PHYSIOLOGY LABS PRACTICAL TASKS

TASKS, PRINCIPLES, QUESTIONS

Hearing, Vestibular system, Stabilometry

Physiologically speaking, Hearing and Vestibular systems have very little in common. Despite this, both are tested in one class.

Required knowledge:
- Sound pitch and intensity (typical frequencies of sounds
- Decibel and other units
- Hearing threshold
- Sound conduction (air vs bone)
- Conduction vs perception defect
- Tuning forks tests, audiometry principles

Overview of tasks:
1. speech test
2. tuning forks tests
3. audiometry
4. vestibular reflexes, nystagmus (Barrani chair)
5. stabilometry

Speech test

Aim: fast assessment of hearing at different frequencies (speech, whisper)
Procedure:
- Ask person being tested to stand in cca 5 m away and turned 90` from face-to-face position (in order to prevent reading lips) and repeat words yuo say
- Start saying words with hi-pitch and lo-pitch tones (cheese, see/root, boom) and wait for each to be repeated.
- Use both loud voice and whispering
- If person being tested cannot hear, ask to move closer
- Record the result as max. distance from which tested subject can repeat w/o hesitation.

Tuning fork tests
Aim: distinguish between conduction and perception=type hearing defect. Also to identify which ear is affected.
Principle: bone and air conduction is evaluated and compared
  Air conduction – sound propagates thru middle ear. Typical for listening to external sounds.

Bone conduction – sound propagates thru bones of scull. Typical to listening to own voice.
For external sounds, air conduction is (physiologically) substantially more sensitive

Tuning-forks tests overview

Test name	procedure	What is tested	comment
Weber	Tuning fork attached to bone in the mid-line	- Bone conduction. - If both ears hear equally	If one ear hears louder than cross-lateral one, this is called **Lateralization** and implies pathology
Rinne	Fork attached to mastoid process and once hearing ceases moved in front of the ear (same)	- Bone conduction and air conduction (of the same ear) - if hearing thru air conduction is longer than in bone cond.	*Normal finding:* sound is perceived longer via air conduction . Test is **negative** *Pathological finding:* sound is perceived longer via bone conduction
Schwabach	For attached to mastoid, once hearing ceases , doctor attaches fork to her/his own mastoid	Comparebone (and air) conduction between patient and doctor	*Normal:* patient and doctor can hear similar intensities

Tasks:
- perform all tuning fork tests. (everybody ,bilaterally, in quiet room)
- perform the tests again while simulating conduction defect
- Record all results
- try to interpret the results

AUDIOMETRY

Aim: estimate hearing threshold over the range of frequencies. Requires audiometer (specific device). May test both air conduction (loudspeaker) and bone conduction (vibrator). Audiometer in labs only allows for testing air conduction.
Use: diagnose various defects including: professional damage, presbyacusis)

Task: perform audiometry and record results into provided chart.
Procedure:
- check audiometer and earphones if properly connected
- work in silent room
- explain the procedure to the tested person

- instruct the person to indicate when he/she starts hearing testing sound
- ask the tested person to put the phones on
- make sure loudness is set to minimum
- turn on audiometer
- before every new tone being used, allow for brief listening at low intensity (to get acquainted with the frequency)
- for each frequency find hearing threshold of each ear. Note: while slowly increasing the intensity, use button to periodically interrupt the tone (ca 1x per second).
- Plot the results into graph
- Try to interpret the finding

Questions:
- Why more than one tuning fork test is needed for proper diagnosis?
- Why tuning fork tests do not require sound-proof room?
- Why audiometry usually requires sound-proof room?
- During audiometry, why does the tested tone need to be periodically interrupted?

VESTIBULAR SYSTEM, STABILOMETRY