Lesions may be present in the sense organ itself, in the peripheral nerve, or in the central nervous system. While the patient's symptoms and physical signs may indicate a disorder of the sensory system, pathological changes involving other systems of the body may also be present and require careful examination. Destructive lesions generally cause bluntness or loss of sensation; irritative lesions may produce hypersensitivity or abnormal sensations. The principal symptoms of a sensory disturbance are tingling, numbness, tenderness, and pain. The principal physical signs are anesthesia, analgesia, diminished or absent reflexes, loss of position sense, and joint deformities. Lesions in the cerebral cortex usually affect the discriminating functions of sensation or produce complex disturbances involving evaluation and interpretation of the sensory signals.

Tests for the sensory system

A good deal of information can be obtained from a few simple clinical tests for each form of sensation, although much depends upon the cooperation of the patient. Electrodiagnostic techniques provide additional, often unequivocal evidence of functional integrity or of the existence of abnormalities in the sensory pathway.

1. Clinical tests. The patient should keep his eyes closed. The sensitivity of the proximal and distal parts of each extremity is determined and also whether the sensory changes are confined to one side of the body. If a sensory change is detected, its dermatomal distribution is evaluated and compared with the findings on the opposite side.

Superficial sensations

Tactile sensation. The sense of touch is tested by a wisp of cotton wool applied lightly to the skin. Quantitative estimations are made by using Von
Frey hairs, graduated in thickness so that different pressures are needed to bend them. The threshold varies considerably on different areas of the body, according to the thickness of the epidermis and the presence or absence of hairs.

**Thermal** sensation. This is tested by applying test-tubes to the skin, one filled with ice, the other with hot water. The patient must be told to respond to the feeling of cold or heat and not to the sensation of touch or pressure.

**Pain** sensation. This is usually assessed by giving a pinprick or by using an algesiometer, which can grade the severity of the stimulus. In tender parts of the skin a mild stimulus may provoke a marked reaction.

**Deep sensations**

*Pressure* sense. This is tested by squeezing the calf and forearm muscles or the deep tendons and noting sensitivity.

*Vibration* sense. The base of a vibrating tuning fork is applied to the bony prominences—e.g., elbow, shoulder, knee, shin, and ankle. The patient’s ability to detect when the vibration stops is noted.

*Position and joint* sense. The fingers and toes are moved passively by the examiner, and the patient is asked to indicate the direction of the movements. In another test, the examiner alters the position of a limb in space and the patient points to each new position.

**Discriminating sensations**

*Two-point* discrimination. To judge whether a tactile stimulus is single or double, various parts of the body are touched simultaneously with the blunt points of a compass or other applicator. The patient is asked each time if he is being touched by one or two points. The normal threshold of discrimination is 1 mm on the tip of the tongue, 2 mm to 3 mm on the fingers, 10 mm on the palm of the hand, and as much as 60 mm on the back.

*Stereognosis.* The appreciation of texture, weight, size, and shape of objects is tested by feeling the materials in the hands. Familiar objects like coins and keys are identified by rolling them between the fingers.

*Graphesthesia.* The patient is asked to identify a letter or number traced on his skin with a blunt edge; the two sides of the body are then compared.

2. Electrodiagnostic tests. Latency measurements of sensory nerve action potentials and studies of reflex conduction times are useful in differentiating disorders of the peripheral nerve from those of central origin. These tests are also used to demonstrate the progress of recovery in regenerating fibers after nerve damage.