ECHOSCAN

HEALTH AT WORK

PREVENTION OF **HEARING RISKS**

- Assessment of auditory fatigue
- Identification of peripheral deafness
- Study of the pharmacological impact of chemicals on hearing
- Pure tone audiometry measurements (optional)

Employees exposure to loud noises or ototoxic substances can lead to **hearing impairment** or even deafness. It is therefore necessary to **prevent risks** before it is too late.

It is for this purpose that the INRS has designed and patented the Echoscan®, a device complementary to pure tone audiometry, capable of **assessing peripheral auditory fatigue**.

This technology, industrialized by the French company Echodia®, is a great progress in the prevention of hearing risks. Approved by the scientific community, Echoscan® is a non-invasive test, without active cooperation of the employee, which detects peripheral auditory fatigue.

Echoscan® is the only device aiming to prevent the accumulation of auditory fatigue which, in the long term, would lead to permanent hearing loss.

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ECHODIA
Nano Signal Technologies

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ECHOSCAN

PRINCIPLE AND OPERATION

Echoscan® enables to test the functioning of the inner and middle ears as well as the auditory nerve centers. It can be used directly on site by occupational health services, it allows fast, objective and non-invasive measurements.

Echoscan® records otoacoustic emissions (OAE) in one ear, while triggering the auditory reflex in the other ear by sound stimulations. The amplitude variations of the OAE make it possible to determine the threshold at which the auditory reflex is triggered. This threshold is highly sensitive to peripheral auditory fatigue which allows to identify its warning signs.

The difference of the trigger level between a measurement made at the beginning and a measurement made at the end of the day makes it possible to evaluate the auditory fatigue related to the workplace.

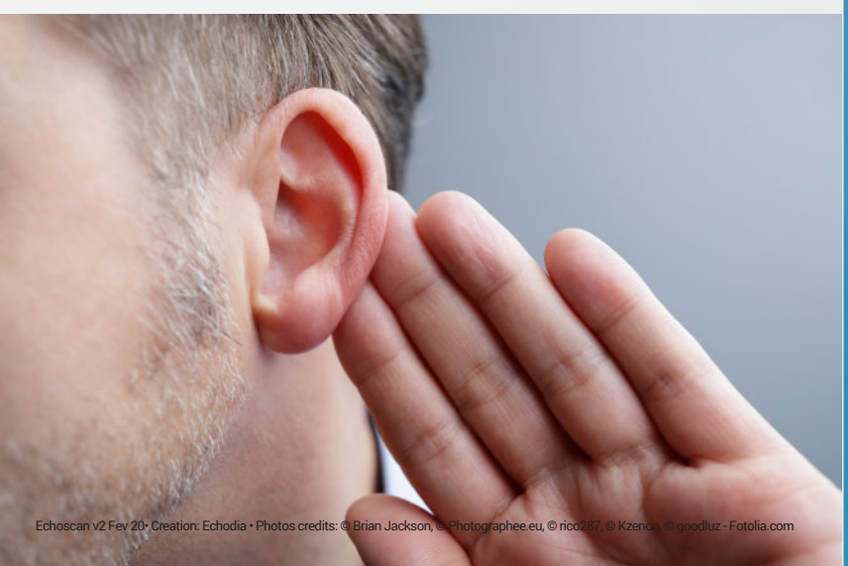
TECHNICAL CHARACTERISTICS

Reflex test:

Requires a computer (PC or Mac) not included
OAE probe: 1 to 7 kHz
Resolution : 16 bits @ 32 kHz
Intensity of contralateral masking: 20 to 100 dB HL
Frequency of contralateral masking: 125 Hz to 8 kHz

Tonal audiometry (optional):

Air conduction (DD45 HI headset)
Bone conduction (B71 headset)
Intensities :
AC = -10 to 110 dB / BC = -10 to 70 dB
Frequencies :
AC = 125 to 12 500 Hz / BC = 250 to 8000 Hz
Testing modes: manual or automatic



How to use Echoscan®?

Step 1: Identity of the employee

Connect the device to a computer (PC or Mac) via the USB cable and press «Start USB». Launch the Echosoft software. Create a new patient or select an existing one. Install the employee in a quiet room (a soundproof booth is not required). Ask the subject to stay still and be as relaxed as possible.

Step 2: Setting up the device

Place the OAE measurement probe in the ear to be tested (called «ipsilateral» ear). Then place the sound transducer in the opposite ear (called «contralateral»).

Step 3: Determination of measurement parameters

From the Echosoft software, start the automatic measurement to determine the parameters specific to each subject. This step should be performed once per ear tested. It allows fast measurement of the amplitude of OAE responses to determine the frequency and level of stimulation to be used to ensure optimal reflex threshold measurements (step 4).

Step 4: Measurement of the auditory reflex

Select the type of measurement: pre or post exposure. The search for the trigger threshold takes place in a few minutes; it is characterized by the emission of sounds of increasing intensity in the contralateral ear.

The reflex is detected by measuring the amplitude variations of OAE in the ipsilateral ear. At any time, it is possible to pause or stop the test.

Step 5: Results reading

The Echosoft software makes it possible to consult the measurements corresponding to the different intensities tested.

The color marker indicates when the reflex is triggered (green) or not (red). The result of the measurement can also be printed and archived on the computer.

Step 6: Results interpretation

Echoscan® calculates the auditory fatigue at the workplace by making the difference between the trigger thresholds measured before and after exposure of the employee:

Fatigue = «post-expo threshold» - «pre-expo threshold»

This value allows to automatically rank auditory fatigue in three classes:

Fatigue proved (Red);
Auditory fatigue possible (Orange);
Absence of fatigue (Green).