BioMech Lab™

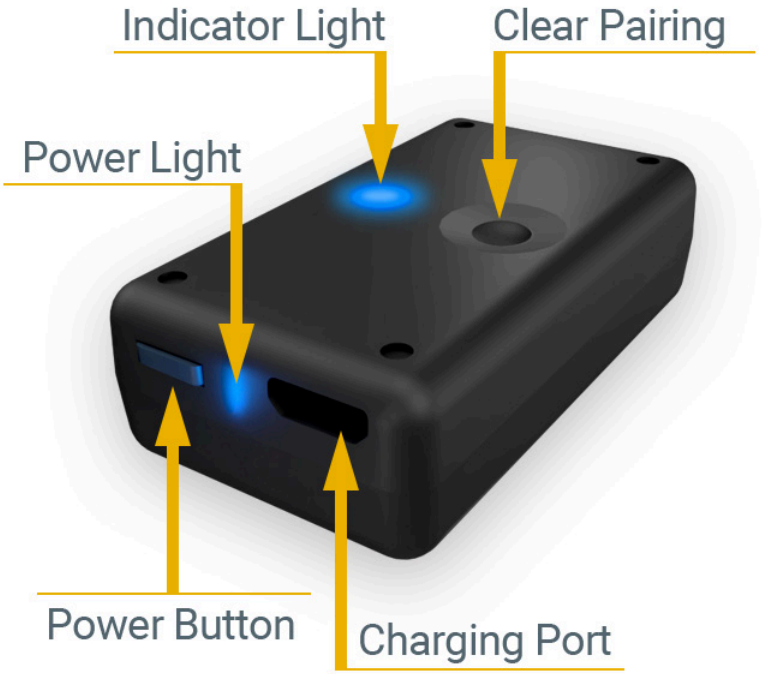
USER MANUAL

VERSION 5.2

TABLE of CONTENTS

SYSTEM STARTUP

SENSOR STARTUP

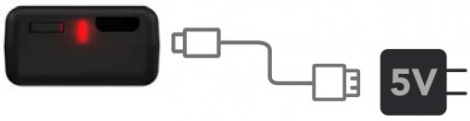


INDICATOR LIGHT COLORS:

- **ORANGE FLASHING LIGHT:** Sensor is calibrating
- **BLUE FLASHING LIGHT:** Sensor is calibrated
- **GREEN FLASHING LIGHT:** Sensor is assigned to test
- **RED FLASHING LIGHT:** Sensor battery level is below 10%

STEP 1 - CHARGE SENSOR

- Connect sensor(s) to the provided charging cord and any 5V USB power adapter.
- Power light is RED while charging.



Charging light will shut off when complete

STEP 2 - POWER SENSOR ON

- PRESS the power button to turn the sensor on.
- Light will FLASH alternating YELLOW/ORANGE.

STEP 3 - CALIBRATE SENSOR

- Light will turn BLUE when auto-calibration is complete.

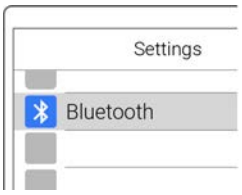
> ***NOTE: IF SENSOR CONTINUES TO FLASH YELLOW/ORANGE, WAVE SENSOR IN A FIGURE 8 MOTION.***

PAIR SENSOR

STEP 4 - PAIR SENSOR TO DEVICE

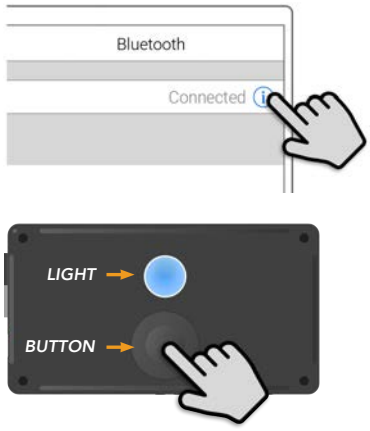
- Go to Settings/Bluetooth on your iOS device.
- Turn on Bluetooth.
- Select "BioMech-XXXX"
- Select "ALLOW" when prompted.

  Your device is now paired with your sensor.



The sensor ID name is located on bottom of the sensor

NEED TO PAIR SENSOR TO ANOTHER DEVICE?



UNPAIR SENSOR

UNPAIR BLUETOOTH

- Go to Settings/Bluetooth on the iOS device paired with the sensor.
- Tap ⓘ next to the corresponding sensor.
- Tap "Forget This Device"

RESET SENSOR

- Press and HOLD Clear Pairing button on top of sensor while turning sensor ON.
- Continue holding Clear Pairing button until sensor light begins FLASHING BLUE/WHITE.
- Follow steps to pair sensor to device

  (device must have BioMech Lab pre-installed).

SENSOR ATTACHMENT

To facilitate optimal data capture it is imperative sensors are securely attached, NOT over loose clothing, to minimize shifting or movement. Attach sensor consistently in the same spot for all assigned locations.

SENSOR ATTACHMENT METHODS

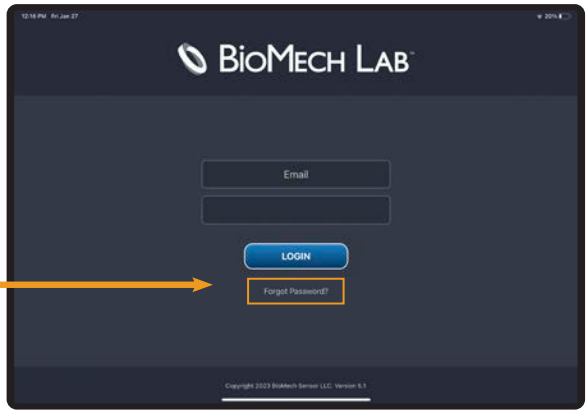
- BioMech skin-safe, single-use, double-sided tape that attaches to the back of the sensor and is placed directly on the skin. (BioMech provides a starter-roll of tape with each subscription. Refills are available for purchase).
- BioMech sensor clips that attach to a stable waistband for Gait tests. (BioMech provides three clips with each subscription. Additional clips are available for purchase).
- Traditional attachment methods such as tape or bandages.

SOFTWARE NAVIGATION

LOGIN

Log into BioMech Lab with the username provided by BioMech.

NOTE: TAP FORGOT PASSWORD TO RESET OR CHANGE YOUR PASSWORD FOR SECURITY REASONS.



HOME

BioMech Lab testing is patient-centric. To begin testing, retrieve results and run reports select an existing patient or add a patient to the directory.

NOTE: LAB AT HOME PATIENT ACCOUNTS AUTOMATICALLY OPEN TO THEIR TEST OPTIONS.

CREATE NEW PATIENT
If the patient is not in the Patient Directory, create a new patient.

EXISTING PATIENT
Select a patient in the Patient Directory.

LOGOUT
Sign out of the BioMech Lab app.

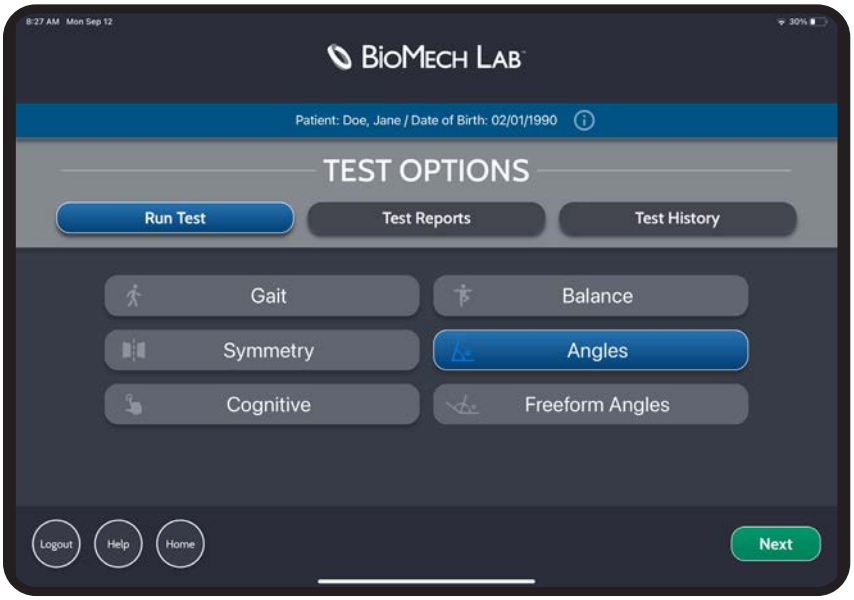
APPLICATION DATA
BioMech Lab user and version reference.

HELP OPTIONS

SUPPORT
Submit a ticket for assistance or to provide feedback.

USER GUIDE
Access manuals and frequently asked questions.

TEST OPTIONS



NOTE: LAB AT HOME PATIENT ACCOUNTS OPEN DIRECTLY TO THEIR TEST OPTIONS

← Select appropriate task.

← Select the test category.

← Step 3:Tap **NEXT**.

RUN TEST

Define and perform tests.

ORDER | RESULTS | REVIEW

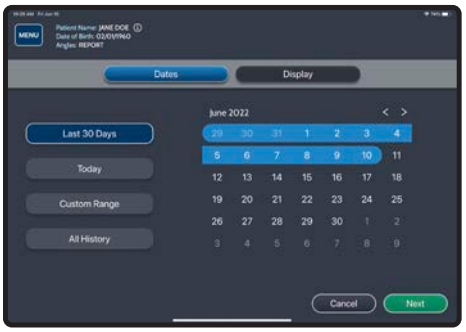
Set the appropriate test criteria, execute the test, review the results and access past tests.

TEST REPORTS

Generate test reports.

REPORT SETUP CRITERIA

Set the appropriate filters to run the report.

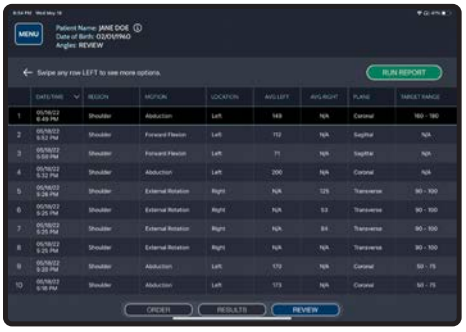


TEST HISTORY

Access past tests.

SORT CRITERIA

Tap the table headers to organize the test list.



TESTING WORKFLOW

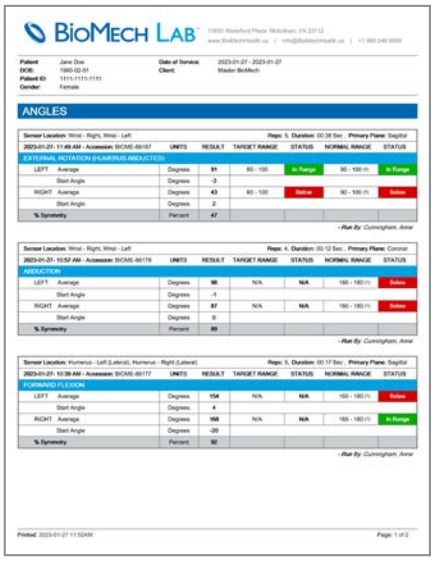
ORDER
Define test parameters.

RESULTS
Run test and view results.

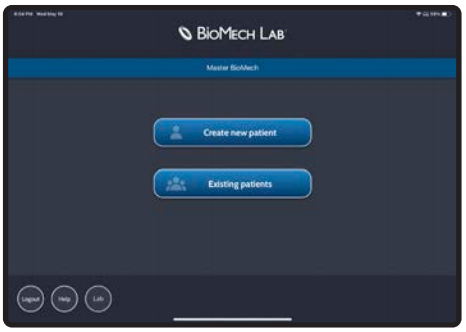
REVIEW
Review previous test.

INDIVIDUAL REPORTS
Generate single test report.

CUMULATIVE REPORTS
Generate multiple test reports.



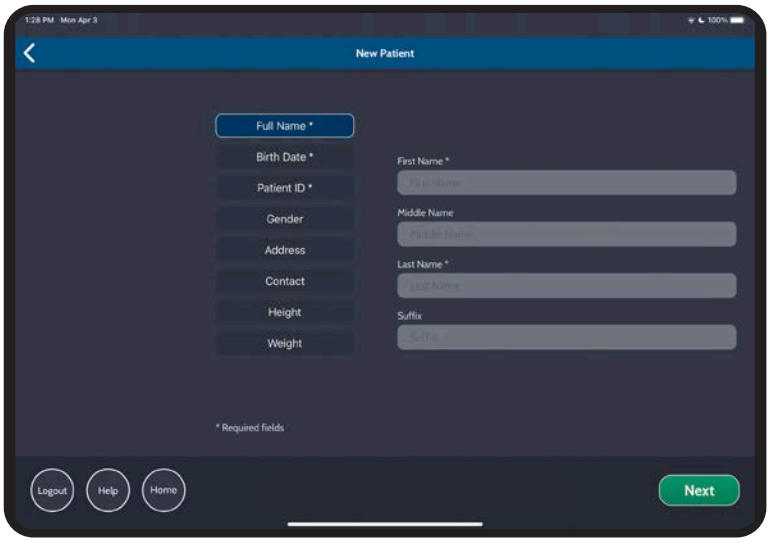
PATIENT SELECTION



CREATE NEW PATIENT

STEP 1 - SELECT CREATE NEW PATIENT

Tap to access the New Patient Form.



STEP 2 ENTER PATIENT INFORMATION

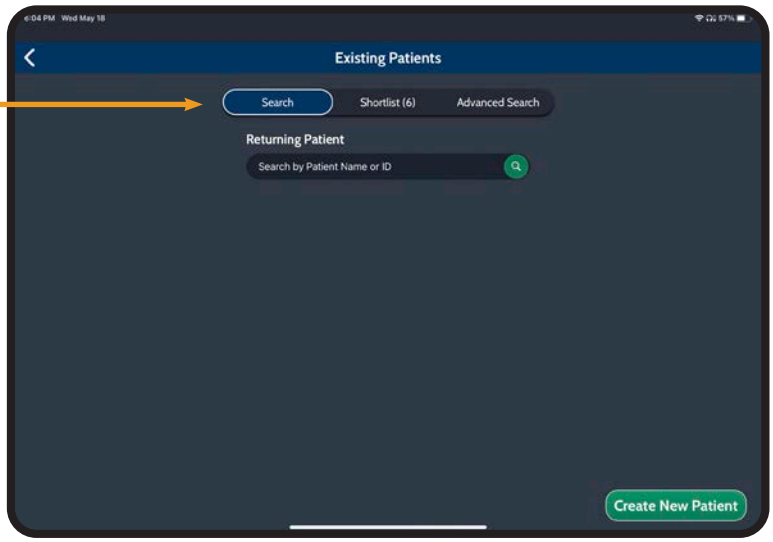
First Name, Last Name, Birth Date and Patient ID are required. Other fields are optional.

STEP 3

Tap NEXT when finished.

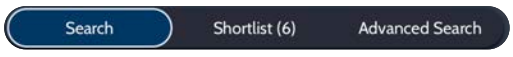
EXISTING PATIENT

Tap EXISTING PATIENTS to access the Patient Directory.



SEARCH

Use the search tools to find and select an existing patient.

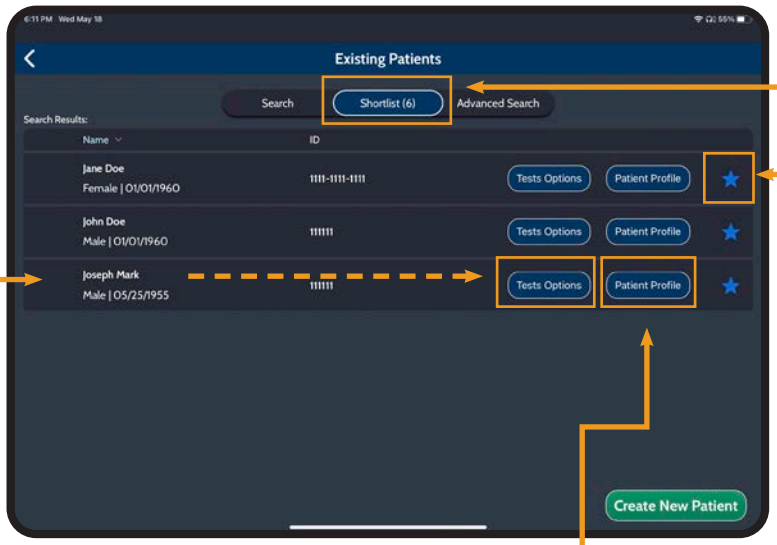


EXISTING PATIENT (CONTINUED)

TEST OPTIONS

Tests Options

Tap to access test options: RUN TEST, TEST REPORTS & TEST HISTORY.



SHORTLIST

Shortlist (6)

Tap the ★ associated with a patient to add them to the SHORTLIST; the star will turn blue. To remove a patient from SHORTLIST tap the blue star; it will turn to a white outline.

PATIENT PROFILE

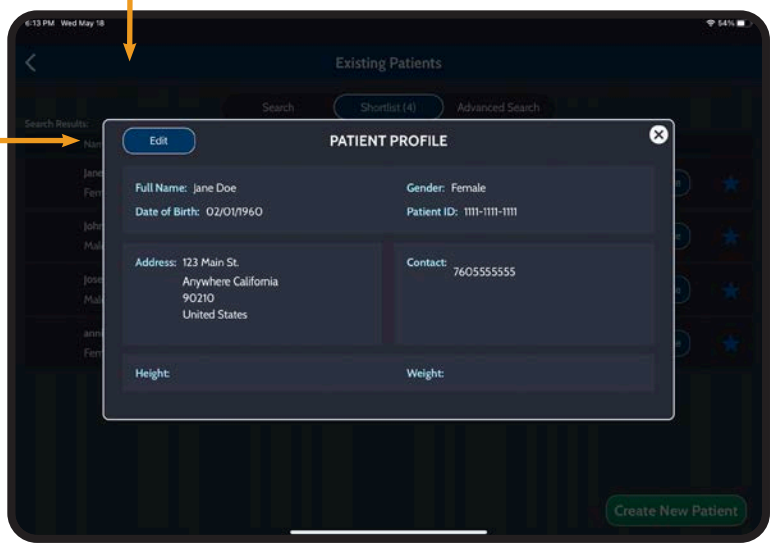
Patient Profile

Tap to view patient information.

EDIT PATIENT PROFILE

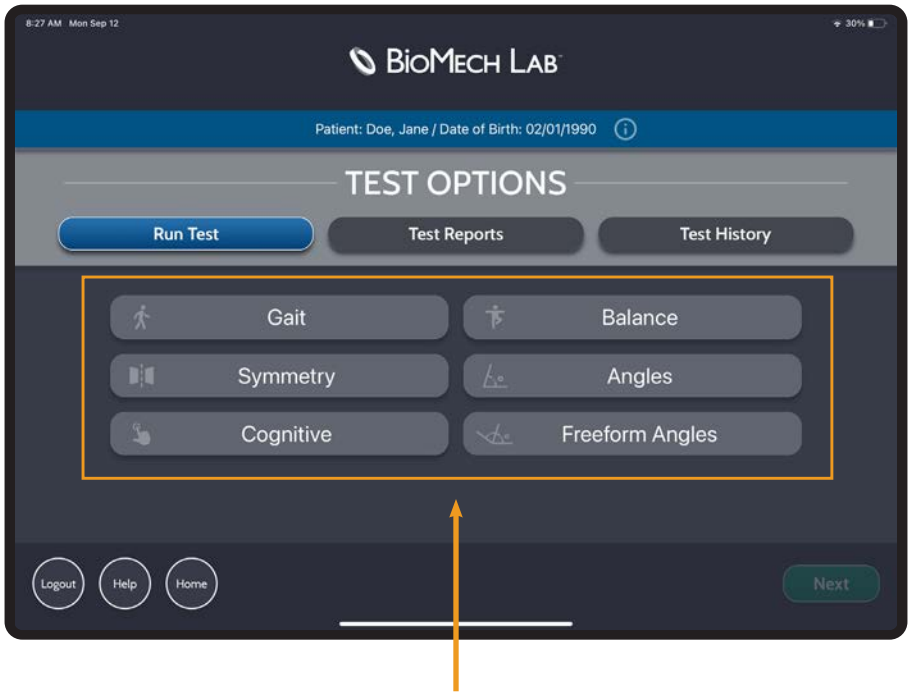
Edit

Tap to edit patient information.

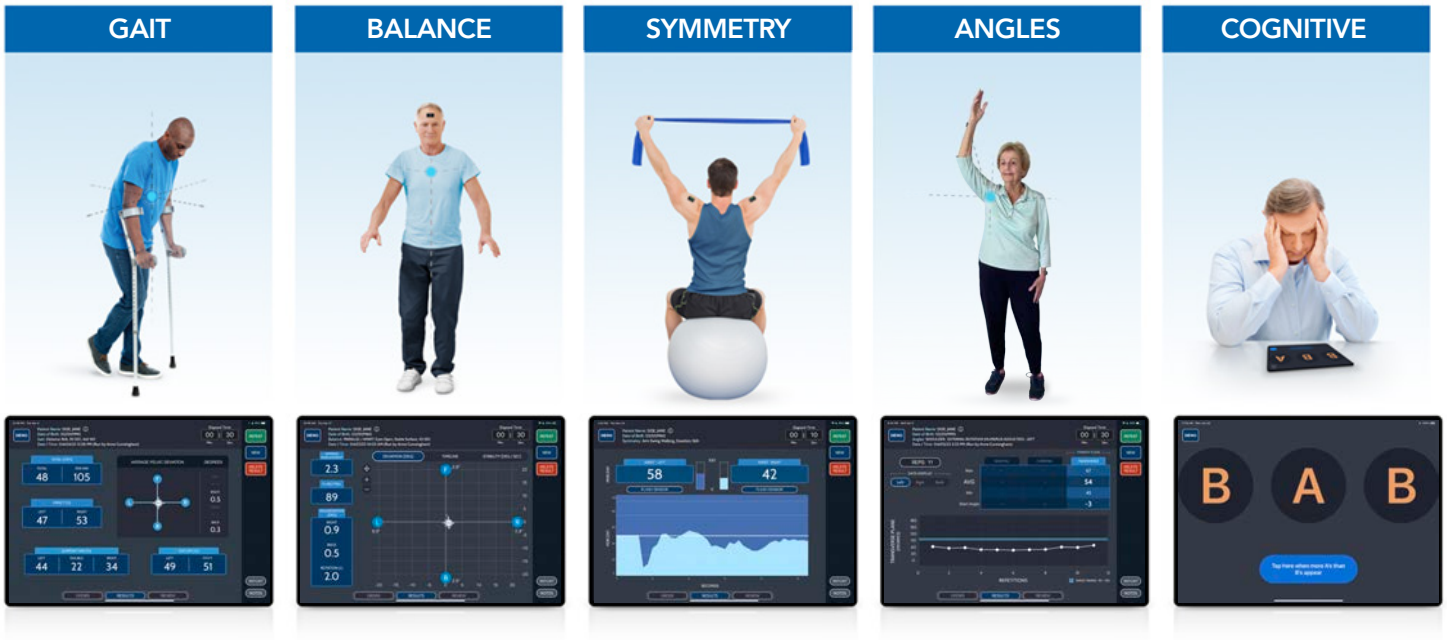


TESTING

TEST MENU



Evaluate Critical Properties of Motion in Real Time



ASSIGNING SENSOR(S) TO TESTS

SENSOR DIALOG BOX

Assign Sensor

Tap ASSIGN SENSOR to view available sensors and assign locations.

BM-3F39
WRIST-LEFT

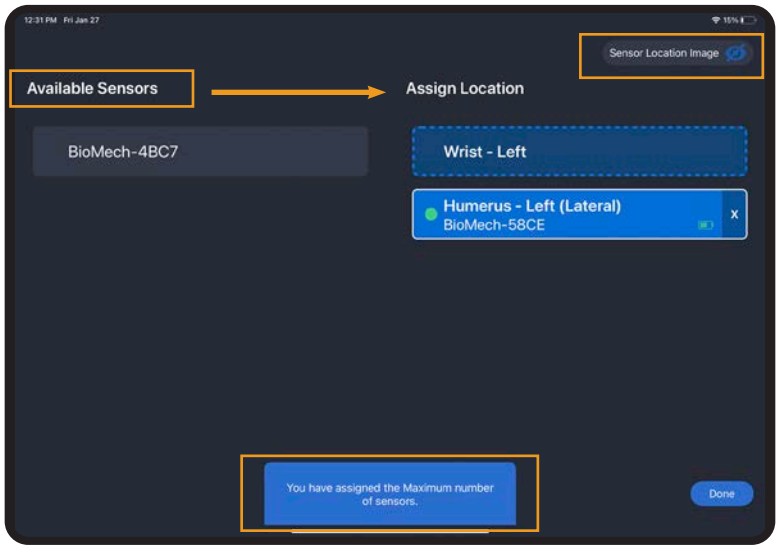
Once assigned, the Sensor Button will be GREEN and list the Sensor's assigned location.

NOTE: A SENSOR WILL BE ASSIGNED AUTOMATICALLY IF ONLY ONE SENSOR IS PAIRED AND THE TEST ONLY REQUIRES ONE SENSOR.

ASSIGN AVAILABLE SENSORS TO LOCATIONS

DRAG AND DROP an available sensor to the preferred location, or tap desired sensor and then tap preferred location.

Tap Done once required sensors have been assigned.



SHOW/HIDE LOCATION IMAGE

Tap Sensor Location Image to show/hide an image detailing correct placement for the selected location.

UNASSIGN SENSOR

Tap the X to unassign a sensor. The sensor will then appear in the list of Available Sensors to assign to a location.

REQUIRED SENSORS

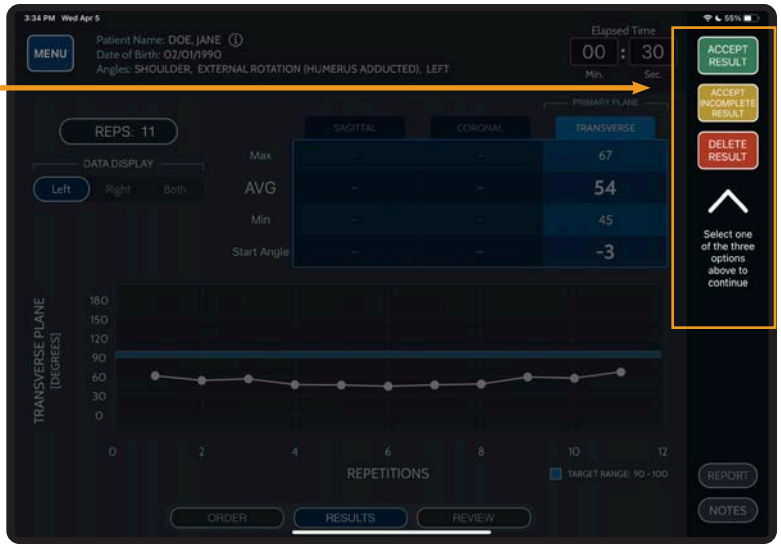
Identifies the number of sensors needed for the specific test.

ACCEPT OR DELETE TEST RESULT

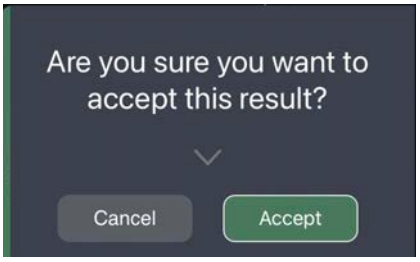
VERIFY RESULTS

Upon completion of a test, ACCEPT RESULT, ACCEPT INCOMPLETE RESULT or DELETE RESULT.

NOTE: A DECISION MUST BE MADE TO CONTINUE.

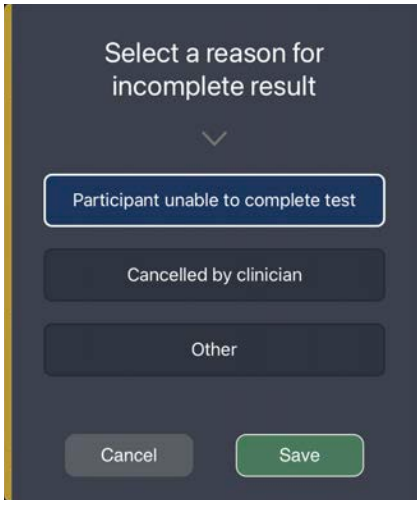


ACCEPT RESULT



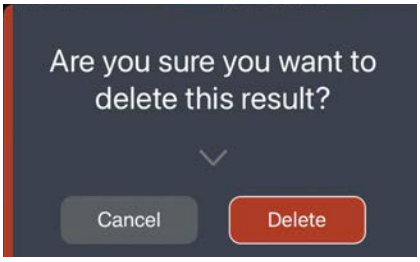
ACCEPTED RESULTS will be available within the application and via the web portal for review and reporting.

ACCEPT INCOMPLETE RESULT



ACCEPTED INCOMPLETE RESULTS indicates a test was attempted, not completed and the reason. These results will be available within the application and via the web portal for review and reporting.

DELETE RESULT



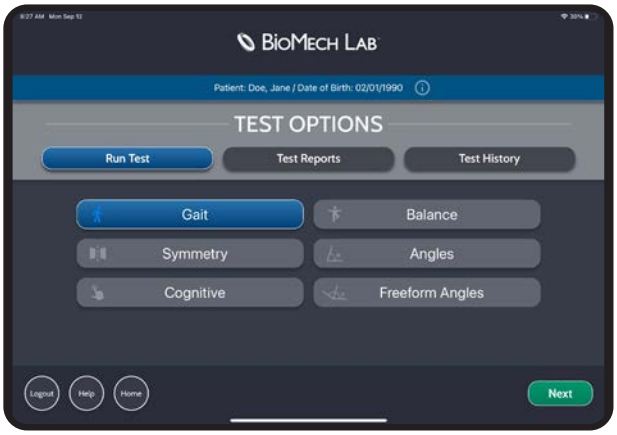
DELETED RESULTS will be discarded from the application but will be accessible via the web portal if needed.

GAIT TESTS

COMPREHENSIVE MEASUREMENT OF KEY GAIT PARAMETERS

Sensor Quantity: 1, **Sensor Location:** Lower Back, **Recommended Starting Position:** Standing Up Straight

GAIT TESTS



GAIT TEST ORDER

DISTANCE
Set test distance. Default setting N/A (i.e. no set distance will be applied to the test). Tap OTHER to specify a different distance. Tap FEET or METERS to set unit accordingly.

DURATION
Set test duration. Default setting is N/A (unlimited time).

Tap NEXT when finished.

AID
Identify if an assistive device/person is used for the test (e.g. crutches, walker, cane, walking belt, etc.).

GAIT TEST CONTROLS

ELAPSED TIME
Displays test time. If duration is specified, the test will stop once the duration is reached.

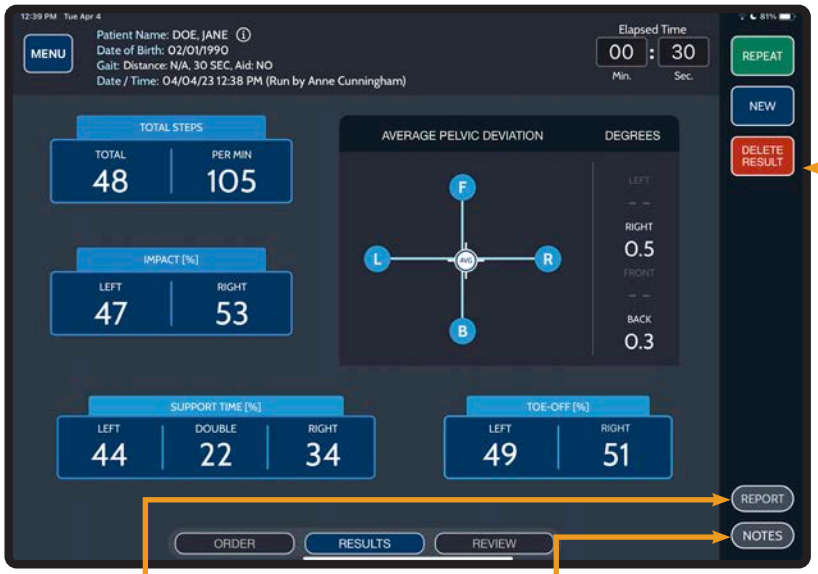
START/STOP
Make sure the patient is standing up straight, still and facing the direction they will be walking prior to pressing START.

Tap START to begin a test. START displays when not recording; STOP displays while a test is being performed.

Tap STOP to stop/pause a test.

TIP: LONG-PRESS START TO INITIATE 5 SECOND TIMER.

ASSIGN SENSOR(S)
Sensor(s) must be assigned to enable the Start button.



REPEAT
Tap REPEAT to perform a new test with the same criteria.

NEW
Tap NEW to return to ORDER to set up a new test.

DELETE RESULT
Tap to DELETE the test result.

REPORT
Tap REPORT to generate a detailed PDF report for the displayed test.

NOTES
Tap NOTES to add/edit test notes. Multiple notes may be saved to a test.

GAIT TEST RESULTS

AVERAGE PELVIC DEVIATION
Average deviation from starting position (measured in degrees). The white dot indicates the average tendency.

FORWARD (F) BACKWARD (B) LEFT (L) RIGHT (R)

TOTAL STEPS

TOTAL: Number of steps performed.

PER MIN: Average number of steps per minute.

ELAPSED TIME
Displays test time.

IMPACT %
Percent of total impact for each foot.

SUPPORT TIME
Percent of time one or both feet are in contact with the ground.

LEFT / RIGHT: Percent of time one foot is in contact with the ground.

DOUBLE: Percent of time both feet are in contact with the ground.

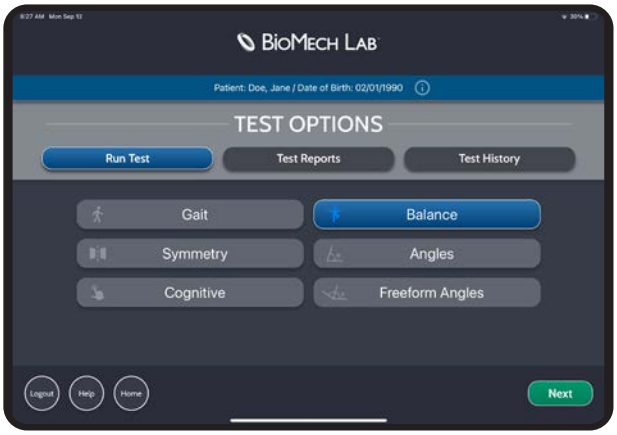
TOE-OFF
Percent of time the trailing foot is in contact with the ground during Double Support.

BALANCE TESTS

MEASURES DEVIATION AND RECOVERY EVENTS

Sensor Quantity: 1 **Sensor Location:** Front of Head (default), Base of Neck, or Lower Back
Recommended Starting Position: Standing Up Straight

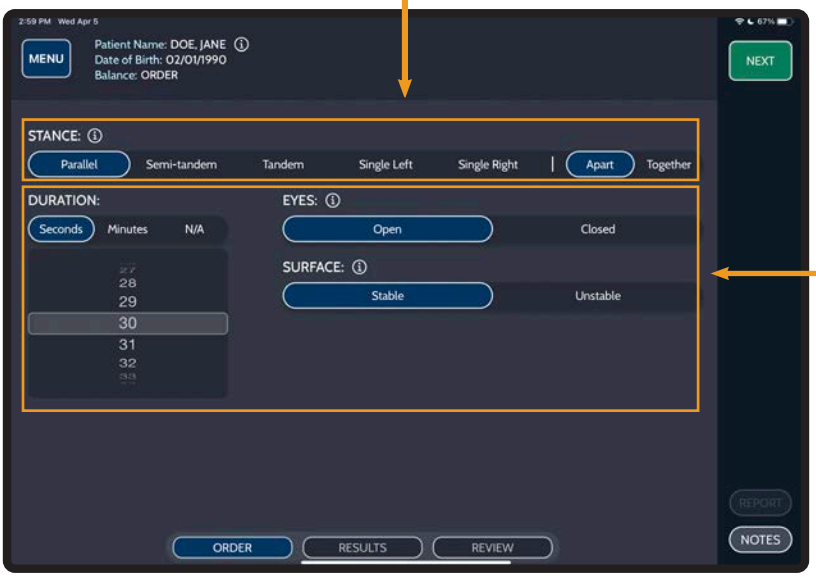
BALANCE TESTS



BALANCE TEST ORDER

STANCE

Options for feet placement include PARALLEL, SEMI-TANDEM, TANDEM, SINGLE LEFT and SINGLE RIGHT. If Parallel is selected, define if the feet will be together or apart. If Semi-Tandem or Tandem is selected, define which foot is forward (LEFT/RIGHT).



Tap NEXT when finished.

DURATION

Set test duration. Default setting is 30 seconds. Select N/A to test for an unlimited time.

EYES

Select whether the patient's eyes will be OPEN or CLOSED.

SURFACE

Select whether the patient will be standing on a STABLE or UNSTABLE surface.

BALANCE TEST CONTROLS

ELAPSED TIME
Displays test time. If duration is specified, the test will stop once the duration is reached.

START/STOP
Make sure the patient is in the desired starting position prior to pressing START. Tap START to begin a test. START displays when not recording; STOP displays while a test is being performed.

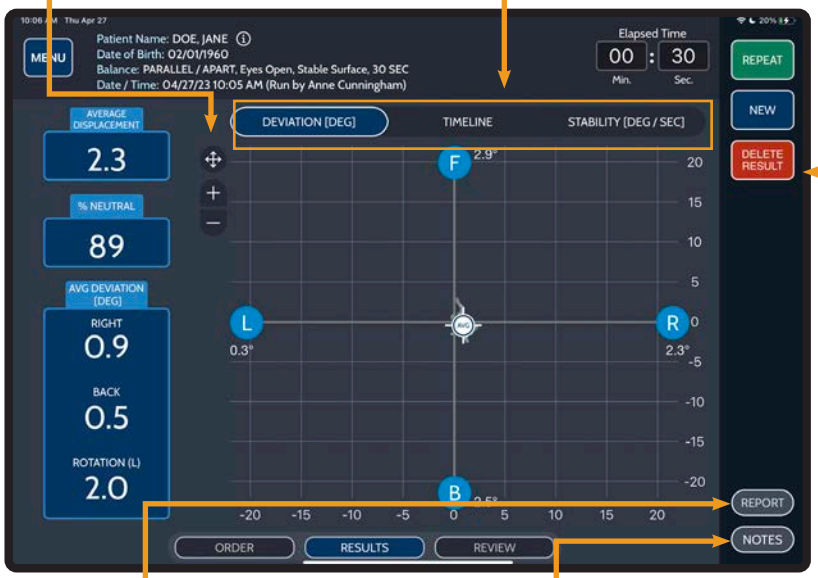
Tap STOP to stop a test.

TIP: LONG-PRESS START TO INITIATE 5 SECOND TIMER.

ASSIGN SENSOR(S)
Sensor(s) must be assigned to enable the Start button.

ZOOM
Tap + / - to zoom in / out or tap ✥ to autofit charts

CHARTS
Tap RECOVERY, DEVIATION, or TIMELINE to view respective graphs.



REPEAT
Tap REPEAT to perform a new test with the same criteria.

NEW
Tap NEW to return to ORDER to setup a new test.

DELETE RESULT
Tap to DELETE the test result.

REPORT
Tap REPORT to generate a detailed PDF report for the displayed test.

NOTES
Tap NOTES to add/edit test notes. Multiple notes may be saved to a test.

BALANCE TEST RESULTS

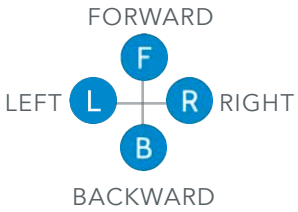
DEVIATION

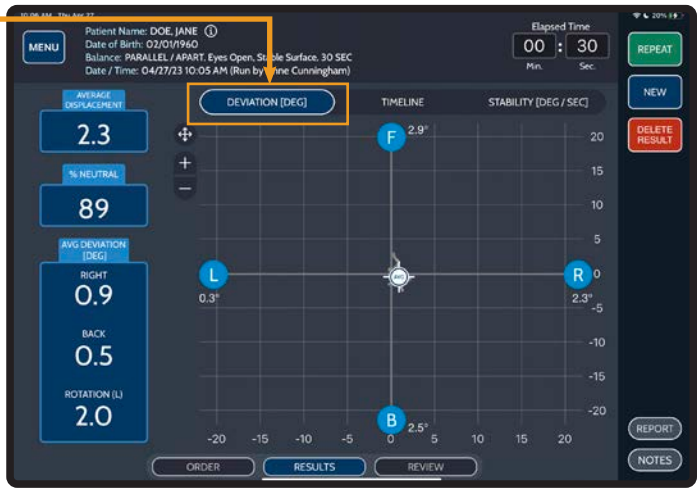
AVERAGE DISPLACEMENT: Magnitude and direction of deviation from the starting position in three dimensions (xyz).

% NEUTRAL: Amount of deviation compared to a 20° maximum threshold, expressed as a percentage.

AVG DEVIATION: Average amount of deviation from the starting position with respect to direction, measured in degrees.

GRAPH: Charts the displacement value and provides the maximum degrees of deviation for each direction.





TIMELINE

GRAPH: Charts a timeline of the displacement throughout the test.

STABILITY

TOTAL SCORE The measurement of velocity when returning to the initial balance position, measured in degrees per second.

DIRECTION Measurement of Left/Right, Front/Back and Rotational movements.

GRAPH Charts the measurement of velocity when returning to the initial balance position, measured in degrees per second.

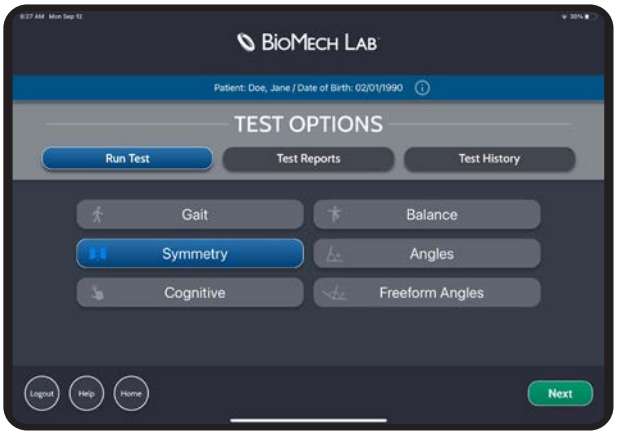
SYMMETRY TESTS

ASSESS SYMMETRY/ASYMMETRY BETWEEN TWO LOCATIONS

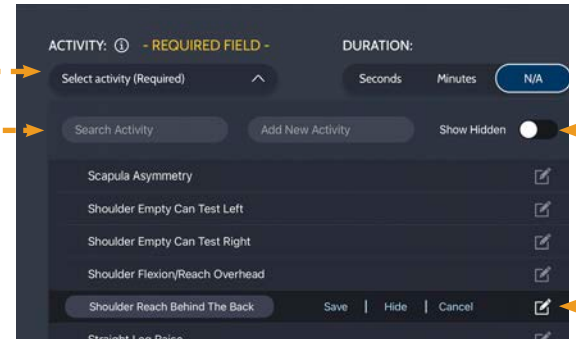
Sensor Quantity: 2
Sensor Location: Multiple Supported Locations

Location - 1	Location - 2
Shoulder (Right)	Shoulder (Left)
Elbow (Right)	Elbow (Left)
Wrist (Right)	Wrist (Left)
Knee Above (Right)	Knee Above (Left)
Knee Below (Right)	Knee Below (Left)
Foot (Right)	Foot (Left)

SYMMETRY TESTS



SYMMETRY TEST ORDER



Tap NEXT when finished.

DURATION
Set test duration. Select N/A to test for an unlimited time.

ACTIVITY
Tap to access the Activity dialog box.

Select the Activity from the list or tap ADD/EDIT to add to or modify the list.

Toggle to SHOW HIDDEN activities.

Tap to EDIT or HIDE an activity.

SYMMETRY TEST CONTROLS

ELAPSED TIME
Displays test time. If duration is specified, the test will stop once the duration is reached.

START/STOP
Make sure the patient is in the desired starting position prior to pressing START. Tap START to begin a test. START displays when not recording; STOP displays while a test is being performed.

Tap STOP to stop/pause a test.

TIP: LONG-PRESS START TO INITIATE 5 SECOND TIMER.

ASSIGN SENSOR(S)
Sensor(s) must be assigned to enable the Start button.

FLASH SENSOR
Tap FLASH SENSOR to have associated sensor light blink green.

REPEAT
Tap REPEAT to perform a new test with the same criteria.

NEW
Tap NEW to return to ORDER to set up a new test.

DELETE RESULT
Tap to DELETE the test result.

REPORT
Tap REPORT to generate a detailed PDF report for the displayed test.

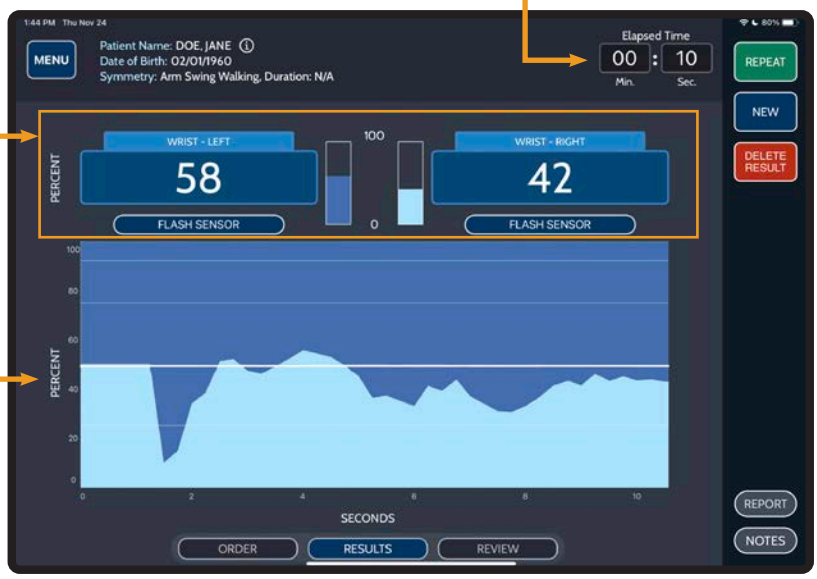
NOTES
Tap NOTES to add/edit test notes. Multiple notes may be saved to a test.

SYMMETRY TEST RESULTS

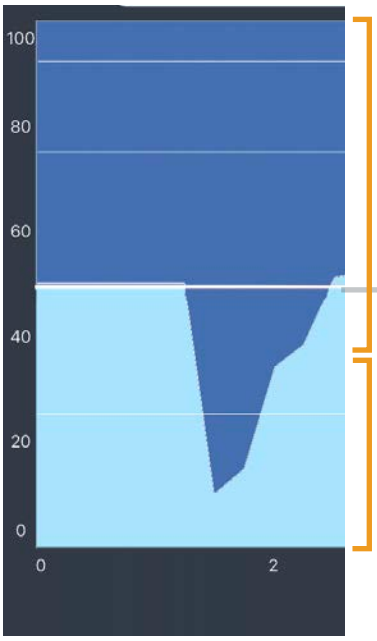
RELATIVE PERCENTAGE
Compares percent of total angular velocity for each sensor (measured in degrees/second).

While running a test, the current value is displayed. Once the test is complete the average amount of movement over the course of the test is displayed.

ELAPSED TIME
Displays test time.



GRAPH
Charts the proportional contributions of movement changes over time.



SENSOR LOCATION 1
Color indicates relative percentage of assigned sensor (e.g. Wrist-Left).

50% MARK
Test begins at 50/50 and adjusts based on proportional contributions.

SENSOR LOCATION 2
Color indicates relative percentage of assigned sensor (e.g. Wrist-Right).

ANGLES TESTS

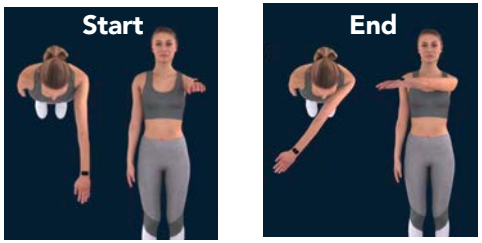
STRUCTURED RANGE OF MOTION ANALYSIS

Sensor Quantity: 1 - 2, **Sensor Location:** Test Specific

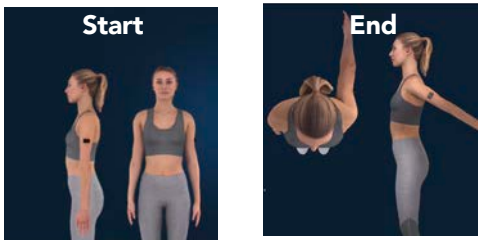
ANGLES TEST MOTIONS

ABDUCTION Arms resting at side, palm facing body, bring arm laterally over head.
Normal Range of Motion: 160 - 180[1] (Coronal)

CROSS-BODY ADDUCTION Arms extended laterally, parallel to the ground, palm facing down, rotate inward across chest.
Normal Range of Motion: TBD (Transverse)



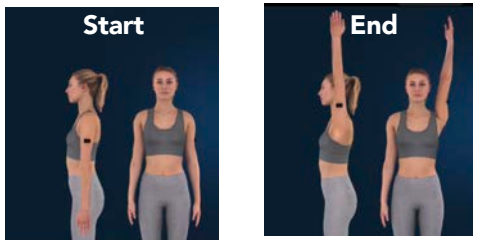
EXTENSION Arms at side, palm facing inward, extend arm backward.
Normal Range of Motion: 50 - 60[1] (Sagittal)



EXTERNAL ROTATION (HUMERUS ABDUCTED) Arms extended laterally, parallel to the ground, flex the elbow at 90°, palm facing down, rotate shoulder upward.
Normal Range of Motion: 90 - 100[1] (Transverse)

EXTERNAL ROTATION (HUMERUS ADDUCTED) Arms at side, flex elbow to 90°, palm facing body, externally rotate shoulder.
Normal Range of Motion: 90 - 100[1] (Transverse)

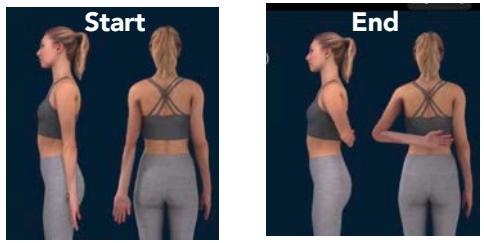
FORWARD FLEXION Arms resting at side, palm facing body, bring forward over head.
Normal Range of Motion: 165 - 180[1] (Sagittal)



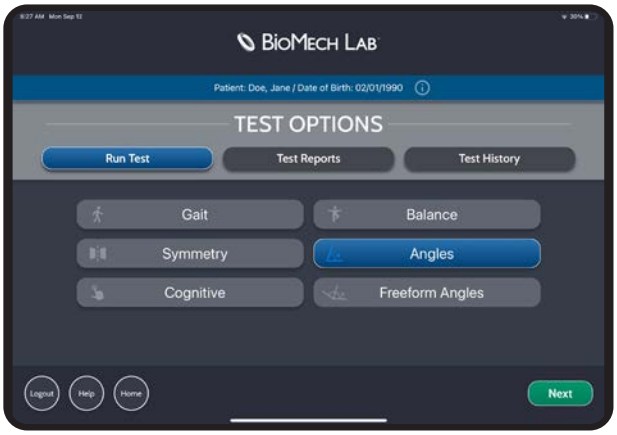
INTERNAL ROTATION (HUMERUS ABDUCTED) Arms extended laterally, parallel to the ground, flex the elbow at 90°, palm facing down, rotate shoulder downward.
Normal Range of Motion: 70 - 90[1] (Transverse)

INTERNAL ROTATION (HUMERUS ADDUCTED)
Arms at side, flex the elbow at 90°, palm facing body, internally rotate shoulder.
Normal Range of Motion: 65 - 75[1] (Transverse)

INTERNAL ROTATION (POSTERIOR IRB)
Arms resting at side, palm facing back, raise hand to internally rotate the shoulder.
Normal Range of Motion: TBD (Coronal)



ANGLES TESTS

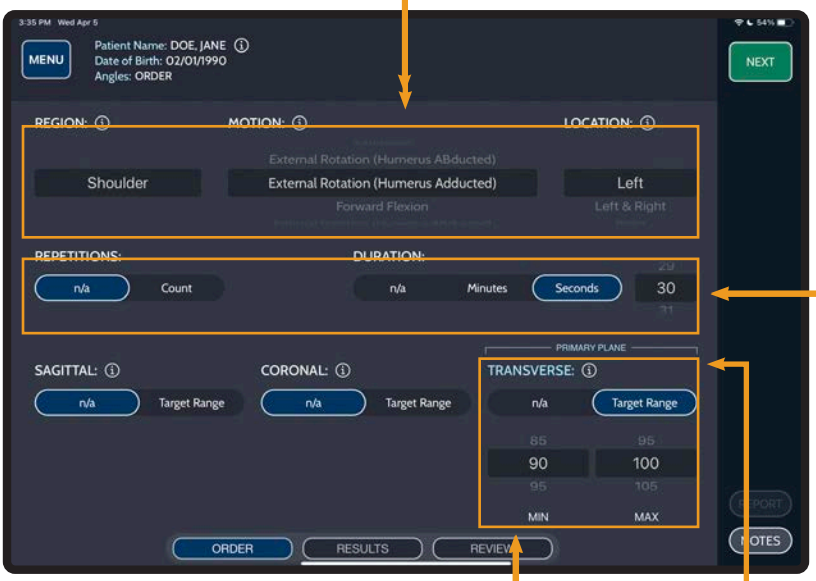


ANGLES TEST ORDER

REGION
Select the body region to be evaluated.

MOTION
Select the motion to be evaluated.

LOCATION
Select a location to perform a unilateral or bilateral evaluation.



Tap NEXT when finished.

REPETITIONS
Set the number of repetitions to be performed. Default setting is n/a (unlimited repetitions).

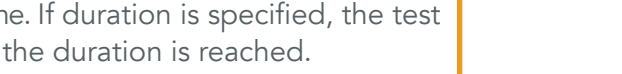
DURATION
Set test duration. Default setting is n/a (unlimited time).

TARGET RANGE (SAGITTAL, CORONAL & TRANSVERSE PLANES)
Set minimum and maximum range of motion thresholds for primary plane movement. The target range is visible on the test graph when defined. Default setting is n/a (no target range set).

TIP: THE PRIMARY PLANE IS INDICATED FOR THE SELECTED MOTION.

ANGLES TEST CONTROLS

ELAPSED TIME
Displays test time. If duration is specified, the test will stop once the duration is reached.



START/STOP
Make sure the patient is in the desired starting position prior to pressing START. Tap START to begin a test. START displays when not recording; STOP displays while a test is being performed.

Tap STOP to stop/pause a test.

TIP: LONG-PRESS START TO INITIATE 5 SECOND TIMER.

WATCH MOTION DEMO
View a simulation for selected motion.

ASSIGN SENSOR(S)
Sensor(s) must be assigned to enable the Start button.

DATA DISPLAY
Toggle between table and graph data for Left and/or Right datasets.

REPEAT
Tap REPEAT to perform a new test with the same criteria.

NEW
Tap NEW to return to ORDER to set up a new test.

DELETE RESULT
Tap to DELETE the test result.

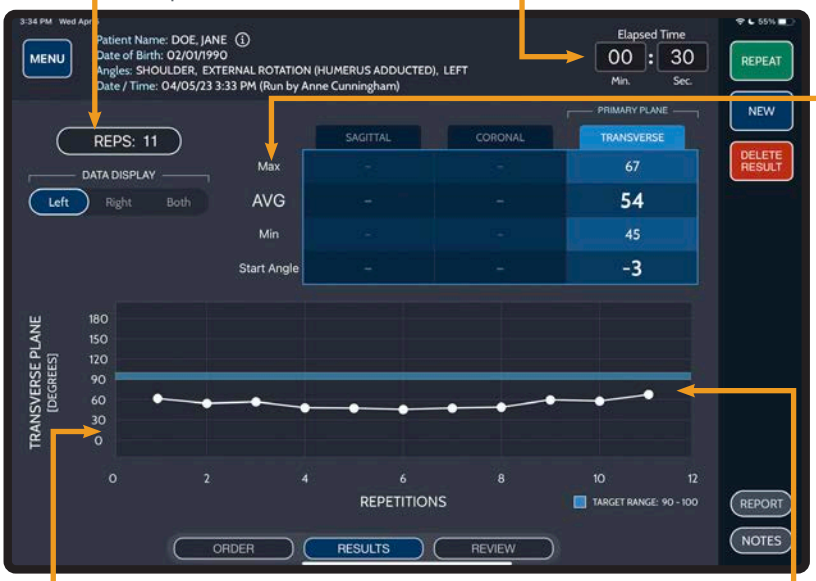
REPORT
Tap REPORT to generate a detailed PDF report for the displayed test.

NOTES
Tap NOTES to add/edit test notes. Multiple notes may be saved to a test.

ANGLES TEST RESULTS

REPETITIONS
Number of motions completed.

ELAPSED TIME
Displays test time.



GRAPH
Charts motion repetitions in degrees from the starting position.

MINIMUM RANGE OF MOTION
Motion with the smallest recorded angle.

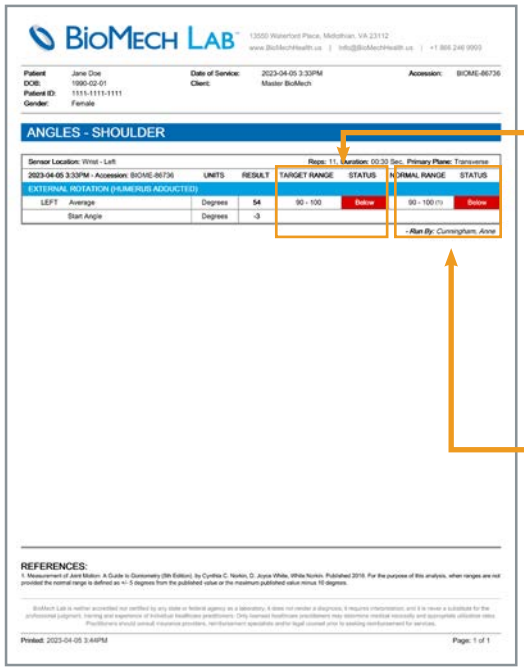
AVERAGE RANGE OF MOTION
Average value of results across repetitions performed.

MAXIMUM RANGE OF MOTION
Motion with the greatest recorded angle.

START ANGLE
Records sensor orientation with respect to the ground.

Positive value: Tilt at start of test is in the same direction as the intended motion. (e.g. Start of 2° with Max of 47° = total movement of 45°).

Negative value: Tilt at start of test is in the opposite direction of the intended motion. (e.g. Start of -3° with Max of 93° = total movement of 96°).



TARGET RANGE
On Graph: Identifies whether the repetition is below, within or above the set Target Range. (Applicable when a target range is defined on the order screen).

On Report: Identifies whether the average deviation is below, within or above the selected target range.

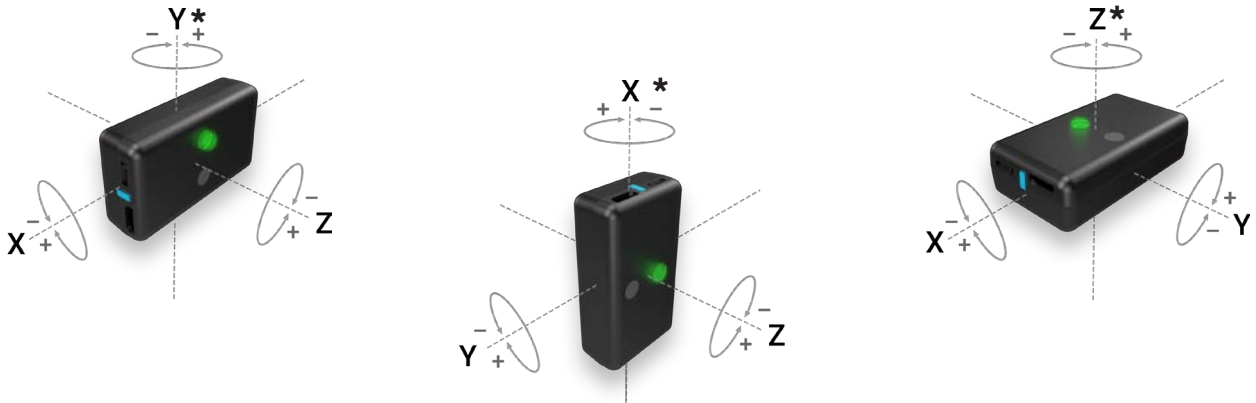
NORMAL RANGE
Identifies whether the average deviation is below, within or above the normal range. Applicable when an established normal range has been referenced.

FREEFORM ANGLES TESTS

USER-DEFINED RANGE OF MOTION ANALYSIS

Sensor Quantity: 1, **Sensor Location:** Anywhere

FREEFORM ANGLES ANALYSES



FROM STARTING POSITION

Place a sensor anywhere to evaluate and report three-dimensional changes in position. The results are displayed in an X,Y, Z table to communicate the three planes. This allows the user flexibility to perform any test in any position. Positive and negative values indicate the directionality.

USE CASES

- Testing range of motion (beyond those provided in the structured angles test menu) in a variety of positions (standing, sitting, prone, supine, etc.)
- Measuring dynamic and functional activities
- Training patients to perform appropriate rehabilitative movements while they observe the real-time data feed, such as:
  - Maintaining proper alignment under load and/or during movement
  - Stabilizing unwanted movements
  - Reaching a suggested degree of rotation
  - Quantifying strengthening/stretching exercises

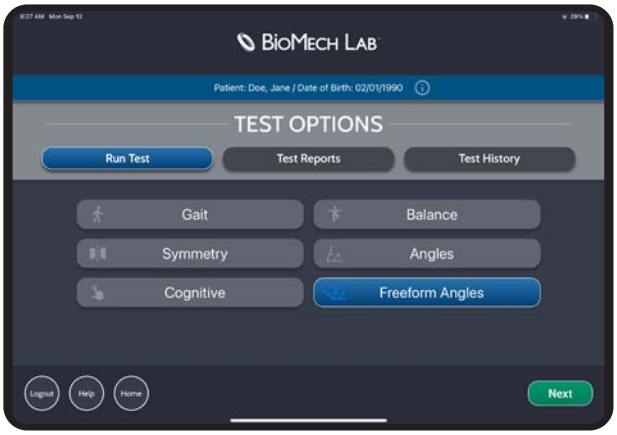
RELATIVE TO GROUND

Place a sensor anywhere to compare its orientation "relative to the ground" using the sensors gravity-sensing feature. The results displayed are the angle perpendicular and parallel to the horizon. Movements in the plane parallel to the ground (horizon) display an N/A (not applicable).

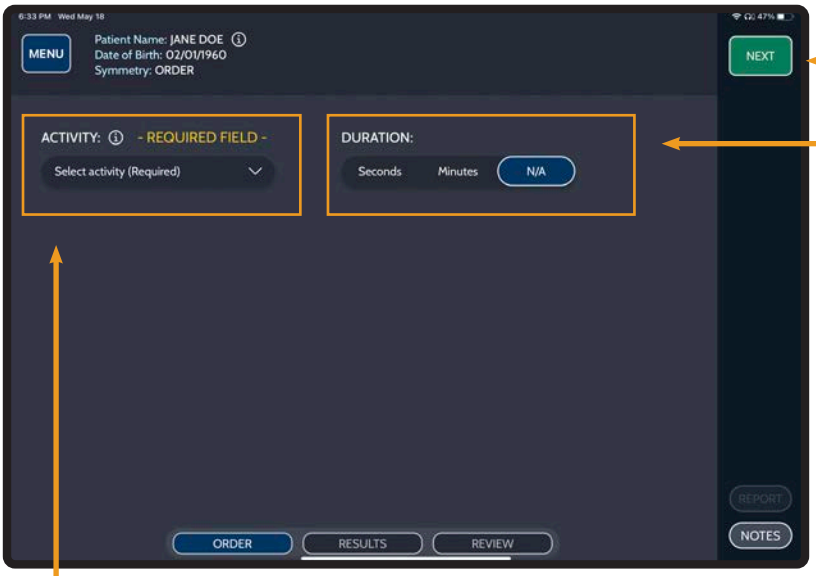
USE CASES

- Tilt, slope, levelness and plumb analysis
- Positioning (static or dynamic)
- Posture, symmetry and rotation/tilt in the anterior, lateral or posterior views
  - Head, shoulder, pelvic, hip, knee and ankle alignment and symmetry
  - Cervical, thoracic and lumbar curvature
  - Standing, sitting, prone, supine, etc.
  - With different footwear, walking aids, orthotics, braces, etc.
- Range of motion relative to the ground
- Biofeedback training:
  - Maintaining proper alignment under load and/or during movement (e.g. neutral alignment while walking)
  - Stabilizing unwanted movements
  - Reaching a suggested degree of rotation

FREEFORM ANGLES TESTS



FREEFORM ANGLES TEST ORDER



NEXT

Tap NEXT when finished

TEST CRITERIA

Select the type of measurement:

FROM STARTING POSITION

Three-axes measurement of the angle change between the starting position and current position of the sensor.

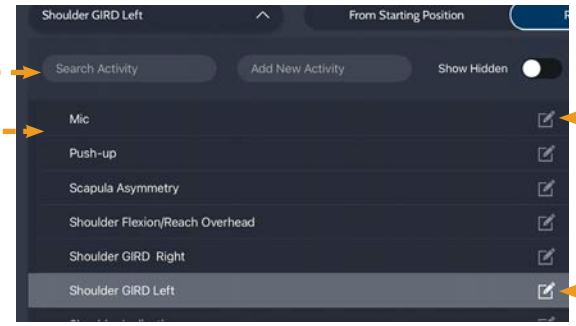
RELATIVE TO GROUND

Two-axes measurement of the sensor orientation with respect to gravitational force.

ACTIVITY

Tap to access the Activity dialog box.

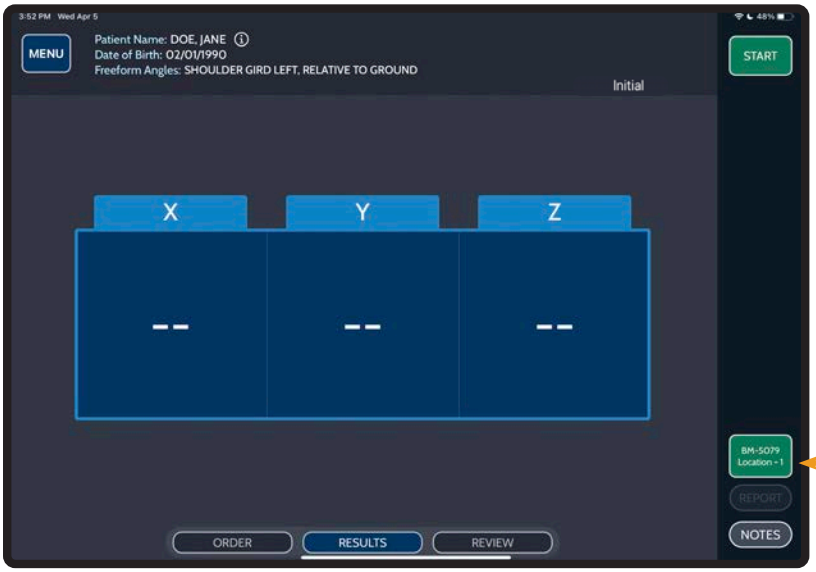
Select the Activity from the list or tap ADD/EDIT to add to or modify the list.



Toggle to SHOW HIDDEN activities.

Tap to EDIT or HIDE an activity.

FREEFORM ANGLES TEST CONTROLS

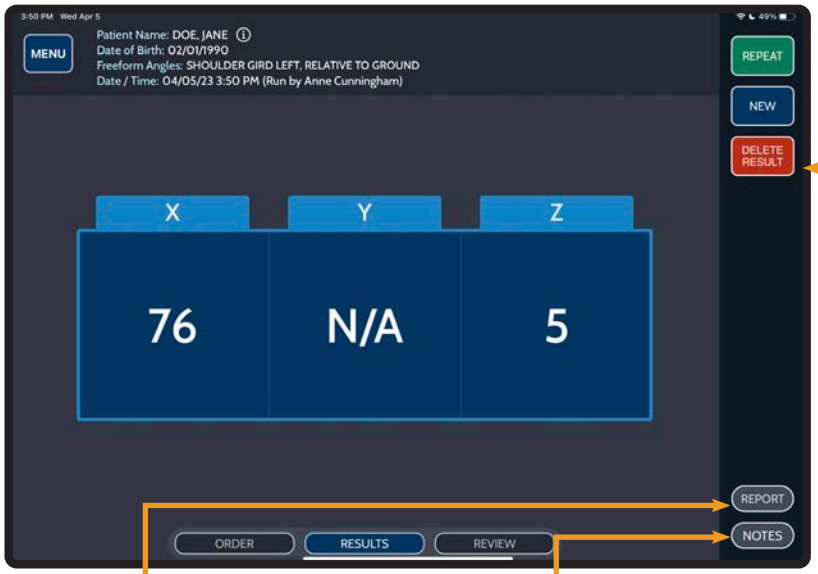


START/STOP
Make sure the patient is in the desired starting position prior to pressing START. Tap START to begin a test. START displays when not recording; STOP displays while a test is being performed.

Tap STOP to stop/pause a test.

TIP: LONG-PRESS START TO INITIATE 5 SECOND TIMER.

ASSIGN SENSOR(S)
Sensor(s) must be assigned to enable the Start button.



REPEAT
Tap REPEAT to perform a new test with the same criteria.

NEW
Tap NEW to return to ORDER to set up a new test.

DELETE RESULT
Tap to DELETE the test result.

REPORT
Tap REPORT to generate a detailed PDF report for the displayed test.

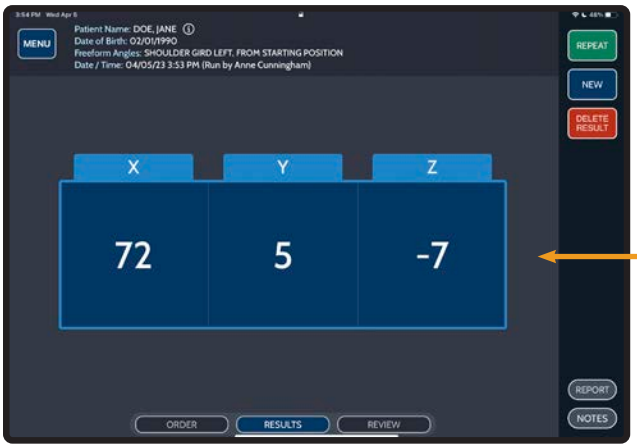
NOTES
Tap NOTES to add/edit test notes. Multiple notes may be saved to a test.

FREEFORM ANGLES TEST RESULTS

Affix any of the six sides of the sensor against a patient or object and tap "Start."

NOTE: WHEN TESTING THE SAME MOVEMENT AT DIFFERENT TIMEPOINTS, AFFIX THE SENSOR USING THE SAME ORIENTATION SO THE RESULTS CORRESPOND WITH THE SAME X,Y, Z COLUMN AND SIGN.

FROM STARTING POSITION



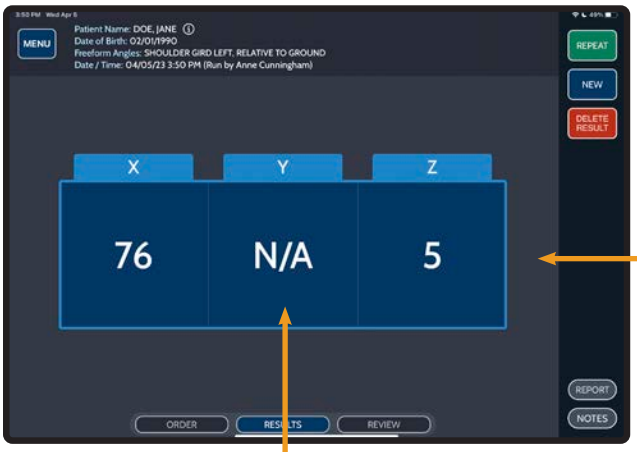
XYZ

Results are displayed in an X, Y and Z table, allowing the user flexibility to perform any test in any position.

POSITIVE/NEGATIVE SIGN

Positive and negative values indicate directionality.

RELATIVE TO GROUND



N/A (RELATIVE TO GROUND ONLY)

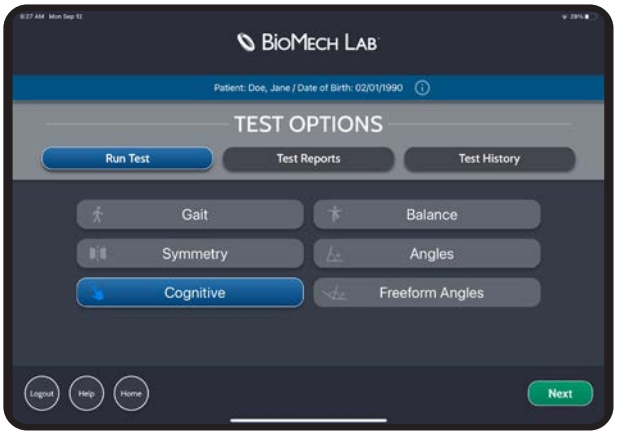
Movements in the plane parallel to the ground (horizon) display an N/A (not applicable).

COGNITIVE TESTS

TIME METRICS FOR A VARIETY OF CUSTOMIZABLE REACTION TESTS

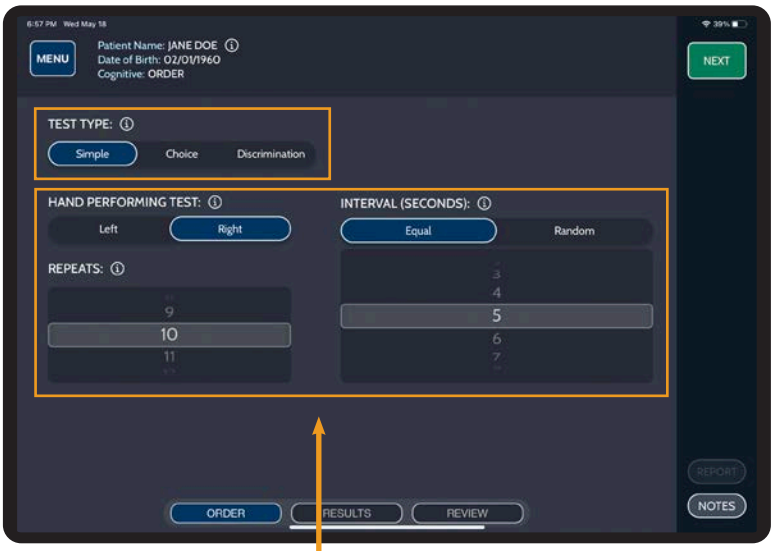
Sensor Quantity: 0, **Sensor Location:** Not Applicable
Recommended Starting Position: Sitting at a table, facing iPad, both hands flat on the table.

COGNITIVE TESTS



COGNITIVE TEST ORDER

TEST TYPE
Set test type.



Simple

Provides a single object (Letter A) as the stimulus in a circle in the middle of the screen.

If **CHOICE** or **DISCRIMINATION** are selected, additional options appear.

Choice

A OR B Provides either the letter A or B as the stimulus in a circle in the middle of the screen. If an A is shown, the patient is expected to respond using the left button on the screen, if the letter B is shown the patient is expected to respond using the right button on screen.

A AND B Provides both the letter A and B as the stimuli in two predesignated circles on the screen. The patient is expected to respond using the button on the side of the screen corresponding to the side of the screen where the A appears.

Discrimination

A "ONE" Provides either A or B as the stimulus in a circle in the middle of the screen. The patient is expected to respond only when an A appears.

AA "TWO" Provides a combination of As and Bs in three circles on the screen. The patient is expected to respond only when more As than Bs appear.

HAND
Identify the hand used to perform the test.

REPEATS
Set the number of times the stimuli will appear.

INTERVAL (SEC)
Set the duration between stimuli appearances. This can either be equal or random.

COGNITIVE TEST CONTROLS

START

Tap START to begin a test.

EXIT TEST

If no response for three times the set interval length, the EXIT TEST icon will appear. Tap to end and exit the test.

(e.g. interval = 5s, EXIT TEST appears after no response for 15s.)

TAP HERE

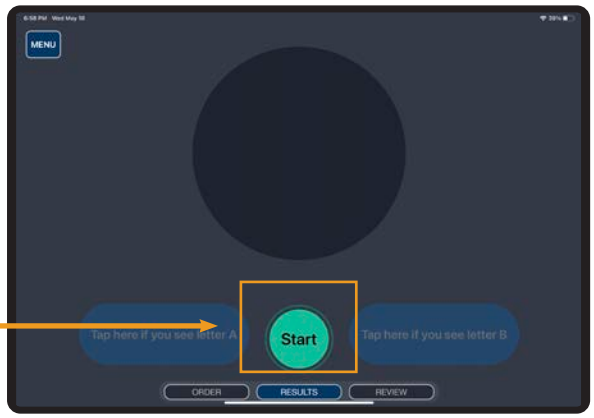
Instruct the patient to tap the corresponding button immediately upon seeing the stimuli, when applicable.

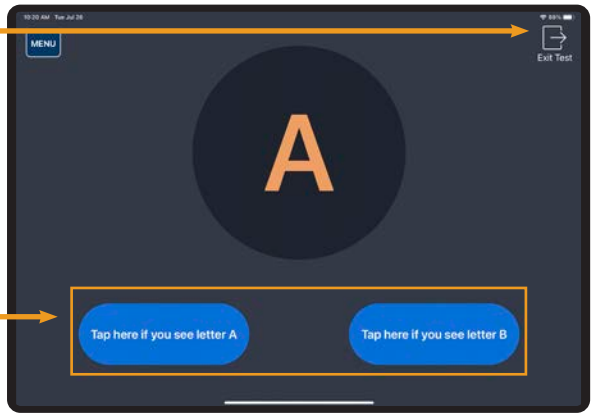
CONTINUE

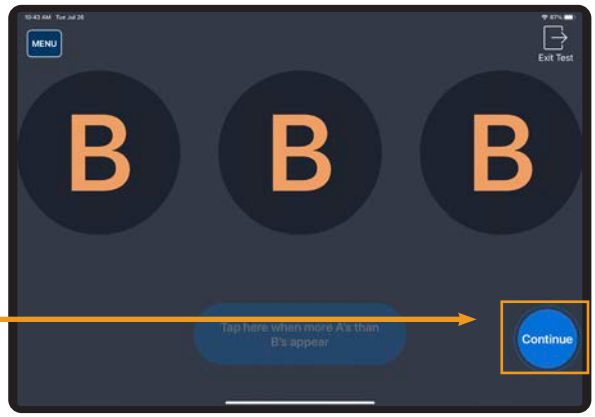
If a Choice or Discrimination test has been selected, the correct response may be no response. In this case, the patient will be prompted with a continue button to continue the test.

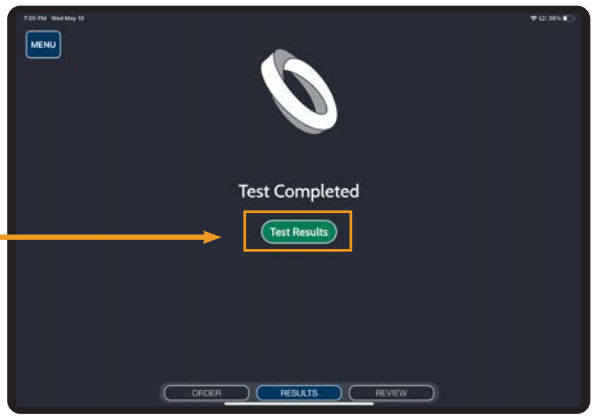
TEST RESULTS

Once a test is completed, the "Test Completed" screen will display. Tap TEST RESULTS to view results.









COGNITIVE TEST RESULTS

TEST DETAILS

TEST: Displays the test type and stimulus used.

STATUS: Complete or Incomplete.

DATE: Date and time the test was performed with the name of the user running the test in brackets.

METRICS

AVERAGE: Sum of all correct response times / number of correct responses.

MEDIAN: Median value from the set of correct responses.

RESULT: Percentage of correct responses.

MINIMUM: Shortest correct response time recorded (in ms).

MAXIMUM: Longest correct response time recorded (in ms).

STANDARD DEVIATION: Standard Deviation value from the set of correct responses.

CHART

Bar graph of reaction times with AVERAGE and MEDIAN reaction times noted. Incorrect Repeats and/or those that did not require a response are not graphed.

REPEAT TABLE

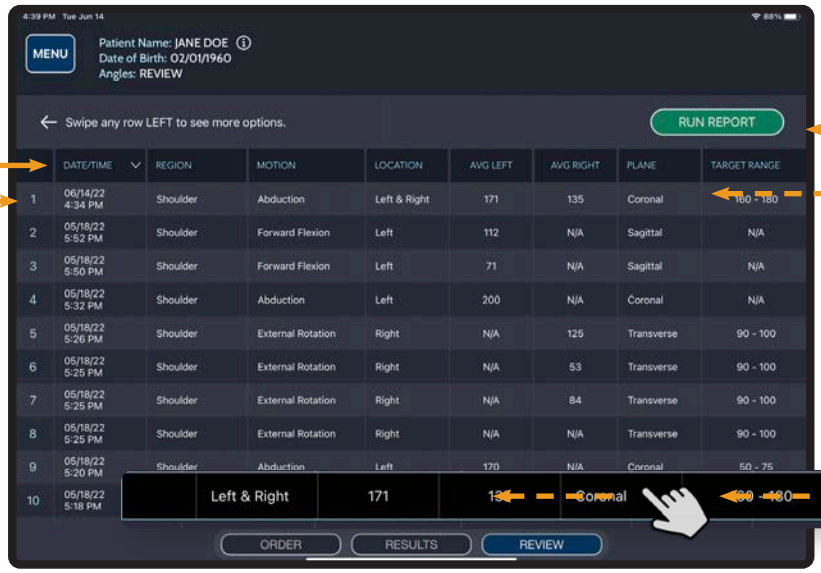
Each repeat is listed, noting the response time in milliseconds and response time versus both the average and median response times. The most recent is shown first by default.

- ↓ Shortest response time
- ↑ Longest response time
- × Incorrect response
- ✓ Correct and did not require a response

REVIEW & REPORT

REVIEW

SORT & FILTER Tap headers to sort or filter the test list.



SWIPE LEFT

Swipe a row LEFT to reveal options:

- **Re-assign** test to another patient
- **Notes** can be added to the test
- **Report** the individual test
- **View** the test results
- **Delete** the test

TEST DETAILS Metrics for each test performed are provided in rows. DOUBLE TAP a row to view the Test Results / Test Execution screen.

REPORTING

RUN SINGLE TEST REPORT

- **From Review** Swipe test row LEFT and tap REPORT to generate a report for a specific test.
- **From Results** Tap REPORT

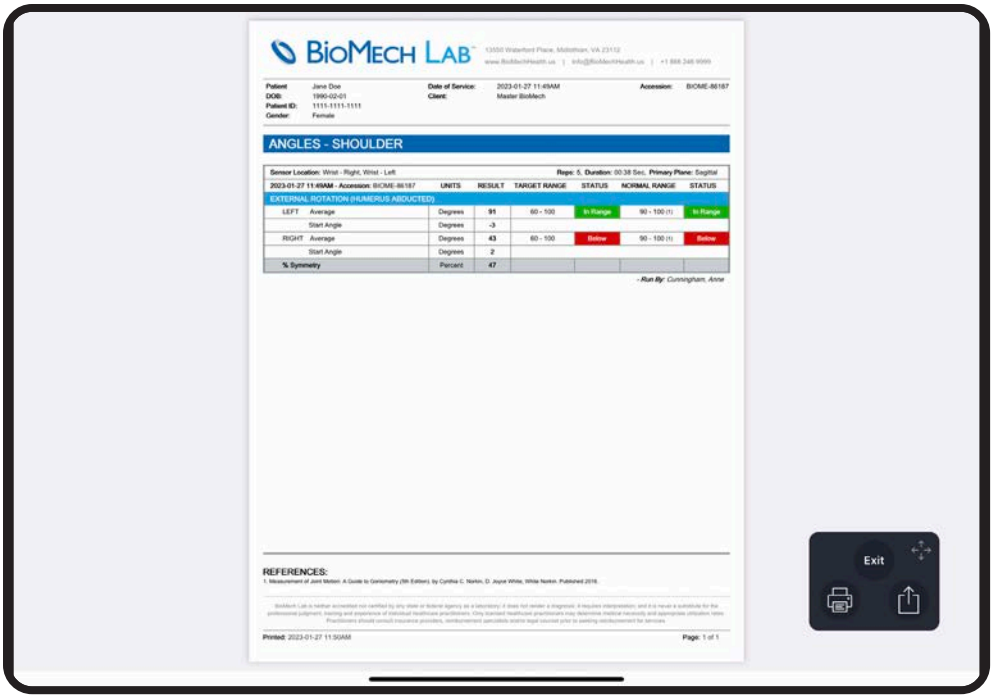
RUN MULTI-TEST REPORT

Tap to generate test reports for all tests. The Report Filter dialog box will appear. Select a date range and data to display.

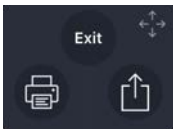
REPORTING (CONTINUED)

PDF REPORT OPTIONS

Reports display instantly on screen for saving or exporting.



EXIT
Tap EXIT to close report and return to Test Review.



SHARE
Tap SHARE and choose an option for sharing.

PRINT
Tap Printer to print to an AirPrint-enabled printer.

METRIC CALCULATIONS

GAIT METRICS

METRIC	UNITS	DESCRIPTION	FORMULA	REPORTABLE RANGE	NORMAL
Functional Gait Index	N/A	Comprehensive calculation of gait symmetry and normalcy.	= (Cadence % Normal + Support Ratio % Normal+Single Support Symmetry+Impact Symmetry+Pelvic Deviation % Neutral) / 5	0 - 100	
Total Steps	Steps	Number of steps performed.	= Total steps		
Cadence	Steps/min	Average number of steps per minute. Duration is defined by start and end of movement instead of elapsed time.	= (Total Steps / Gait Time) * 60		
Cadence % Normal	Percent	Cadence compared to a normal walking cadence of 100 steps per minute. Tudor-Locke C, Han H, Aguiar EJ, et al How fast is fast enough? British Journal of Sports Medicine 2018;52:776-788.	=IF((Cadence/100)*100) > 200, 0, ((Cadence/100)*100) > 100, 100 - (((Cadence/100)*100)-100), ((Cadence/100)*100)	0 - 100	100 Steps/min
Average Step Length	Feet	Average distance walked per step measured in feet. Perry, Jacquelin. Gait Analysis: Normal and Pathological Function. Slack, 2010.	= Selected Distance / Total Steps NOTE: 1) Distance must be selected to calculate value (N/A reported if no distance set). 2) Meters are converted to feet when applicable.		2.1 - 2.5 ft
Double Support	Percent	Percent of time both feet are in contact with the ground.	= (Double Support / (Single + Double Support)) * 100	0 - 100	
Impact Left/Right	Percent	Percent of total impact for each foot (measured in meters/second^2).	LEFT = (Left Impact Total / Total Impact) * 100 RIGHT = (Right Impact Total / Total Impact) * 100	0 - 100	
Impact Symmetry	Percent	Symmetrical analysis of Left and Right Impact.	= IF(OR(Impact Left =0,Impact Right=0),0, 100 - ((Impact Difference / Maximum Impact) * 100)	0 - 100	
Single Support Left	Percent	Percent of time only the left foot is in contact with the ground.	LEFT = (Left Single Support / (Single + Double Support)) * 100	0 - 100	
Single Support Right	Percent	Percent of time only the right foot is in contact with the ground.	RIGHT = (Right Single Support / (Single + Double Support)) * 100	0 - 100	

GAIT METRICS (CONT.)

METRIC	UNITS	DESCRIPTION	FORMULA	REPORTABLE RANGE	NORMAL
Single Support Symmetry	Percent	Symmetrical analysis of Left and Right Single Support time.	= IF(OR(Single Support Left=0,Single Support Right=0),0, (100 - ((Single Support Difference / Maximum Single Support) * 100))	0 - 100	
Support Ratio % Normal (Single:Double)	Percent	Single vs. Double Support compared to a normal ratio of 4:1 (80/20 Single/Double). Whittle, M.W. Gait Analysis: An Introduction; Butterworth-Heinemann: Oxford, UK, 2014.	=IF(Double=0,0,IF(OR((((Single Left+Single Right)/Double)/4)*100>200,(((Single Left+Single Support Right)/Double)/4)*100<12.5),0,IF((((Single Left+Single Right)/Double)/4)*100>100,100-(((((Single Left+Single Right)/Double)/4)*100)-100),(((Single Left+Single Right)/Double)/4)*100)))	0 - 100	4:1
Toe-off Left	Percent	Percent of time during Double Support the left foot is trailing (pushing-off).	= (Left Toe-off / Double Support) * 100	0 - 100	
Toe-off Right	Percent	Percent of time during Double Support the right foot is trailing (pushing-off).	= (Right Toe-off / Double Support) * 100	0 - 100	
Toe-off Symmetry	Percent	Symmetrical analysis of Left and Right Toe-off.	=IF(OR(Toe-off Left=0,Toe-off Right=0),0,100-((Toe-off Difference/Toe-off Maximum)*100))	0 - 100	
Average Pelvic Deviation Left/Right	Degrees	Average pelvic tilt left and right measured in degrees from starting position.	= Sum (Coronal Plane Measurements) / Total Number of Measurements)		
Average Pelvic Deviation Front/Back	Degrees	Average pelvic tilt forward and backward measured in degrees from starting position.	= Sum (Sagittal Plane Measurements) / Total Number of Measurements)		
Average Pelvic Deviation Displacement	N/A	Average pelvic displacement from zero.	= SQRT ((Average Pelvic Deviation Left/Right)^2 + (Average Pelvic Deviation Front/Back)^2)		
Pelvic Deviation % Neutral	Percent	Percent deviation on a scale of 0 - 20°. Murtagh, Ryan D; Quencer, Robert M; Uribe, Juan. Pelvic Evaluation in Thoracolumbar Corrective Spine Surgery: How I Do It. PubMed, 2016-03-01.	=IF(Average Pelvic Deviation Displacement > 20, 0, 100-((Average Pelvic Deviation Displacement /20)*100))	0 - 100	0 - 20°

SYMMETRY METRICS

METRIC	UNITS	DESCRIPTION	FORMULA	REPORTABLE RANGE	NORMAL
Percent Symmetry	Percent	Percentage of total angular velocity for each sensor (measured in degrees/second).	LEFT = (Sensor 1 / Total Angular Velocity) * 100 RIGHT = (Sensor 2 / Total Angular Velocity * 100	0 - 100	

BALANCE METRICS

METRIC	UNITS	DESCRIPTION	FORMULA	REPORTABLE RANGE	NORMAL
Average Deviation Displacement	N/A	Average displacement from zero.	= SQRT ((Average Deviation Left/Right)^2 + (Average Deviation Front/Back)^2 + (Average Deviation Rotation)^2)		
Deviation % Neutral	Percent	Percent deviation on a scale of 0 - 20°. Murtagh, Ryan D; Quencer, Robert M; Uribe, Juan. Pelvic Evaluation in Thoracolumbar Corrective Spine Surgery: How I Do It. PubMed, 2016-03-01.	= IF(Average Pelvic Deviation Displacement > 20, 0, 100-((Average Pelvic Deviation Displacement/20)*100))	0 - 100	0 - 20°
Average Deviation Left/Right	Degrees	Average tilt left/right measured in degrees from starting position.	= Sum (Coronal Plane Measurements) / Total Number of Measurements)		
Average Deviation Front/Back	Degrees	Average tilt forward/ backward measured in degrees from starting position.	= Sum (Sagittal Plane Measurements) / Total Number of Measurements)		
Average Deviation Rotation	Degrees	Average rotation left/right measured in degrees from starting position.	= Sum (Transverse Plane Measurements) / Total Number of Measurements)		
Stability Score	N/A	The measurement of velocity when returning to the initial balance position, measured in degrees per second.	= Sum (Right/Left, Front/Back and Rotation Average Angular Velocity)		

ANGLES METRICS

METRIC	UNITS	DESCRIPTION	FORMULA	REPORTABLE RANGE	NORMAL
Maximum, Minimum & Average Range of Motion	Degrees	Total deviation from initial starting position (measured in degrees).	= IMU measurement		
Start Angle (Relative to the Ground)	Degrees	Sensor orientation with respect to gravitational force.	= IMU measurement		
% Symmetry	Percent	Symmetrical analysis of Left and Right range of motion.	= IF(OR(Average Deviation Left=0,Average Deviation Right=0),0, (100 - ((Average Deviation Difference / Maximum Deviation) * 100))	0 - 100	

SUPPORT

CUSTOMER SUPPORT

ONLINE
Access help tools through Main Menu > Help

CLIENT ADMINISTRATOR
The Clinical/Site Admin is the primary support for data collection issues within the organization. If additional support is needed please contact your organization's designated BioMech administrator for assistance.

BIOMECH CONTACTS

CUSTOMER SUPPORT
BIOMECH: (866) 246-9999
EMAIL: support@BioMechHealth.us

Telephone and email response within 24 hours Monday through Friday 8:30 a.m. – 4:30 p.m. Eastern Time.

SENSOR CARE

- The sensors can be cleaned with rubbing alcohol or alcohol wipe.
- Do not immerse the sensor in any liquids.
- Turn the sensor off when not in use.
- Do not disassemble the sensor.
- Do not use or leave the sensor near a heat source.
- Use only UL Listed or CE Approved or equivalent 5V USB chargers.

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