



## Data Collection Worksheet

**Please Note:** The Data Collection Worksheet (DCW) is a tool to aid integration of a PhenX protocol into a study. The PhenX DCW is not designed to be a data collection instrument. Investigators will need to decide the best way to collect data for the PhenX protocol in their study. Variables captured in the DCW, along with variable names and unique PhenX variable identifiers, are included in the PhenX Data Dictionary (DD) files.

### Cycloplegic Autorefraction (Retinomax)

#### **SET-UP**

1. At the beginning of each test session, the Retinomax must be calibrated. Measure the model eye.
2. Be sure the measured values of the model eye fall within the following ranges (from the Retinomax manual) when compared with the values indicated on the model eye label. If any values are not within the listed ranges clean the Retinomax measuring window and the model eye. If the measured values are still not within listed ranges, contact Nikon.  
  
SPH: +0.25 D CYL: +0.25D  
R1: +0.02 mm R2: +0.02 mm  
T: +0.05 mm N: +0.05 mm  
S: +0.05 mm I: +0.05 mm
3. Make sure the printer has sufficient paper to record the results.
4. If the child is wearing spectacles, remove them prior to testing.
5. Print out the measurements of the model eye. Tape the printout to the quality control log for the testing session.

#### **NOTE**

1. The Retinomax will only be performed on eyes that have undergone cycloplegia. If for some reason only 1 drop of cyclopentolate is administered, this will still be considered a "cycloplegic" refraction and Retinomax testing will still be performed.

#### **PROTOCOL**

1. Verify that no less than 30 minutes have elapsed since the drops were administered.

2. Have the child stand with his/her back against the wall, sit in a parents lap, or sit in an exam chair that can be raised.
3. The tester should sit opposite the child.
4. Press the POWER button to turn on the Retinomax and extend the forehead rest by pushing it in toward the instrument.
5. Set the measurement mode to AUTO (/A/) on the set-up screen. The set-up screen is viewed through the viewfinder of the measuring unit and appears when the MODE and R/L keys are pressed simultaneously. From the Set-up Menu, confirm that AUTO from the READING sub-menu is selected. Use the "R/L" key to move the cursor down and the "eyeball" key to move the cursor up. Press the print key while the item is selected (cursor located on the same line) to change the selection. AUTO should be set as the "default" setting for the instrument. The examiner should verify that this setting has not been modified. Move the cursor to "exit" and hit "print" to move to the "measurement" mode.
6. Press "Mode" to select "R/K: both Refractometry and Keratometry" for Refraction and Keratometry mode (the top of the screen will say:  
R1 AX1 R2 AX2 and you will see "R0/L0" on the upper right portion of the screen).
7. Press R/L as needed (seen toward lower left portion of screen).
8. Make sure that "quick" is NOT lit up.
9. Tell the child, "I will be showing you a picture of a tree. When you look inside, try to watch the tree." Point to and tell the child to look in the little hole in the front of the Retinomax and see if he/she can see the tree.
10. Roughly align the instrument with the patients right eye by observing the patient from outside the viewfinder. Running your thumb along the groove of the units forehead rest makes positioning easier. Lower the forehead rest to where it just contacts the patients brow or your hand on the brow.
11. When aligning the measuring unit with the patients eye, take care to NOT TILT the unit in the vertical or horizontal plane such that it is not aligned with the childs visual axis and make sure that the patients eyelashes do not get in the way.
12. Press the green START button on the measuring unit handle. Be sure to press it once and release. Do not hold it down. Measurements will be made automatically when alignment is achieved.
13. Look through the viewfinder. Once the patients right eye appears on the screen, bring the image of the pupil to the center of the screen by moving the measurement unit. Next, move the measuring unit in so that each dot of the

display can be seen sharply. Measurements begin automatically when the correct position is achieved. The tone will sound each time a measurement is made. During measurement, four light spots will appear for keratometry, while a central light spot will appear for refraction. If the keratometry lights cannot be seen, can only be partially seen, or appear hazy, the measuring light is being blocked. This may be due to blocking by the eyelashes or eyelids, blinking, or pathology of the cornea. Try to clear these by having the child open his/her eyes wider or by lifting the lids.

**14.** The display in the viewfinder will initially show "R0/L0" indicating that the unit has obtained 0 measurements for the right and left eye. If you don't see this, turn the Retinomax off and on again. As measurements are obtained, the counter will change to reflect the number of measurements taken on each eye. When you have eight readings (indicated by "R8" for the right eye), the instrument will stop automatically and indicate the need to switch to the left eye. The instrument will identify the switch and begin to measure the left eye automatically.

**15.** Repeat steps # 9- #14 on the left eye.

**16.** It helps to put your free hand on the child's forehead to reduce movement and head tilting, and to keep the instrument forehead rest from distracting the child.

**17.** Encourage the child to keep looking at the tree and to keep his/her eye open as long as possible. It may help to keep asking questions about the target (e.g., "What do you see?" "What color is the tree?" "Is it a big tree or a little tree?").

**18.** Once measurements are completed for both eyes, ensure that the printer is on, aim the front panel of the measuring unit at the printer and press the PRINT key. The printout tape will include refraction, keratometry, and confidence level values for refraction.

**19.** If the confidence level is  $\geq 8$ , this is considered a good measure. If the confidence level is  $\leq 7$ , retake the measurements a second time.

**20.** If the confidence level is again  $\leq 7$  on the second measurement, turn off the Keratometry mode and take a third measurement.

**21.** If the third measurement is  $\geq 8$ , testing is complete for that eye. If the confidence level is  $\leq 7$  on the third measurement, cycloplegic retinoscopy should be performed.

**22.** Label the Retinomax printout with the child's name and ID. Secure the printout to the data sheet.

**23.** Retract the forehead rest. Turn off the Retinomax unit to clear the measurements for the next child. Rest the measuring unit in the charger stand

between testing children.

### **RECORDING**

1. The unit automatically records and prints the measurements.
2. Make sure you write down the child's ID number on the printout.

### **Cycloplegic Retinoscopy**

Cycloplegic retinoscopy is performed to obtain a measure of refractive error **ONLY** in instances where cycloplegic autorefractometry cannot be obtained on an eye or when it is of poor quality (Retinomax confidence rating  $\leq 7$ ). In all instances, retinoscopy will be performed on both eyes.

### **SET-UP**

1. Verify that no less than 30 minutes have elapsed since the drops were administered and that at least 1 drop (should usually be 2 non-simultaneous drops) of cyclopentolate was administered.
2. Infants and toddlers should be held securely in parent's lap. Alternatively, infants may be in an infant seat.
3. To keep child stable and still on the chair, older children can be seated in exam chair with ankles crossed and knees apart.
4. Place the examiner's chair to comfortably allow for the proper working distance.
5. Adjust chair height to put video screen at child's eye level.
6. The examiner should be seated to afford an on-axis assessment of the child's refractive error without obstructing the child's view of the distance target. If the child is strabismic, cover the eye (if possible) that is not being evaluated so that retinoscopy is performed on axis.
7. If child is wearing spectacles or contact lenses, remove them.
8. Room illumination should be dim or dark.
9. Optional: Place the retinoscopy spectacles on the child if so desired and if they can be comfortably worn.

### **PROTOCOL**

1. Direct the child's attention to the cartoon video. Instruct him/her to "keep looking" at it. If the child is too young to watch the cartoon, direct the child's

attention to your retinoscope light by whistling or making attention-grabbing noises as you are performing retinoscopy.

2. If performing retinoscopy on a strabismic eye, occlude the fellow eye so that the strabismic eye fixates in primary gaze, and retinoscopy measurements are made on-axis.

3. Perform retinoscopy, identifying each of the major meridians. Using loose lenses or lens bars neutralize the reflex movement of each meridian separately. Recall that the meridian being assessed is perpendicular to the streak orientation (e.g., when the streak is oriented vertically, you are moving the beam horizontally and assessing the horizontal meridian).

a. Take care to hold the neutralizing lenses as close to the eyes as possible.

b. Lenses should be held parallel to the patients frontal plane.

c. If the child is reclined, as in an infant seat, position yourself to ensure that retinoscopy measures are along the visual axis.

d. Continually remind the child to maintain fixation of the target; asking questions about the target if helpful.

4. Repeat steps #1-3 for fellow eye.

5. If the child did not wear the retinoscopy spectacles, subtract the dioptric equivalent of your working distance to obtain your net retinoscopy finding.

6. If the child wore the retinoscopy spectacles, remove and wipe the temples of the glasses with an antibacterial wipe. In this instance, the actual lens powers used to neutralize the retinoscopy reflex will be the "net" retinoscopy finding.

### ***RECORDING***

#### **Indicate:**

1. For each eye, record the refraction in spherocylindrical form.

2. Indicate whether the recording is in plus or minus cylinder form.

3. If the child was unable to complete testing for either eye, check which eye.

Protocol source: <https://www.phenxtoolkit.org/protocols/view/111402>