

Studies on Pain. A New Method for Measuring Pain Threshold: Observations on Spatial Summation of Pain

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Abstract

The purpose of these studies has been to present a new method for measuring pain thresholds, together with experimental observations on the physiology of pain and on the effect of various chemical agents upon pain thresholds. Methods for estimating the intensity of the stimulus required to evoke a painful sensation in the skin may be classified under the headings: mechanical, chemical, electrical, and thermal.

Conclusion

1. A quantitative method for measuring pain thresholds in the skin by thermal radiation has been described. The method has the general advantage of measuring a physical quantity which is directly proportional to the changes occurring in the skin. The method has the further advantages of precision, simplicity of technique, rapidity of measurement, and the fact that the stimulus is innocuous upon repeated application except at high intensities. Further, any part of the skin surface may be studied and the size of the stimulated area varied at will.
2. Pain thresholds measured in this way did not vary consistently with time of day, with the general effectiveness, or the emotional state of the 3 subjects.
3. Individual threshold measurements for 3 subjects were 0.229, 0.231, and 0.233 gm. cal./ sec./cm.² and all measurements were found to be within + 12 per cent of their respective average values. The standard deviation for a single measurement was calculated to be + 2 per cent.
4. Intense pain in any part of the body raised the pain threshold in the skin in other parts as much as 35 per cent.
5. The senses of pain and heat, which were always stimulated together, were shown to be separate sensations through the action of acetylsalicylic acid. This drug lowered the heat threshold and raised the pain threshold.
6. The peripheral structures responsible for pain sense were distinguished from those of temperature and touch by demonstrating that occluding the blood for 25 minutes did not directly affect the pain threshold in the ischemic hand, whereas other sensations could hardly be elicited.
7. Pain sense was found to have no spatial summation in the sense that the pain threshold for many end organs was no lower than that for a few. This was observed to be the case for minimal stimuli and for supraminimal stimuli after morphine administration.
8. The intensity of radiation which produced blistering in 3 seconds was observed to be twice that necessary for the bare perception of pain.

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