

LSFG SKIN, Laser Speckle Flowgraphy

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#### Standard Clinical Tests:

These tests are routinely done as part of an eye clinic appointment. If so, we will not need to repeat them. All subjects will be told which of the following tests will be done for the study. This will be determined primarily by Dr Kardon.

1. a. Visual acuity will be measured by having the subject read the smallest letters on an eye chart with their glasses or best correction. This takes about 5 minutes or less.
1. b. Intraocular pressure (IOP) may be done using a tonopen. A drop of a topical anesthetic will be placed in the eye as a numbing agent before IOP is checked. The tonopen touches the surface of the cornea of the eye very briefly. This will take a few minutes.
1. c. Blood pressure will be checked using a portable blood pressure cuff. We will have the subjects sit quietly for a few minutes. This will take a few minutes.

#### 2. Ocular Coherence Tomography (OCT):

The thickness of the optic nerve and macula will also be measured inside of the eye using a special camera that forms an image of the layers of the retina. The imaging is harmless and measures the thickness or structural health of retinal layers and optic nerve. This test takes approximately 10 minutes. If the OCT is not available and/or there is not a record of the subject having an OCT, a fundus photo will be taken with a portable fundus camera as a substitute.

If above tests have been done recently, these might not need to be repeated. The PI will decide based on the diagnosis of the subject. If we do not need to repeat them, we will use the result of their previous test(s). The subjects will know before we start what tests will be done for the study.

The following are the new tests that will be done, usually following the above standard testing. Dr Kardon will determine which one or more of the following are appropriate for each subject. The subject will be informed which of the following will be done ahead of time.

Before starting the next section of procedures, the Empatica E4 Wristband will be placed on the patient to allow monitoring of physiological response during the scanning process.

The Empatica E4 Wristband Is a wearable wristband wireless device designed for continuous real-time data acquisition of electrical dermal activity, which measures the sympathetic nervous system arousal. This will allow us to establish a possible connection between changes in sympathetic nervous activity in the patient and changes in ocular and skin blood flow. This is a wristband approximately the size of a watch. The patient will wear one on each wrist.

Laser Speckle Flowgraphy(LSFG-SKIN): This device uses a Class I laser diode. Subjects will be either seated or lying down (supine or prone), determined by skin area to be measured. Next, the LSFG SKIN will be positioned closely to the skin surface for accurate circulatory measurement. During measurement, the subject will be asked to relax, remain still, and maintain normal breathing. This test will take 10-15 minutes with breaks.

For most subjects there is one visit. If they need a followup visit because a repeat measurement is beneficial, we may ask them to retest. We will try to coordinate the study visit with their clinic appointment-if they agree to another study visit. In addition to the test results we obtain from this study, we will also review the subjects's medical chart for doctor's notes regarding their diagnosis and treatment, if it is applicable to the study. Only relevant information will be documented. Data will be stored at the University of Iowa Healthcare, Department of Ophthalmology.

Laser-Speckle Blood Flow Imaging (LSFG-NAVI): This FDA approved device uses a Class I laser diode. Most subjects do not need dilation for this test, but those with smaller pupils may be dilated. Dr Kardon will determine this, or a pupil less than 4-5 mm (the IRIS must be 5mm in darkness). Subjects will be seated at the instrument and we will adjust the chinrest and then let the subject rest with the lights dimmed for about 5 minutes before doing the test. Next, they will place their chin in the chinrest and look at a fixation target. This test will take about 5-10 minutes with breaks. This test may be repeated following a light stimulus given to each eye using a handheld calibrated instrument in order to measure the blood flow response to activation of the retina by light. This will take another 5-10 minutes.

The study is expected to take up to 1 hours to complete. For most subjects there is one visit. If we need to repeat a test because it failed we will call them and ask them to come back and repeat the part of the study that failed. If they have a follow up visit in any of the clinics listed previously and repeat scanning is beneficial or their condition is changing we may ask them to retest. We will try to coordinate the study visit with this appointment- if they agree to another study visit. In addition to the test results we obtain from this study, we will also review the subject's medical chart for other test results and doctors notes regarding their diagnosis and treatment if it is pertinent to their diagnosis and is applicable to the study. Only relevant information will be documented. Data will be stored at University of Iowa Healthcare, Dept of Ophthalmology.

Note: All testing for this study will be done by the research study team in research areas with research equipment. Dr Kardon will not use clinic time for any research related activities. This testing is not billable and is not being used clinically.