

Additional materials for professionals.

PRO beta mode.

The materials below regard the elements of the StethoMe application for users with medical education and having an account with the “Doctor” attribute at the StethoMe platform. The above mentioned functions are elements of the official StethoMe application, available at [Google Play](#) and [App Store](#).



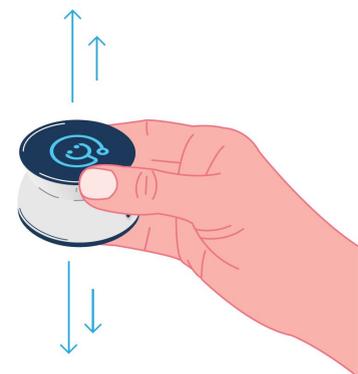
- ?** The functions being the object of these instructions are test functions and as such they may feature minor deficiencies that will be fixed at a later stage.
- You can find the description of other application functions at www.stethome.com.

1. Auscultation of lungs using the Lungs PRO function



- 1.1. Launch the StethoMe application, go to the “Pro beta” tab and select the “Lungs PRO” examination.**
- 1.2. Make sure that the stethoscope is switched on.**

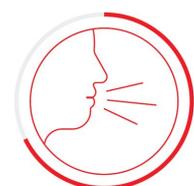
If the stethoscope is not used, it will enter the sleep mode. You will be able to wake it up by moving it vigorously in the vertical axis.



- 1.3. Carry out an examination.**

Begin the examination by putting the stethoscope directly to the patient’s skin.

- ?** StethoMe® detects automatically any excessively loud sounds, as well as stethoscope movement. If the noise is excessive, the following red icon is displayed.



- ② During the examination you can have earphones connected to the stethoscope socket.

1.4. Familiarise yourself with the result.

After completing the examination you will receive the result of analysis carried out by the certified StethoMe® AI algorithms and information on quality of the recording.

Possible results:

- No abnormal auscultation sounds have been detected.
- A small number of abnormal auscultation sounds has been detected.
- Abnormal auscultation sounds have been detected.
- Analysis is impossible. No breathing detected or excessive noise in the room.

The Lungs PRO auscultation mode displays, next to the general result, also a pie chart with the pathologies detected.



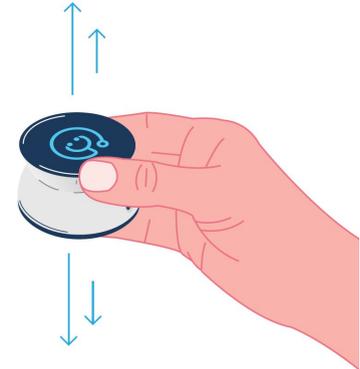
Each of the diagram quadrants may displays one of the three states, e.g.:

- pale colour means that a given pathology, in this case - wheezes, has not been detected
- a half-filled quadrant means that a small intensity of a given pathology's sounds has been detected, in this case - a small number of wheezes
- a filled quadrant means that the sounds of a given pathology, in this case - wheezes, are very clearly audible.

2. Sound playback on a mobile phone in real time.

2.1. Make sure that the stethoscope is switched on.

If the stethoscope is not used, it will enter the sleep mode. You will be able to wake it up by moving it vigorously in the vertical axis.



2.2. Connect wired or wireless earphones to your mobile phone.

2.3. Launch the StethoMe application, go to the “Pro beta” tab and select “Play the sound on a mobile phone”.

- ① The “play sound on a mobile phone” mode is not fitted with the StethoMe AI® artificial intelligence algorithms and does not display their predictions.



Play the sound on your phone

2.4. Carry out an examination.

Begin the examination by putting the stethoscope directly to the patient’s skin. During the examination the phone screen will show a wave symbol meaning that the sound is transmitted from the stethoscope to the earphones.

- ① The sound is transmitted only when the stethoscope is put to the body.
- ① A dynamic double tap with a finger on the stethoscope screen will switch the filter used from lungs to heart and the other way round.
- ① If the sound is too silent, check whether the phone volume is set to the maximum level. Check this also after connecting earphones (the system remembers settings separately).
- ⚠ If any technical problems or audio interference appears, or if the stethoscope disconnects from the phone, go back to previous screen using the “Back” button

and select once again the option to play sound on the phone.
If this does not help, switch the stethoscope off and then on again.

Recording examples and classification thereof

Normal breathing (no pathological sounds)

Below you can find examples of recordings that present normal breathing. These examples are recordings that do not include any additional pathological sounds.

<https://www.youtube.com/watch?v=PdoYq098uF4>

<https://www.youtube.com/watch?v=ozGHnUi9AhA>

<https://www.youtube.com/watch?v=fkNfGMBABn0>

<https://www.youtube.com/watch?v=W9PueJhEdVE>

Additional abnormal auscultation sounds have been divided into 4 classes in line with the most recent guidelines of ERS into:

1. Wheezes

Wheezes are continuous tonal sounds that appear during obstruction.. They usually appear during expirations, but in case of strong obstruction they are audible during both inhalations and exhalations. On a spectrogram they are represented in the form of vertical lines. They sound similar to whistles, squeaks, and sometimes voice.

Examples:

- <https://www.youtube.com/watch?v=qI1r6hDYFis>
- <https://www.youtube.com/watch?v=N8O1U7dSnLo>
- <https://www.youtube.com/watch?v=pfbn18P8ti4>
- <https://www.youtube.com/watch?v=jXuRnKHiY68>

2. Rhonchi

Rhonchi are continuous tonal sounds that appear during obstruction caused by mucus. They appear during both inspirations and expirations. On a spectrogram they are visible as vertical lines and increased intensity of sound for lower frequencies (higher saturation in the lower part of the spectrogram). They sound similar to snoring, low frequency whistles, and sometimes voice.

Examples:

- https://www.youtube.com/watch?v=Xz2rDhA_eaM

- <https://www.youtube.com/watch?v=HfPZXS2k2b4>
- https://www.youtube.com/watch?v=qlsXplFn_Sk
- <https://www.youtube.com/watch?v=7dWbay-fi9Y>

3. Fine crackles

Fine crackles are non-continuous, transient sounds that appear during sudden opening or closing of the respiratory tract. They usually appear during inhalations, but in case of higher intensity they may occur during both inhalations and exhalations. Fine crackles occur mainly in groups and are visible as a series of vertical lines on a spectrogram. This group of sounds includes also the sounds referred to as crepitations and other crackles that are not classified as coarse crackles. These sounds can be confused with the interference resulting from improper execution of recording. They sounds similar to bursting bubbles or walking on wet snow.

Examples:

- https://www.youtube.com/watch?v=0_SFqHjn8vY
- <https://www.youtube.com/watch?v=4afUkbpUpdY>
- https://www.youtube.com/watch?v=oXfO_CGcL9A
- <https://www.youtube.com/watch?v=0fAFrShoRVk>

4. Coarse crackles

Coarse crackles are non-continuous, transient sounds that appear during sudden opening or closing of the respiratory tract. They usually appear at the end of expirations, but in case of higher intensity they may occur during both inspirations and expirations. Similarly to fine crackles, they occur in groups and are represented on spectrograms as series of vertical lines. They sound similar to snoring and gurgling, and sometimes they are similar to rhonchi.

Examples:

- <https://www.youtube.com/watch?v=-9SOEMMkTrc>
- <https://www.youtube.com/watch?v=4afUkbpUpdY>
- https://www.youtube.com/watch?v=oXfO_CGcL9A