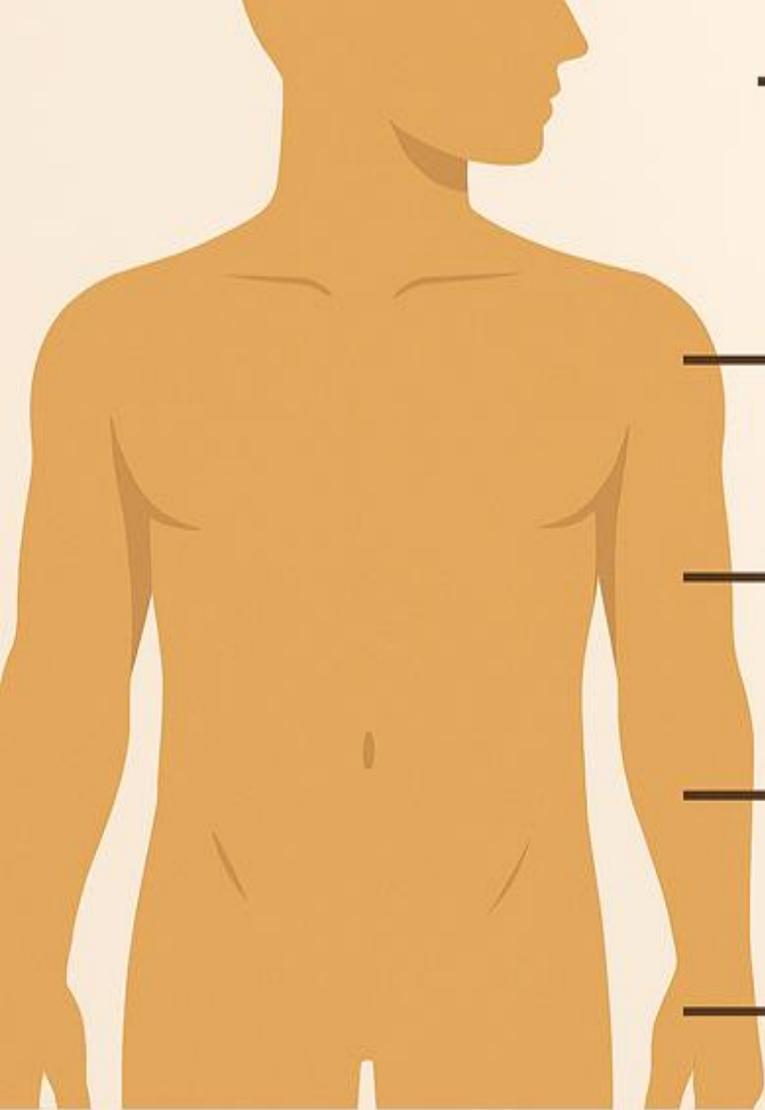


Physiology of
THE SOMATIC SENSATIONS
(Mechanoreceptive sensations)



Crude Touch



Pain



Pressure



Vibration

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Study Objectives

By the end of this lecture, students should be able to:

- 1. Differentiate between the major types of somatic sensations (protopathic vs. epicritic; pain, temperature, mechanoreception).**
- 2. Explain the physiological basis involved in touch, pressure, vibration, proprioception, and temperature sensations.**
- 3. Describe methods used to clinically test each type of sensation.**
- 4. Apply this knowledge to oral and dental sensory mechanisms.**

Somatic sensation

I- According to site of perception

Protopathic (crude) sensation

1. Slow pain
2. Temperature
3. Crude touch

Perceived at the level of the thalamus
Poorly localized.

Perceived at the level of the cortex
well localized.

Epicritic (fine) sensation

1. Fine touch
2. Deep pressure
3. vibration
4. Sense of movement
5. Sense of position

Somatic sensation

II- According to type of sensation

Pain sensation

Thermal sensation

Mechanoreceptive sensations

1-Tactile sensation

2-Kinesthetic sensation

A. Touch sensation
i- Crude touch
ii- Fine touch
B. Pressure sensation
C. Vibration sense

(proprioceptive)
A. Sense of movement
B. Sense of position

THE SOMATIC SENSATIONS

II Mechanoreceptive Sensations

1. Tactile Sensations

A. Touch Sensation:

● Types: **i) Crude (rough) touch:**

▶ Definition: - not sharply localized and needs a relatively strong touch stimulus to produce it

▶ It is tested by stroking the oral cavity or tongue lightly by a piece of cotton while the person is closing his eyes.

ii) Fine Touch:

▶ Definition: It is sharply localized and gives information about the nature of touch stimuli.

Types: 1) Tactile localization:

▶ Definition: It is the ability of the person to localize accurately the point of touch without using his vision.

▶ It is tested by asking the person to close his eyes and touch his oral cavity by a pencil or a piece of cotton and ask him to localize the point of touch.



2) Tactile discrimination (two point discrimination):

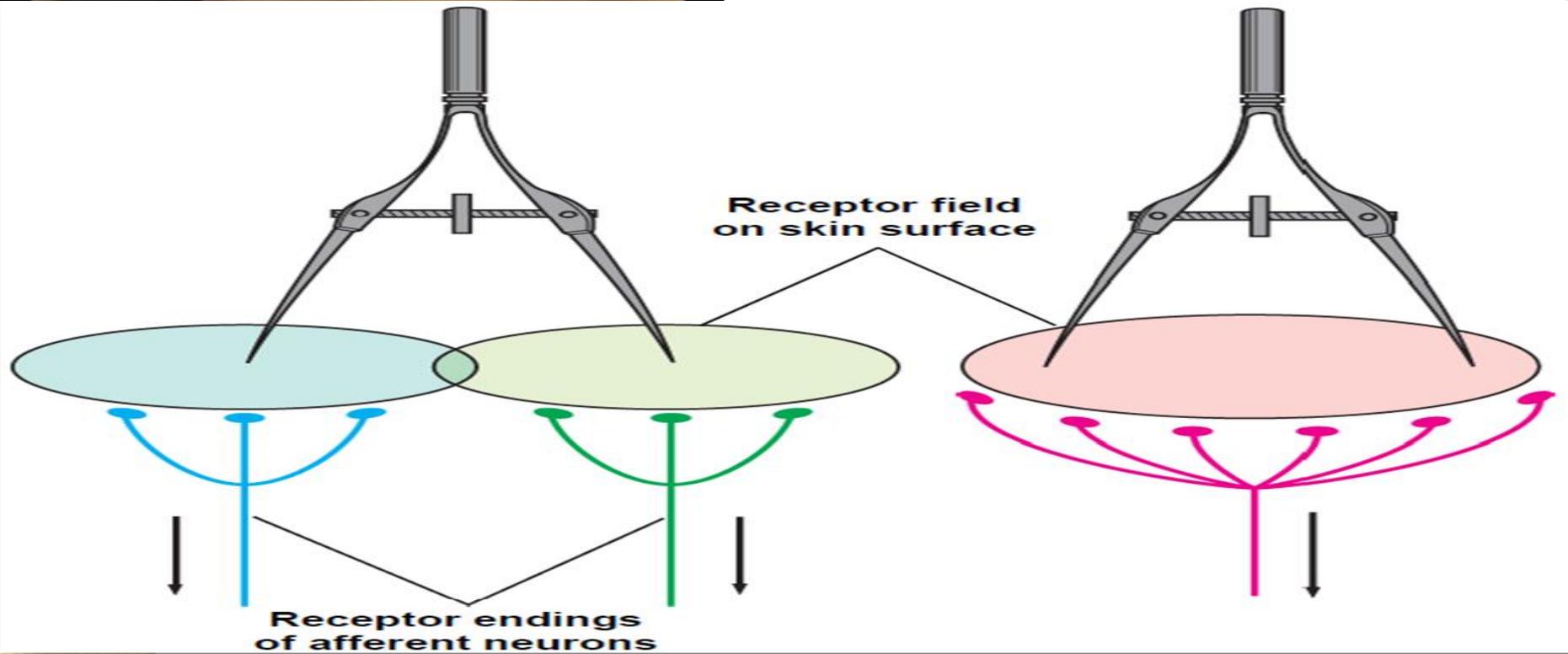
▶ **Definition:** It is the ability of the person to perceive two stimuli applied to the skin at the same time, as two separate points of touch, without using his vision.

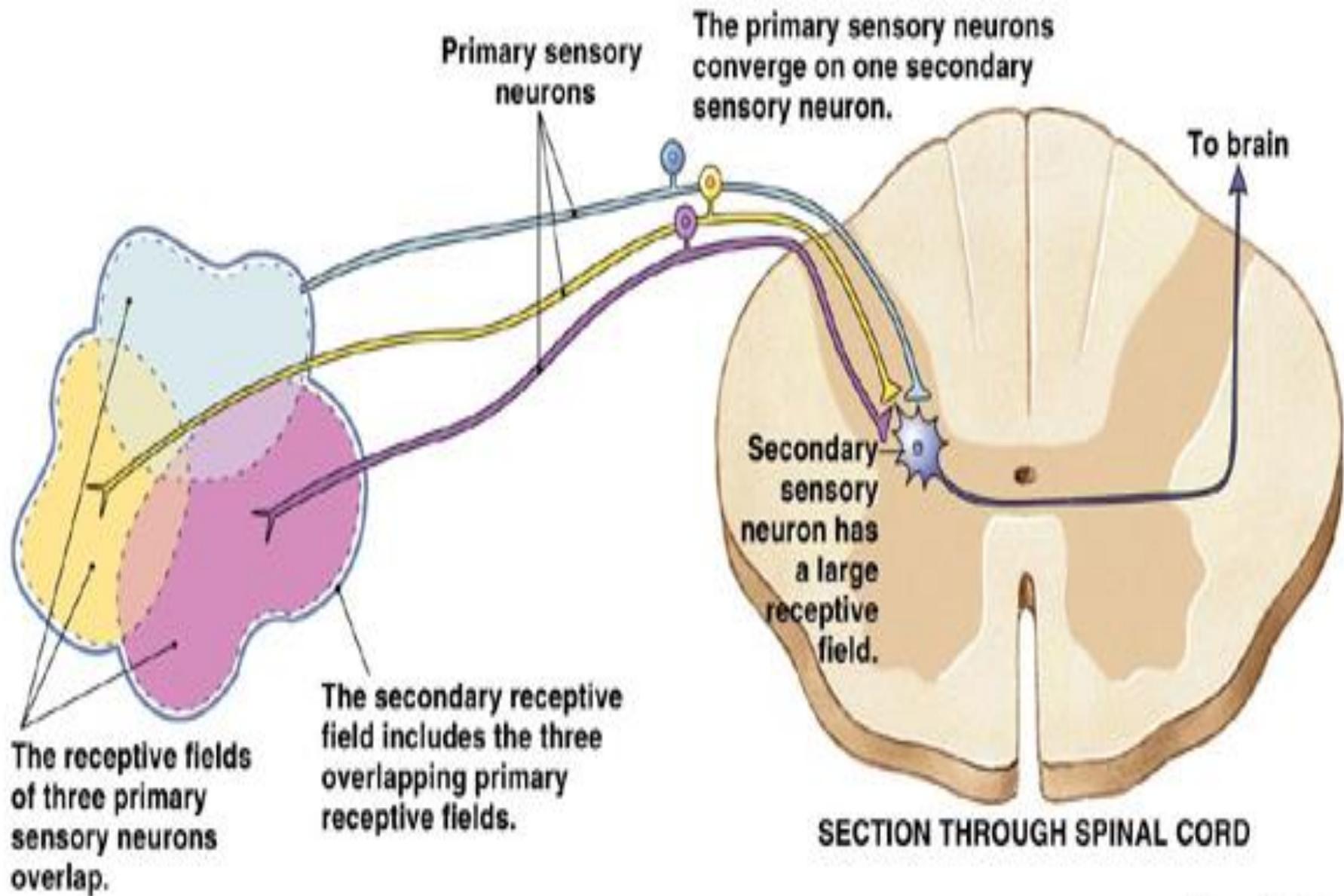
▶ **It is tested by** "Weber's compass test".

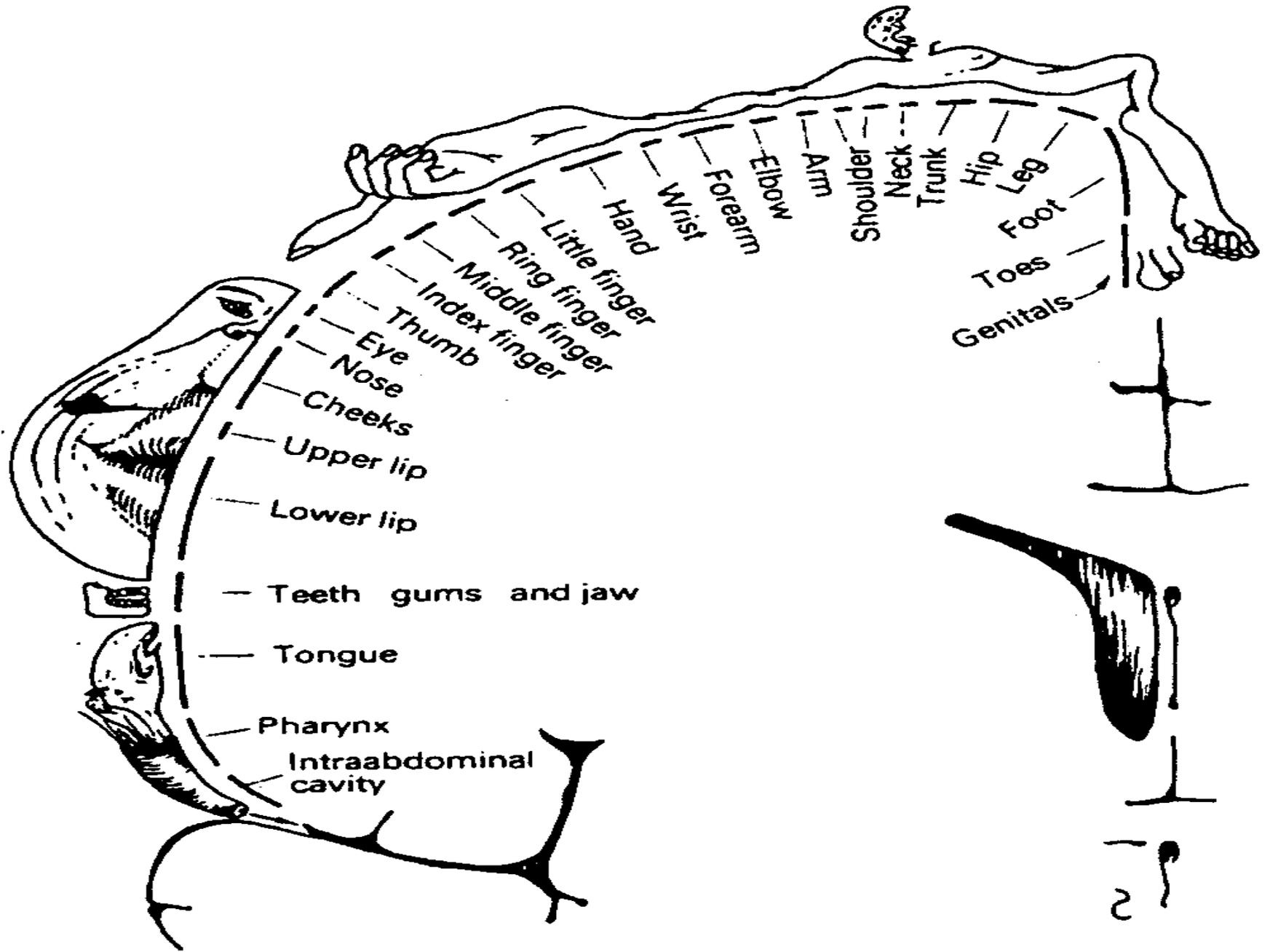
▶ **Factors affecting tactile discrimination:**

Tactile discrimination is more accurate over finger tips, lips, nipple, lobule of ear and tip of nose (minimal distance 1-3 mm) due to:

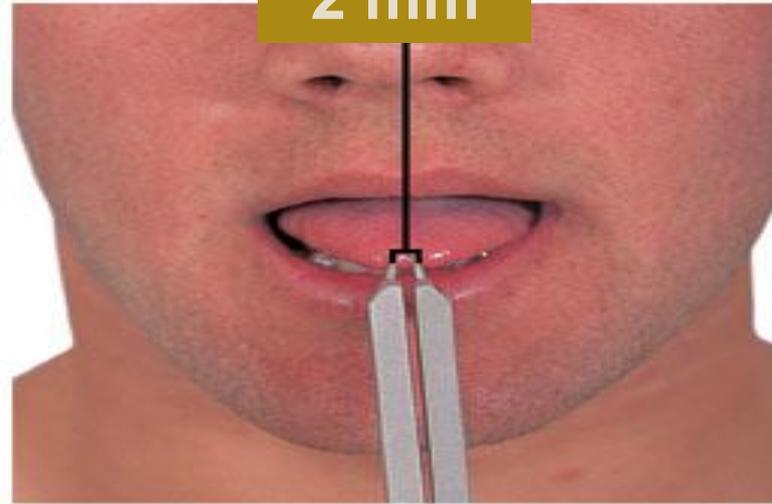
- Large number of receptors
- Less convergence in the nervous pathway
- Large area of representation in the cerebral cortex.



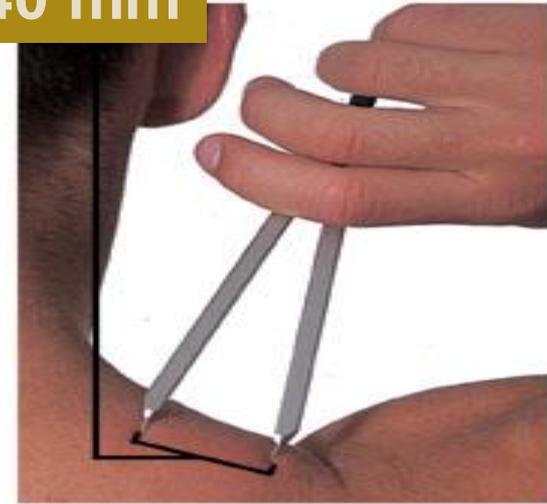




2 mm

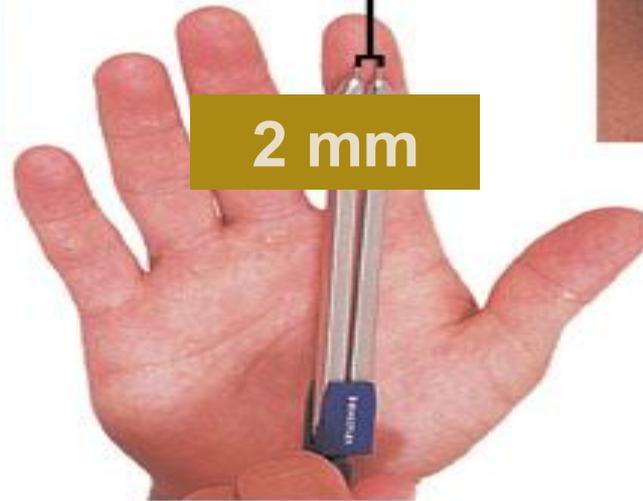


40 mm



4 mm

2 mm



Threshold distance at different areas

It is the minimal distance that a person can feel two stimulated points simultaneously as two separate points with eyes closed.

B. Pressure Sense

● Types:

1-According to intensity of stimulus:

A-Crude Pressure: with low ability to discriminate different weights.

B- Fine Pressure: with high ability to discriminate different weights.

2-According to location:

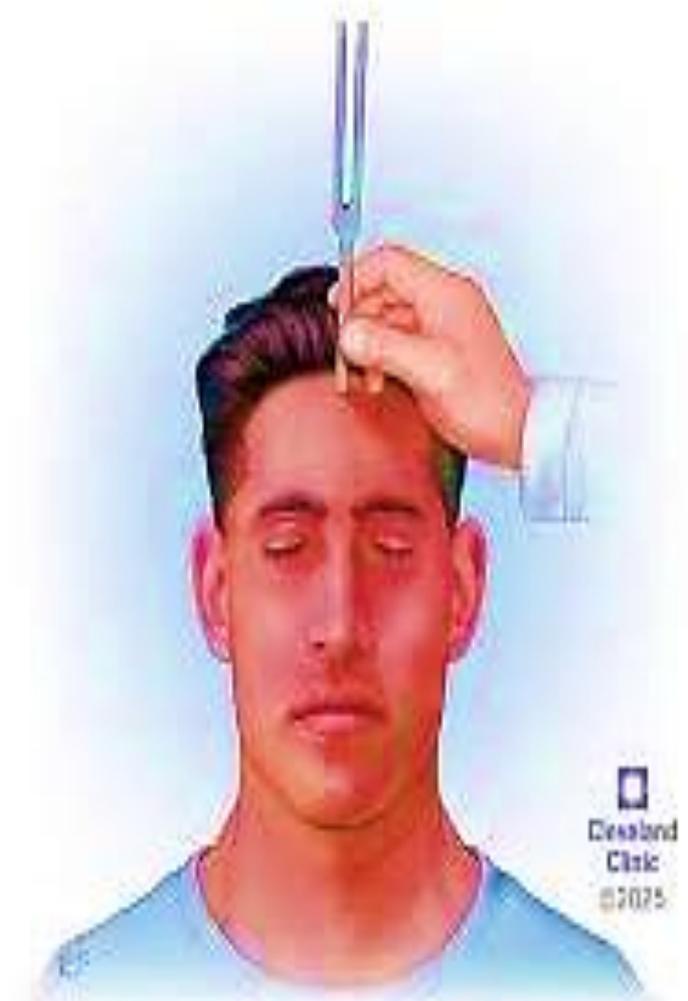
a-Light pressure sensation

b-Deep pressure sensation

▶ It is tested by: The person can differentiate between weights without lifting them.

C. Vibration Sense

- **Definition:** Vibration sense is the feeling of rhythmic pressure produced by rapid repeated stimulation of certain mechano receptors.
- **It is Tested by** asking the person to close his eyes and place the base of a tuning fork over a bony prominence. Bones are not sensitive to vibration, but are preferred because: The bone conducts the vibrations to greater number of receptors in the surrounding area.



Testing of vibration sense

2. Kinesthetic Sensations

● **Definition:** stimulation of the receptors present in the deeper layers of skin and subcutaneous tissues, muscles, tendons, ligaments and joints. Conscious sensation of position and movements are known as kinesthetic sensations.

● **Types:**



**Static proprioception
(sense of position)**

The sensation of position of different body parts relative to each other and relative to the space

**dynamic proprioception
(sense of movements)**

The sensation of movement of different body parts relative to each other and relative to the space

II- Thermoceptive Sensation

● **Thermoreceptors: I-Cutaneous (external)** : Warm and cold receptors. Cold receptors are 4 –10 times more numerous than warm receptors

II- Internal Thermoreceptors: In hypothalamus (core temperature).

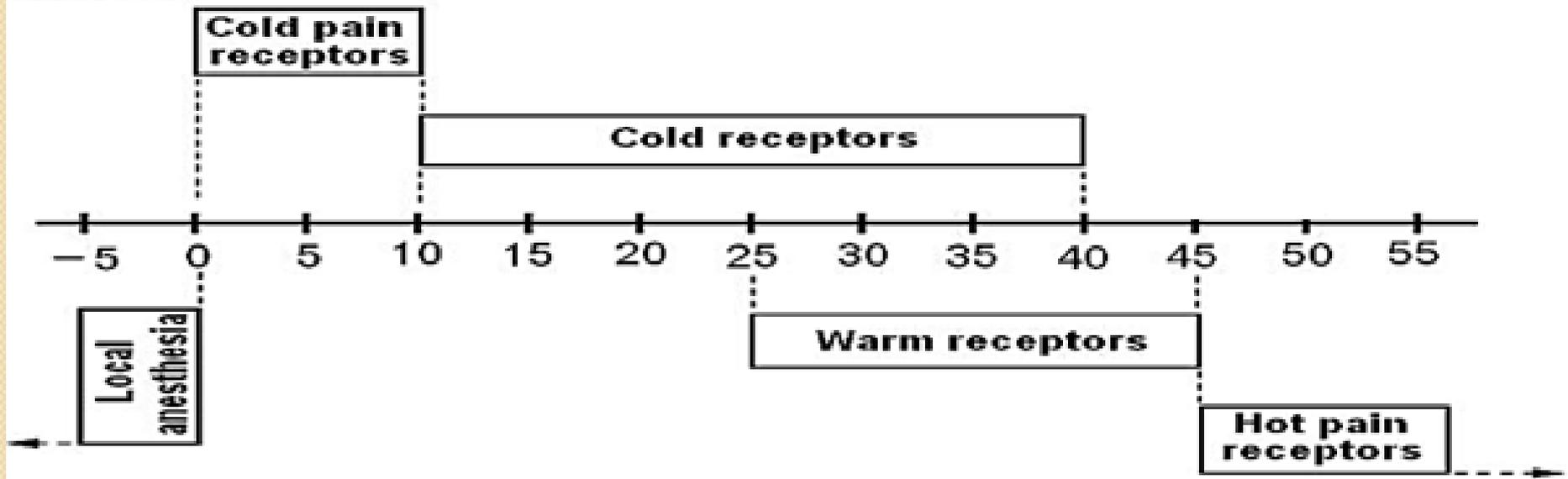
● **Significance of Thermal Sensations:**

1-Information of the higher centers about the external and internal temperature.

2-Helps in body temperature regulation.

Different Grads of Temperature

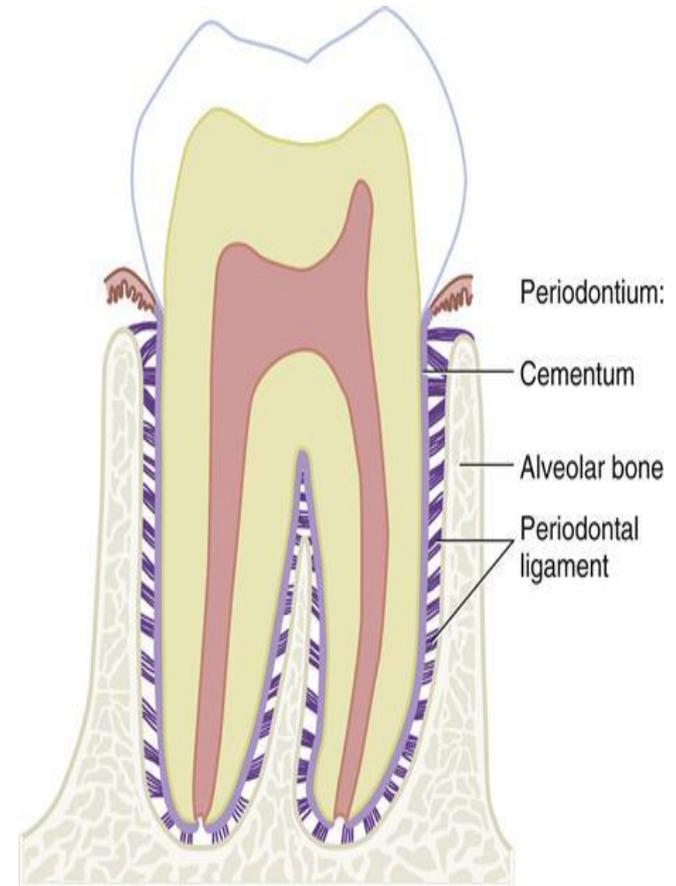
Stimulus:



- It is Tested by: a metal tube with fine end whose temperature is heated electrically in controlled manner.

Mechanoreceptors in oral cavity:

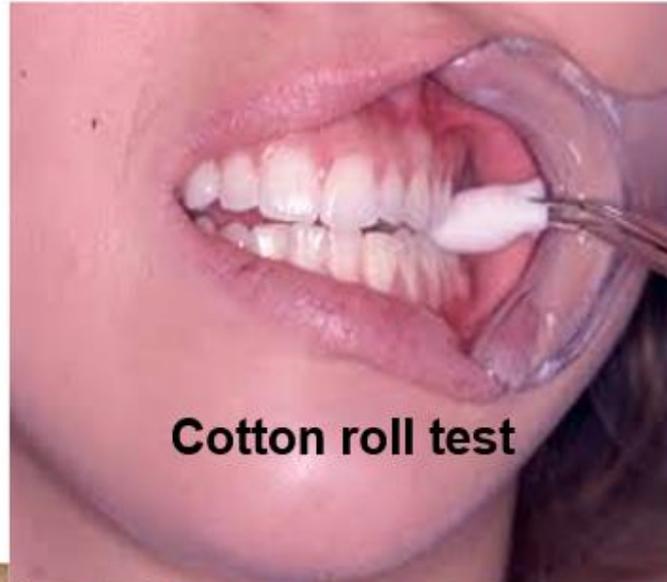
- Lip mucosa
- Tongue
- Gingiva
- Muscle spindle
- Temporomandibular joint
- Periodontal ligament



Functional significance for
•mastication and speech.

Testing Sensation in the Oral Cavity

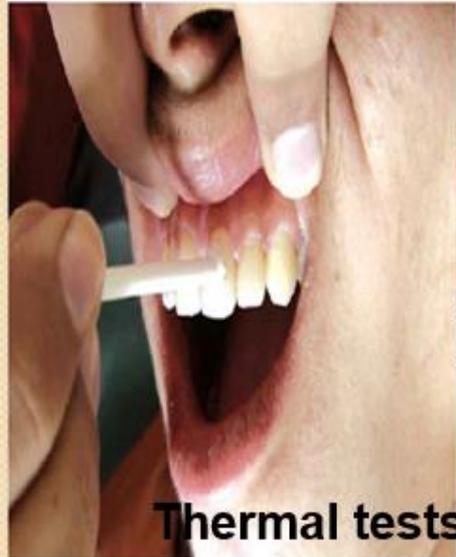
Thermal tests
(cold spray)



Cotton roll test



Air puff test



Thermal tests



Electric pulp testing



Percussion



THANK YOU