Center for Human Phenomic Science

Ophthalmology Core Protocol and IRB Language

Description of Ophthalmology Testing and Procedures

Comprehensive eye exam includes: visual acuity, anterior segment exam, fundus exam, and refraction.

Intermediate eye exam includes: visual acuity, anterior segment exam.

Basic eye exam includes: Visual acuity, best corrected.

Visual Acuity

Prior to dilating the eyes, the visual acuity will be measured in each eye using the standard snellen optotypes. If the visual acuity is less than 20/25 in either eye, a cycloplegic automated refraction using a Retinomax will be performed at least 30 minutes after dilation.

Refraction

This test utilizes the manual practice of trying lenses of varying strengths to determine the eye's refractive error. This generally occurs before dilation in the adult population and requires dilation in the pediatric population.

Automated Refraction

The Retinomax automated refractor will acquire an accurate estimation of the eye's refractive error. This generally occurs before dilation in the adult population and requires dilation in the pediatric population, but is very useful in younger or less cooperative patients and is worth considering for your studies.

Risks: If dilation drops are used there may be stinging or a mild feeling of irritation to the eye. Dilation lasts for several hours some patients experience sensitivity to light or headaches.

Color Testing

There are several different versions of this test. In all versions, the person being examined is asked to identify colors either by lining up colored chips or identify numbers written in various colors.

Risks: None

Center for Human Phenomic Science

Ophthalmology Core Protocol and IRB Language

Pupil Exam

The direct and consensual pupillary response will be evaluated using a transilluminator flashlight and utilizing the swinging flashlight technique. Done along with eye exam pupil size can be measured prior to dilation, but if needed should be specifically requested.

Risks: None

Visual Field Measures (Humphrey)

This automated machine maps the peripheral vision utilizing the static stimulus to map peripheral vision thresholds. Testing usually takes about 20 minutes.

Visual Field Measure (Goldman)

This manually operated machine maps the peripheral vision utilizing a kinetic or kinetic stimulus to map peripheral vision thresholds. Testing usually takes about 40 minutes.

Risks: None

Anterior Segment Exam (slit lamp exam)

The anterior segment of the eye will be examined at the slit lamp to assess for any abnormality prior to eye dilation.

Dilation

A medication in the form of eye drops will be put in the eyes to make the pupils larger and paralyze the accommodative focusing muscle in the eye. Pupillary dilation may last up to 24 hours while the blurring effect of paralyzing the focusing muscle only lasts a few hours. The medication usually takes 30 minutes to work.

Risks: The most common side effect is mild discomfort from the drops including burning and stinging upon instilling. In rare cases, adverse side effects may include heart arrhythmia.

Center for Human Phenomic Science

Ophthalmology Core Protocol and IRB Language

Ophthalmoscopy (Fundus Exam)

The back of the eye (fundus) will be examined with an indirect ophthalmoscope held about 2 inches from the eye. If any abnormalities are present, then fundus photography can be obtained to document the retinal structure.

Risks: The light is bright and can cause slight discomfort for the child.

Full Field Sensitivity Testing/ Dark Adaptation

A full field stimulus threshold testing will be performed. Dark adaptation parameters are measured using a standard full field stimulus threshold test using the ColorDome instrument (ColorDome Diagnostics). In brief, the patient with dilated pupils is dark adapted for 40 minutes in a totally dark room. Using the Espion program, the right and left eyes are tested separately using the FST test degeneration protocol. This involves presenting the subject's eye with dim white lights in various regions of the field and asking whether the subject perceives the light. As the light becomes progressively dimmer and the position varies off center, the subject eventually makes a number of errors and the testing is stopped. The probability of correct responses is presented in graphic form and the intensity in decibels is calculated. Testing usually takes about 1.5 hours.

Risks: The patient may fatigue as the test is long.

Optical Coherence Tomography of the Optic Nerve or Retina

Optical coherence tomography (OCT) will be performed to document the anatomical structures of the optic nerve or retina. OCT utilizes optical coherence to measure the retina in microns and document the anatomical structures within the retina. This is a non-contact test whereby the subject stares at a fixation point while a technician images the back of the eye. Testing usually takes about 15 minutes.

Risks: None

Electroretinography

After dilation and a period of dark adaptation, electrophysiology contact lens probes are placed on the eyes to measure the retinal function after stimulation to light. Testing usually takes about 1.5 hours

Risks: There is a small chance of corneal abrasion from the insertion of the contact lens. The patient may get fatigued from the length of the testing.

Center for Human Phenomic Science

Ophthalmology Core Protocol and IRB Language

Visual Evoked Response

This test is a computerized recording of electrical activity in the occipital cortex that results from stimulating the retina with light flashes. This is used for detecting defects in the retina-to-brain pathways.

Risks: Due to the flashing lights this procedure should be carefully administered to patients prone to seizures.

Fundus Photography

This test uses a fundus camera with a high magnification lens to take digital pictures of the retina and optic nerve. Pupil dilation is typically necessary in order to acquire imaging. This test takes about 10 minutes, +/- dilation time.

Risks: Flash is mildly uncomfortable to a dilated eye but very quick.

Ocular Ultrasound

This test utilizes sound waves to create a linear or two-dimensional scan of the eye. A probe is placed on the eye or eyelids to acquire the scan. In a linear scan (A-Scan), eye axial length is usually being measured. In a two-dimensional scan (B-Scan), the contour and reflectivity of sound in the entire globe of the eye is assessed. Testing usually takes about 15 minutes.

Risks: There is a small risk of corneal abrasion to the eye from the probe touching the surface of the eye during an A-Scan.

Sensorimotor Exam

Sensorimotor eye examination includes assessment of ocular motility, ocular alignment in multiple fields of gaze to assess the degree and pattern of strabismus (ocular misalignment), and binocular function, such as stereopsis and fusion. This test takes approximately 15 minutes.

Risks: None