

UK Biobank

Measurement of Intraocular Pressure

Version 1.0

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1. Introduction

1.1: This manual details the procedure for Measurement of Intraocular Pressure at an Assessment Centre of the UK Biobank. This is done at the 4th 'station' of the Assessment Centre visit, as listed in Table 1.

Table 1: sequence of assessment visit

	Visit station	Assessments undertaken
1	Reception	<ul style="list-style-type: none"> • Welcome & registration • Generating a USB key for Participants
2	Touch screen Section	<ul style="list-style-type: none"> • Consent • Touch screen questionnaire • Hearing Test • Cognitive function tests (Shape, Pairs, Fluid Intelligence, Snap)
3	Interview & blood pressure	<ul style="list-style-type: none"> • Interviewer questionnaire • Blood pressure measurement • Measurement of arterial stiffness (Pulse Wave Velocity)
4	Eye measurements	<ul style="list-style-type: none"> • Visual acuity • Auto-refraction • Intraocular pressure • Retinal image (OCT Scan)
5	Physical measurements	<ul style="list-style-type: none"> • Height (Standing and Sitting) • Hip & waist measurement • Weight and Bio-impedance (Body Composition) measurement • Hand-grip strength • Heel-bone ultrasound • Spirometry (Lung function Test)
6	Cardio (Physical fitness)	<ul style="list-style-type: none"> • Exercise ECG (Cycling)
7	Sample collection & exit	<ul style="list-style-type: none"> • Blood samples collected • Urine sample sought • Saliva sample sought • Consent & result summary printed • Travel expense claim provided
8	Web-based diet questionnaire	<ul style="list-style-type: none"> • Dietary assessment

1.2: Throughout this document, the term 'Participant' signifies a study participant who is taking part in the Assessment Centre process, regardless of whether they eventually give or withhold consent to take part in the UK Biobank study.

1.3: The collection of data from assessment visits uses the direct data entry system of the Assessment Centre Environment (ACE). This has five components (**Assessment Centre Environment**), of which Vox operates the Ocular station of the assessment visit.

1.4: At the start of their visit, each participant is issued with a USB Key at the Reception station. This USB Key acts as a participant identifier (it contains Participant ID, name, date of birth and gender) and as a temporary storage device for the recorded data. As the participant progresses between stations, the USB key acts as an identifying token and also as a data transfer mechanism. At the Reception & Exit module, all data on the USB key is removed, after it has been backed up to the Assessment Centre head PC.

2. Staff

Assessment centre technicians trained in this procedure are responsible for carrying it out. The Duty Manager oversees that all assessment centre staff work in accordance with the standard operating procedure.

3. Participant testing procedure

3.1: High intraocular pressure can indicate glaucoma. It can be screened for using an optical response analyser, which measures the difference in air pressures at which the cornea flattens inwards and outwards, using a puff of air so there is no contact with the eye. The instrument used at the UK Biobank Assessment Centre is the Reichert Ocular Response Analyser (ORA; figure 1).

Figure 1: Reichert Ocular Response Analyser



3.2: Intraocular pressure is tested after the **Visual Acuity** and **Refraction** tests. The participant is seated in an enclosed dark room, free from sources of glare and conditioned to maintain the correct humidity and temperature for the efficient running of the eye measurement equipment. The participant's USB key remains in the computer, and Vox continues to operate following the previous tests at the station.

3.3: If the participant has had any eye surgery within the last 4 weeks they cannot have any Ocular measurements. Participants with possible eye infections do not undergo refraction, intra-ocular pressure or OCT measurements but may complete the Visual Acuity Measurement.

3.4: Before the testing session each day the dust cover is removed from the Reichert Ocular Response Analyser. The device is switched 'On' before switching the computer base unit on.

4. Testing of Intraocular Pressure

4.1: The measurement procedure is explained to the participant and they are informed that this test will measure the pressure in the eye and that the measurement is taken when a gentle puff of air is felt against the eye. The right eye will be measured first, followed by the left eye. The participant is reassured that the device will move but will not touch the eye. They are reminded to remove glasses and contact lenses. Contact lens cases and solutions are provided for this purpose. If the participant does not wish to do this, the test is not performed and the reason is recorded.

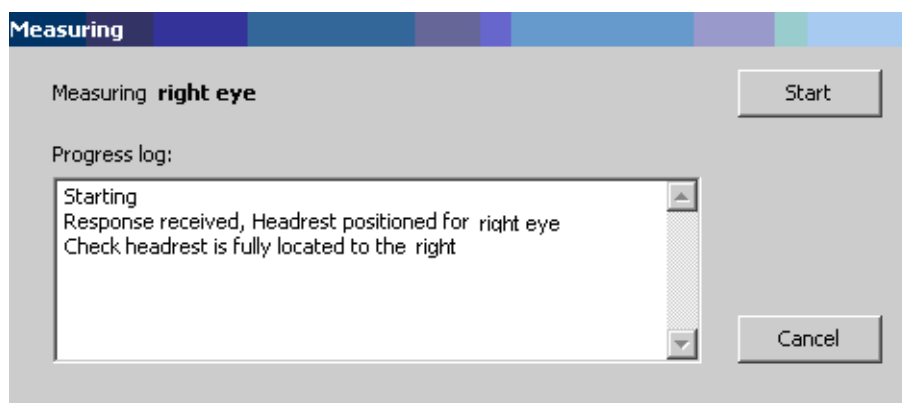
4.2: On the Vox screen 'Measurable' is selected if Intraocular Pressure of the Right eye is measurable. If Intraocular Pressure cannot be measured the reason why this was not performed is selected (Equipment Failure or Other Reason; Other Reason can be either a reason from the drop down menu or free text entered in the blank window space).

The screenshot shows a software window titled "UK Biobank, Miss Caron Paterson : Ocular, Intra-Ocular Pressure (Right Eye) * TRAINING/DEMONSTRATION VISIT *". The main area contains the text "Intra-Ocular Pressure. Right eye" on the left and a large empty box labeled "Right" on the right. In the center, there are three radio button options: "Measurable", "Not performed - equipment failure", and "Not performed - other reason". At the bottom of the window, there are navigation buttons: "< Prev", "Help", "Lock", and "Next >". A progress indicator consisting of a row of small squares is located between the "Help" and "Lock" buttons.

4.3: The participant is positioned using the height-adjustable table to allow them to be sat up straight. The headrest is moved to the left side of the lens and the participant is instructed to place their forehead against the headrest (their chin should be almost resting against the device). It is checked that the participant's eyes are level with the black plastic dot on the side of the ORA device, and that the participant's hair is not between the eye and eye piece as this may affect the reading.

4.4: The participant is instructed to look down the barrel of the device using their right eye. They should view a ring of four red lights with a green light in the middle. If the participant cannot see some or any of these lights then their positioning is checked.

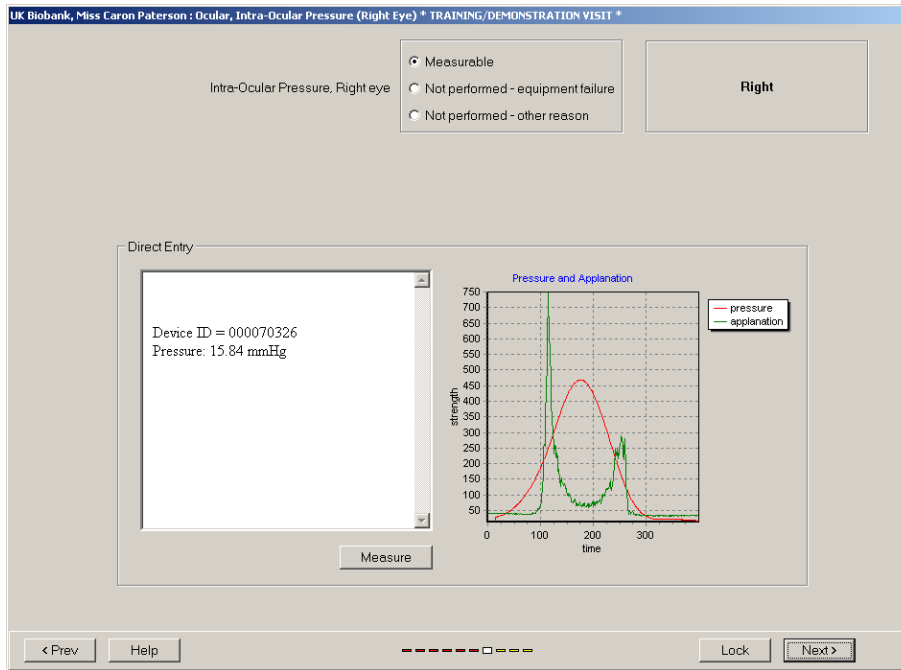
4.5: The Progress Log on a pop up window (below) shows the position of the headrest for the eye being measured. The headrest is checked to be in the correct position.



4.6: Just prior to taking the measurement the participant is asked to blink a few times, then to keep both eyes wide open while staring straight ahead. They are reminded that only a gentle puff of air will be felt, but that nothing else will touch the eye.

4.7: The 'Start' button on Vox is selected. An audible click means that the test has been taken. The results are displayed on the Vox screen.

4.8: If the participant blinks during the measurement, the Progress Log shows that the measurement has not been taken. The operator clicks 'Measure' to attempt the test again. Once the results are displayed on the Vox screen, 'Next' is clicked.



4.9: If the IOP measurement is greater than 24 mmHg the measurement is re-taken by clicking on the 'Measure' button. The participant is checked to be positioned correctly and that their hair is not in the way of the air puff lens. They are instructed not to blink during the measurement. A maximum number of 3 attempts are made at obtaining an accurate result.

4.10: The left eye is measured as outlined above. The participant then proceeds to the capture of **Optical Coherence Tomography** and Retinal Imaging.

4.11: The headrest is cleaned with Azowipes. The air tube is not cleaned.