‘*Important Note for Eye Care Providers*’ on the last page.] Be aware of patients ‘memorizing’ the eye chart. Many clinics are limited to only a few 20/20 lines and must be creative in randomizing the letters (reading them backwards, etc.).

- Record the cycloplegic refraction findings for each eye in block 62:
  - The 'sphere' amount in the first blank (between the pre-printed entries of "By" and "S.")
  - The 'cylinder' amount in the second blank (between the pre-printed entries of "S." and "CX"; if there is no cylinder amount, enter 'sphere', 'sph', or 'DS'.)
  - The 'astigmatism axis' in the third blank (after the pre-printed entry of "CX"; if there is no astigmatism, enter a horizontal line here.)
  - After the astigmatism axis, write the word 'cycloplegic' (or 'cyclo') to indicate the type of refraction conducted.

Typical cycloplegic refraction entry on DD Form 2808:

60. OTHER VISION TEST							
1 x Proparacaine 0.5% @ 1200							
1 x Cyclopentolate 1.0% @ 1201							
1 x Cyclopentolate 1.0% @ 1206							
61. DISTANT VISION				62. REFRACTION BY AUTOREFRACTION OR MANIFEST			
Right	20/20	Corr. to 20/20	By +0.25	S. -0.25	CX 180		Cyclo
Left	20/25	Corr. to 20/20	By +0.75	S. -0.50	CX 180		Cyclo

- If you know the refraction amount is outside of qualifying standards for flight school, it is a good idea to make a note to the Flight Surgeon in block 73 or on a separate note. This should be discussed with your local Physical Exam Section and Flight Surgeon for local SOP. All Eye Care Providers and Flight Surgeons must ensure they know the most current standards for entry to flight school.

**UPDATED ENTRY STANDARDS FOR CLASS 1/1A FLIGHT DUTY MEDICAL EXAMINATIONS.** (as of 28 March 2002):

**Hyperopia** greater than +3.00 diopters of sphere

- (in any meridian by transposition in either eye)

**Myopia** greater than -1.50 diopters of sphere

- (in any meridian by transposition in either eye)

**Astigmatism** greater than +/- 1.00 diopter of cylinder in either eye

Must meet standards in both plus-cylinder and minus-cylinder formats so transpose to ensure patient meets standards (spherical equivalent method does not apply).

For example, the cycloplegic refraction of

-1.00 - 0.75 x 180 (in minus-cylinder format)

might appear qualified at first glance. However, after transposition into plus-cylinder format of

-1.75 + 0.75 x 090 (in plus-cylinder format)

it is apparent that this refraction is disqualifying because the sphere amount exceeds -1.50.

- Transposition Review:*
1. Algebraically sum the sphere and cylinder powers;
  2. Change the sign of the cylinder power;
  3. Change the axis by 90 degrees.

Cyclo transposition table goes here.

## ‘Important Note for Eye Care Providers’

A cycloplegic refraction is NOT necessarily equal to the refraction you would give for spectacle lenses. If a patient is “on the border” of being qualified or disqualified, it is best for the Army and for the patient to use the “least amount of prescription needed to see within standards” approach.

For example, if a patient has a cycloplegic refraction that is +/- 0.25 diopters outside of standard but can still read to the 20/20<sup>-1</sup> standard with the refraction amount that is WITHIN standards, enter the lesser amount.

Do NOT, however, try to “push” the 20/20<sup>-1</sup> on borderline cases. These patients receive an entirely new cycloplegic exam once they come to Fort Rucker to enter flight school. If they are outside of the standard, they will be required to request an exception-to-policy which will likely be disapproved. Use your professional judgement but do not allow someone to come to flight school knowing he/she has a good chance of failing their detailed cycloplegic exam upon arrival.

### **- Additional MANDATORY Testing With Cycloplegic Refraction -**

Since the patient is dilated during a cycloplegic refraction, it is a prime opportunity to conduct a brief slit lamp exam to check any disorders of the anterior segment and optic nerve. A full dilated fundus exam (DFE) is not required but highly encouraged.

Due to the advent and popularity of refractive surgery, it is now MANDATORY for the Eye Care Provider conducting the cycloplegic exam to also provide the following information with all Class 1/1A FDMs:

#### **#1: EVIDENCE OF NO REFRACTIVE SURGERY:**

- Make an entry in block 73 (NOTES) indicating that there is no evidence of refractive surgery. (Highly advise that the patient also sign an entry stating he/she has not had refractive surgery.) This can easily be made part of the local overprint to DD Form 2808.
- If patient has had refractive surgery, ensure the patient contact the US Army Aeromedical Research Lab (USAARL) at Fort Rucker to determine if there are any current research programs ongoing that may allow the patient to participate for entry into flight school.

#### **#2: EVIDENCE OF CORNEAL CURVATURE:**

- Provide evidence of corneal curvature with one of the following:
  - Manual or Automated Keratometry readings of each eye [enter in block 60 (OTHER VISION TEST) or block 73 (NOTES); or photocopy to full-size page and attach to physical; do not staple automated strip-paper to physical as it will not likely remain attached].
  - and/or Topography of each eye (attach full-size page to physical)