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| iversity of Texas Medical Branch | Effective Date: | Aug 00 |
| Pulmonary Function Clinic        | Revised Date:   | Aug 19 |
| Policy 03-10 MIP/MEP             | Review Date:    | Aug 23 |

## Patient Testing – MIP/MEP on Profiler & Elite Plethysmograph

**Audience** All personnel in the Pulmonary Function Clinic.

**Purpose** Maximum Inspiratory Pressure (MIP) is the lowest pressure developed during a forceful inspiration against an occluded airway. It is usually measured at maximal expiration and recorded as a negative number in either cm H<sub>2</sub>O or mmHg. Breeze software defines MIP as the greatest sub-atmospheric pressure that can be developed during inspiration again an occluded airway.

Maximum Expiratory Pressure (MEP) is the highest pressure that can be developed during a forceful expiratory effort against an occluded airway. It is usually measured at maximal inspiration and reported as a positive number in either cm H<sub>2</sub>O or mmHg.

MIP and MEP are sometimes measured at the testing end-expiratory level (functional residual capacity [FRC]).

### Instructing the Patient

Standard testing procedures being with instructing the patient and demonstrating proper technique. The greatest potential source for error is the failure of the patient to perform the test properly.

MIP/MEP testing requires the patient to provide a full and sustained effort. Substantial coaching may be required to obtain a proper effort.

If the patient is relaxed, the MIP/MEP results will represent his/her true inspiratory and expiratory pressure capabilities.

General procedures for this test include the following:

- Instruct the patient to loosen any tight clothing.
- Have the patient use nose clips and rubber mouthpiece.

**Note:** Inspiratory and expiratory pressure measurements must be performed in separate maneuvers.

**Procedure** The following is the correct procedure for performing MIP/MEP testing on a patient:

- Before beginning the test, zero the pneumotach by clicking the Zero Flow. There must be no flow through the pneumotach during this procedure.
- Ensure that the pneumotach is attached to the pneumotach clip and umbilical and that this is attached to the patient circuit in the arm of the Profiler or Elite.

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- Place nose clips on the patient and have them hold their cheeks with their hands.
- Tell the patient to breathe normally through the pneumotach. If you have the Keystroke to Start Test option turned on (default), press the spacebar to begin data collection. If not, breathing on the system starts the testing procedure and begins data collection. The patient's breathing efforts are immediately displayed on the screen. Observe the patient's tidal breathing until the patient is comfortable.
- Press the spacebar or click Next to display the tracing of the patient's tidal breathing.

**Note:** The graph on the left of the Data Collection screen displays the volume vs. time tracing of the patient's breathing. After a minimum of four tidal breaths, a MIP or a MEP pressure measurement can be obtained with one of the following steps.

#### **MIP**

- Instruct the patient to exhale slowly to residual volume (RV).
- When the patient appears to be at RV, press the spacebar or click Next. The occlusion piston will immediately close.
- When the piston closes, have the patient inhale as hard as possible to produce maximal negative pressure. The occlusion piston reopens in four seconds, ending the test. To open the piston prior to this time, press the spacebar or click Next as soon as pressure measurement is made.

#### **MEP**

- Instruct the patient to inhale slowly to total lung capacity (TLC).
- When the patient appears to be at TLC, press the spacebar or click Next. The occlusion piston will immediately close.
- When the piston closes, have the patient exhale as hard as possible to produce a maximal positive pressure.
- The occlusion piston reopens in four seconds, ending the test. To open the piston prior to this time, press the spacebar or click Next as soon as the pressure measurement is made.

The graph on the left of the screen also displays the pressure vs. time tracing for each patient effort. The graph's lower half is negative pressure (inspiratory maneuver); the top half is positive pressure (expiratory maneuver).

Repeat the above steps until all inspiratory and expiratory test efforts have been made.

**Note:** Pressure measurements can be obtained at any lung volume. Measurements do not have to be taken at RV or TLC.

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### Acceptability Criteria

The following are the acceptability criteria for MIP/MEP testing:

- Pressure tracing should show 1 to 3 seconds of sustained effort; there should be a pressure plateau after initial transients.
- Pressure plateau of 1 to 3 seconds should be observed.
- At least 3 MIP and 3 MEP maneuvers should be recorded.
- The maximum value of 3 efforts within 20%, will be reported.

**This form documents the approval and history of the policies and procedures for the Pulmonary Function Laboratory. The Medical Director signs all policies verifying initial approval. Annually thereafter, the Director and/or designee may approve reviews and revisions.**

| Date  | Approved by:                                                                       | Signature |
|-------|------------------------------------------------------------------------------------|-----------|
| 11/07 | V. Cardenas, MD<br>Medical Director Pulmonary Laboratory                           |           |
| 6/09  | V. Cardenas, MD<br>No changes to the policy                                        |           |
| 7/10  | V. Cardenas, MD<br>No changes to the policy                                        |           |
| 2/12  | A. Duarte, MD<br>Medical Director Pulmonary Laboratory<br>No changes to the policy |           |
| 5/14  | A. Duarte, MD<br>Medical Director Pulmonary Laboratory<br>Changes to policy        |           |
| 8/16  | A. Duarte, MD<br>Medical Director Pulmonary Laboratory<br>Changes to policy        |           |
| 11/17 | A. Duarte, MD<br>Medical Director Pulmonary Laboratory<br>No changes to policy     |           |
| 8/21  | A. Duarte, MD<br>Medical Director Pulmonary Laboratory<br>No changes to policy     |           |
| 8/23  | A. Duarte, MD<br>Medical Director Pulmonary Laboratory<br>No changes to policy     |           |