BI 121, Lab 6 Pulmonary Function Testing (PFT)

I. Attendance

II. Pulmonary Function Test/PFT
   A. What? Measure of static & dynamic lung function
   B. Why? Picture of lung health; absence, presence, progression of disease (e.g., asthma, emphysema); effectiveness of drugs
   C. How? Complete PFT with computer or dinosaur spirometer

III. Crucial Clinical Measures
   A. VC vital capacity = FVC forced vital capacity amount of air exhaled after maximal inhalation
   B. FEV$_{1.0}$ = How much of VC in 1 second? \([\text{FEV}_{1.0}/\text{FVC}] \times 100\)
      If \(\geq 75-80\% (0.75-0.80) \rightarrow \) clinically normal
      If \(\leq 40-50\% \rightarrow \) obstructive disease (e.g., asthma)

IV. Your Goals
   A. Estimate your VC & FEV$_{1.0}$ → Use nomogram pp 6-6 or 6-7 LM
   B. Measure these values accurately w/computer PFT LabChart
   C. Compare estimated with actually assessed values to determine whether you're within a healthy range.
Respirometer \(\rightarrow\) measures **complete Pulmonary Function Test or PFT!**

**NB:** Should be able to blow out \(\geq 75 - 85\%\) of VC/FVC in 1 second! That's \(\text{FEV}_{1.0}/\text{FVC} \geq 0.75 – 0.85\). If less, may indicate asthma or other lung disease.
Sample PFT from Collins 13.5 L Respirometer
Spirogram graphing complete *PFT* from computer simulation.

- **TV** = Tidal volume (500 ml)
- **IRV** = Inspiratory reserve volume (3,000 ml)
- **IC** = Inspiratory capacity (3,500 ml)
- **ERV** = Expiratory reserve volume (1,000 ml)
- **RV** = Residual volume (1,200 ml)
- **FRC** = Functional residual capacity (2,200 ml)
- **VC** = Vital capacity (4,500 ml)
- **TLC** = Total lung capacity (5,700 ml)
e.g., Monica height = 5'6" = 66", age = 21 yr

FEV1.0 = 3.35 L
FVC 3.82 L

FEV1.0/FVC = 3.35/3.82 = 0.8769 \equiv 87.7 \%
1 Estimate, 2 Setup, 3 Assess, 4 Compare

**Spirometry in Normal Females Prediction Nomograms**

- **FEV1.0** = 3.35 L
- **FVC** = 3.82 L
- **FEV1.0/FVC** = 3.35/3.82 = 0.8769 ≈ 87.7%

Example: Monica height = 5'6" = 66", age = 21 yr
How to put together?
Viola!!
Calibration is crucial in all physiology testing!
Sample subject setup
Q about lab?

Sample data!
### Spirometry Report

<table>
<thead>
<tr>
<th>Flow channel</th>
<th>Flow Time</th>
<th>Volume channel</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data selection</td>
<td>18.63 s</td>
<td>(0.31 min)</td>
<td>(241.1 L/min)</td>
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<tr>
<td>Inspirations</td>
<td>5</td>
<td>PIF</td>
<td>4.02 L/s</td>
</tr>
<tr>
<td>Expirations</td>
<td>4</td>
<td>PEF</td>
<td>10.02 L/s</td>
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<tr>
<td>$\dot{V}_E$</td>
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<td>(13.4 L/min)</td>
<td></td>
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<tr>
<td>$V_T$</td>
<td>0.89 L</td>
<td>FVC</td>
<td>3.56 L</td>
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<tr>
<td>$f$</td>
<td>0.28 Hz</td>
<td>FEV$_1$</td>
<td>3.09 L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FEV$_1$/FVC</td>
<td>87%</td>
</tr>
</tbody>
</table>

Graphs showing respiratory waveforms.