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The Vision in Preschoolers Study Group. Comparison of Preschool Vision Screening Tests as Administered by Licensed Eye Care Professionals in the Vision in Preschoolers Study. *Ophthalmology* 2004;111:637-650. Preschool Vision Screening Tests Administered by Nurse Screeners Compared with Lay Screeners in the Vision in Preschoolers Study. *Invest Ophthalmol Vis Sci* 2005;46:2639-2648.

Cover Test

What Are You Testing?

The purpose of performing a cover test is to determine the presence of primary position heterotropias (manifest strabismus) and heterophorias (latent strabismus), as these conditions are often associated with amblyopia in young children. The cover test provides a precise, objective measure of eye alignment and results in information on the presence, magnitude, direction, and frequency of the deviation.

What You Need to Do the Test:

1. A black plastic occluder.
2. Detailed near fixation targets.
3. Remote control for VCR.
4. VIP video tape for distance fixation.
5. Loose prisms or prism bars.

Getting Ready:

1. Turn on the video tape provided for the distance cover test target.
2. Have the targets provided for the near cover test ready for use.

How You Do the Test:

1. The examiner is seated facing the child and slightly to the child's side during distance testing, and directly in front of the child during near testing.
2. First perform the cover test (both the unilateral and alternating cover test procedures) in primary gaze using the distance target at 10 feet (3m).
3. Then, repeat testing at 40 cm.

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Distance Cover Test:

Unilateral Cover (Cover-Uncover) Test:

1. Direct the child to look at **details** on the distance fixation target and ask the child to concentrate on the picture.

For testing of the right eye, place the occluder over the child's left eye while closely observing the child's right eye for movement after the left eye is covered. Allow 3-4 seconds before proceeding in case the child takes up fixation slowly and continue to observe the right eye only for movement.

For testing of the left eye, repeat the procedure but cover the child's right eye while closely observing the left eye for movement after the right eye is covered. Again, allow 3-4 seconds before proceeding.

2. Repeat the unilateral cover-uncover test a minimum of 3 times for each eye. You may use more repetitions, if necessary, to determine the presence and frequency (i.e. constant or intermittent) of the deviation.
3. Make certain that the occluder completely covers the eye on each cover stroke.
4. If no movement of either the right or left eye is detected when performing the unilateral cover test, then the patient does not have a tropia. Proceed with the alternating cover test to detect the presence of a phoria.
5. If movement of the fellow eye is detected when testing either the right or left eye, the child is strabismic. Check the box on the data form that says "**Tropia, total deviation.**" Describe the tropia by completing the set of items in the box at the end of the arrow on the data form.
6. Note the laterality:
 - a. Mark *right* when the right eye deviates consistently.
 - b. Mark *left* when the left eye deviates consistently.
 - c. Mark *alternating* when fixation alternates.
7. Note the frequency: Constant or intermittent.

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8. Note the direction:
 - a. If the deviating eye moves inward after the fellow eye is covered, an *exotropia* is present.
 - b. If the deviating eye moves outward after the fellow eye is covered, an *esotropia* is present.
 - c. If the deviating eye moves down after the fellow eye is covered, a *hypertropia* is present.
 - d. If the deviating eye moves up after the fellow eye is covered, a *hypotropia* is present.
9. Note the direction of the *larger* directional component of the strabismus: Eso, exo, hyper, hypo. For example, if a child has an esotropia with a hypertropic component and the esotropia is larger, under “**Direction**” on the data form categorize the tropia as an esotropia. Measure and record the magnitude of the larger component of the deviation using the “Measurement Procedure for Strabismus” (described next). All strabismic deviations must be neutralized with prisms, not estimated.

Measurement Procedure for Strabismus:

1. Place either loose prisms or a prism bar before the deviating eye. The prism chosen for starting this procedure is based on the examiner’s estimate of the amount of the larger deviation present. For example, if a child has an esotropia with a hypertropic component and the esotropia is larger, use a base-out prism and determine the prism value necessary to neutralize the esotropic component of the deviation.
2. Without allowing binocular fixation, alternately cover the right and left eyes while adding the appropriate base prism until the direction of the larger component of the strabismus in the deviating eye is neutralized (i.e. no movement is observed). Then add additional prism until the deviation reverses direction. For example; for esotropia, add base-out prism until a small exo movement is observed. The value in prism diopters used just before the direction reversal is recorded as the magnitude of the strabismus. Record this on the data form.
3. For your use in providing clinical care to the child, you may neutralize any other smaller deviation observed. Do *not* record the magnitude of the smaller deviation on the data form; you may include this under “**Examination Findings**” on the last page of the GSE forms. You must prism neutralize and record only the larger component of the deviation; that is, the esotropic component in the example cited above.

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Alternating Cover Test Procedure for Phorias:

1. If there was no strabismus present on the distance unilateral cover test, the examiner should proceed with the distance alternating cover test to detect the presence and magnitude of a phoria.

The occluder is introduced and held in place in front of the left eye for at least 1-2 seconds and it is then moved quickly to the right eye and held in place for 1-2 seconds while **not allowing binocular fixation to occur**.

2. This cycle should be repeated at least 3 times as the examiner observes the eye that is being uncovered to detect a re-fixation movement.
3. If no movement is present on the alternating cover test, mark the response labeled “**No tropia or phoria.**”
4. If a phoria is detected, mark the response labeled “**Phoria & no tropia.**” Describe the phoria by completing the set of items in the box at the end of the arrow. Neutralize the phoria with loose prisms or a prism bar as described next in the “Measurement Procedure for Alternating Cover Test.”
5. Note the direction:
 - a. If the eye moves inward as the fellow eye is uncovered, an exophoria is present.
 - b. If the eye moves outward as the fellow eye is uncovered, an esophoria is present.
 - c. If the eye moves down as the fellow eye is uncovered, a hyperphoria is present in that eye.
 - d. If the eye moves up as the fellow eye is uncovered, a hypophoria is present in that eye.

Measurement Procedure for Alternating Cover Test:

1. If a phoria is detected on the alternating cover test, place either loose prisms or a prism bar before one of the child’s eyes. The base direction and amount of prism chosen is based on the examiner’s estimate of the child’s deviation.
2. Alternate covering the right and left eyes without allowing binocular fixation while increasing the prism power until the movement is neutralized (i.e. no movement is observed). Add additional prism until the direction of the deviation is first reversed.
3. The value in prism diopters obtained just before the direction is reversed is recorded as the magnitude of the phoria.

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Near Cover Test:

1. Follow the distance unilateral and alternating cover test procedures as outlined above, but use a near viewing distance (40 cm) for the near cover test procedure.
2. Use the near targets provided at 40 cm instead of the distance target.
3. Establish the correct test distance (40 cm) at the beginning of the procedure. Re-check the viewing distance as needed if the child moves closer or further away during testing.
4. During the near cover test you may have the child "glue the target to the end of your nose" to maintain an accurate testing distance and to reinforce fixation. This will allow the examiner the use of both hands to hold the occluder and prism.
5. While testing, keep reminding the child to look at the fixation targets.
6. Engaging the child in describing the object will help maintain the child's attention and help to stabilize accommodation.
7. Other aspects of testing and measurement are the same to maintain near fixation as was described to maintain distance fixation.

What You Tell the Child:

1. When viewing the near fixation target, have the child describe the characteristics of the object or objects on the target. The important task is to make certain that the child maintains fixation on the near target. ("How many eyes does the clown have? What color is Big Bird?")

What You Write Down:

1. If a tropia is present, record the results as "**Tropia (total deviation)**" and complete the boxed items for Laterality (right, left, or alternating); Frequency (constant or intermittent); the direction of the deviation (eso, exo, hyper, or hypo); and the magnitude of the total deviation. If the tropia is composed of both a horizontal and vertical component, record the characteristics of the larger component on the GSE form; you may record both components under "**Examination Findings**" on the last page of the forms.
2. If no tropia is present but a phoria is detected, record the results as a "**Phoria & no tropia.**" Indicate the direction (eso, exo, left hyper, or right hyper) and the magnitude of the deviation.
3. If no tropia is present and no phoria is present, record "**No tropia or phoria.**"

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4. Check “**Incomplete**” for laterality, frequency, direction, and/or magnitude if the test is aborted (e.g., due to the child’s uncooperativeness) before an assessment could be made.

Remember!

1. Keep asking the child to describe the fixation target that you are using while you are doing the test. Direct the child’s attention to the **details** on the targets.
2. Make sure the occluder completely covers the eye and stays over the eye for at least 3 seconds.
3. Prism neutralization of all strabismic deviations and phorias must be performed using the alternate cover test.
4. Have several different targets available and change them as needed to help maintain continued and accurate fixation.