LSAT is a single-purpose simulator for lung sound auscultation training. Lung sound auscultation is one of the essential steps in chest examination. This skill requires three areas of expertise: listening to the sounds of a patient’s chest with proper use of the stethoscope, having a clear understanding of sound variations and being able to describe these sounds clearly to others. In addition, in order to give a diagnosis, relations between sounds and auscultation sites play an important role. Trainees learn not only to distinguish the sounds and their location, but to understand comprehensively what they indicate.

Outstanding sound quality
Cases are recorded from actual patients; sounds are exactly those of real patients.
Computer synchronization of all outputs.

Accurate location and spread of lung sounds
15 speakers are located in the torso manikin (seven in the anterior, eight in the posterior), each speaker playing back sounds distinct to each auscultation area. Speakers are completely synchronized.
The torso rotates on a base, allowing examination of both the front and back as in a real clinical procedure.

Efficient selection of the cases
Cases are carefully selected for educational purposes based on classification standards of the American Thoracic Society.

Useful explanation windows-including illustrations, chest radiographs and CT images-enhance training.

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Sounds can be monitored graphically in real time. The sound volume, the pace of respiration and the operating time are controllable, expanding the variety of training options.

Explanation window for each case can be referred to on the monitor. General descriptions along with clinical data on individual cases including patient histories, illustrations, radiographs and CT images.
Skills & Training

35 lung sound cases and one example of vocal fremitus are available with the system. Cases belong to the chosen category: each case has 2 variations, with and without heart sounds. (exceptions: normal with loud heart sounds, Hamman’s sign)

15 built-in speakers reproduce lung sounds with natural propagation and sound transition across the chest wall.

Anterior area
1 trachea
2 upper right lung field
3 upper left lung field
4 middle right lung field
5 middle left lung field
6 lower right lung field
7 lower left lung field

Posterior area
0 upper left lung field
1 upper right lung field
2 middle right lung field
3 middle left lung field
4 lower left lung field
5 lower right lung field
6 right costophrenic angle
7 left costophrenic angle

The classification of lung sounds is based on the criteria of the American Thoracic Society.

36 cases are available for training. 34 cases include 2 versions – with and without heart – sounds

<table>
<thead>
<tr>
<th>NORMAL</th>
<th>standard</th>
<th>FINE CRACKLES</th>
<th>both lower area</th>
</tr>
</thead>
<tbody>
<tr>
<td>mildly weak</td>
<td></td>
<td></td>
<td>both lower and middle area</td>
</tr>
<tr>
<td>mildly strong</td>
<td></td>
<td></td>
<td>whole thorax 1</td>
</tr>
<tr>
<td>loud heart sounds</td>
<td></td>
<td>WHEEZES</td>
<td>upper and middle area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ABNORMAL</th>
<th>weak: left lower area</th>
<th>around trachea and upper area</th>
</tr>
</thead>
<tbody>
<tr>
<td>absent: left</td>
<td>RHONCHI</td>
<td>trachea and upper area</td>
</tr>
<tr>
<td>weak: right lower area</td>
<td></td>
<td>trachea and upper area (polyphone)</td>
</tr>
<tr>
<td>absent right</td>
<td></td>
<td>with an inspiratory wheeze</td>
</tr>
<tr>
<td>weak: whole thorax</td>
<td></td>
<td>MISCELLANEOUS CONTINUOUS SOUND</td>
</tr>
<tr>
<td>bronchial sounds</td>
<td></td>
<td>squawk</td>
</tr>
<tr>
<td>COARSE CRACKS</td>
<td>right lower area</td>
<td>MISCELLANEOUSpleural friction rub: left lower area</td>
</tr>
<tr>
<td></td>
<td>both lower area</td>
<td>pleural friction rub: right lower and middle area</td>
</tr>
<tr>
<td></td>
<td>right middle area</td>
<td>Hamman’s sign</td>
</tr>
<tr>
<td></td>
<td>left lower area</td>
<td>Vocal fremitus (palpable at both sides of the chest)</td>
</tr>
<tr>
<td></td>
<td>both upper area</td>
<td></td>
</tr>
<tr>
<td></td>
<td>whole thorax</td>
<td></td>
</tr>
</tbody>
</table>

Effectiveness
In the past, cassette tapes or CDs have been used with limited success to improve the training of physicians in the auscultation of the respiratory system. They have been impossible to learn from and such methods cannot convey the spread of lung sounds over the chest wall. In order to study lung sounds through a stethoscope, we have invented an innovative lung sounds auscultation simulator. This device has fifteen built-in speakers inside the human-sized manikin for actual stethoscope listening. Lung sounds were recorded from actual patients at 15 points on the chest wall, seven from the anterior chest wall and eight from the back with a stethoscope with an attached microphone. The data was input to a computer through a noise filter and special soundboard. The sounds were adjusted to each respiratory cycle to improve the quality and each sound was appointed to one of the 15 auscultation site speakers. The data was converted by a D/A converter and are amplified to each built-in speaker as educational lung sounds. The classification of lung sounds is displayed graphically on the computer monitor. The trainee can hear the lung sounds by clicking the computer interface. There are 35 cases prepared for the system.


Lung Sound Auscultation Trainer "LSAT" M81-S

Set includes:
1 LSAT model unit
   Torso with rotary base
   15 built-in speakers, 8 ch. amplifier
   size: 32 x 35 x 62H cm
   packing size: 51 x 46 x 80 cm 10 kg

1 PC
   Windows XP, 12ch.D/A PCI board, mouse,
   112 keyboard, 15" TFT monitor
   software & data installed
   packing size: 59 x 59 x 40 cm

1 Amplifier
   size: 32 x 35 x 8H cm
   packing size: 46 x 46 x 15 cm 10 kg

2 Speakers
   packing size: 62 x 41 x 40 cm

1 T-shirt

Optional parts
11241-090 manikin carrying case for "LSAT"
Specifications are subject to change.