

## Sensitivity Testing As a Means of Differentiating the Various Forms of Leprosy Found in Nigeria

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The object of this paper is first to describe a method of testing one aspect of cutaneous sensation, and of expressing the results obtained in a roughly qualitative way.

Fig. 1 illustrates the stimulator that is used; it consists of a bicycle spoke the end of which has been bent through 90°, and a piece of mono-filament nylon suture, which is attached to the bicycle spoke holder by a screw.

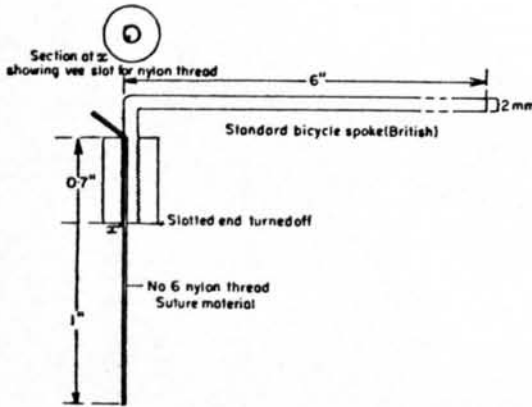


FIG. 1. The stimulator.

Six stimulators are made in this pattern, each having a mono-filament nylon suture of a different thickness and ranging from standard thickness No. 1, to standard thickness No. 6.

Where a particular skin area is to be tested it is first lightly shaved with a hand-operated mechanical razor to remove hair. Next the patient is shown the stimulator and reassured that no unpleasant sensation will follow its application. A single test stimulus is delivered to the shaved area, care being taken not to drag the nylon thread over the skin surface and not to leave it in contact with the skin for more than one second. The patient, whose eyes are

open, is asked to indicate with one finger the point stimulated. When it is clear that the patient knows how to indicate that he has felt a stimulus, then the test may begin. The six nylon threads are delivered to the skin area under investigation in a *random order* so that each thread is used three times and the patient, whose eyes are covered, indicates that he has felt a particular stimulus by pointing with his finger. The results of the test are scored as "felt" or "not felt" for each nylon thread used, gross misreference being scored as "not felt." Failure to recognize stimuli delivered to the opposite side of the body invalidated the test.

The method used has the following advantages: (1) The equipment is very simple and easily carried. (2) The test is in no way alarming for the patient. (3) The language barrier is bypassed.

The next stage in the investigation is to establish the normal response pattern in various parts of the body in subjects who are free from leprosy but come from the same social and economic background as the patients that will subsequently be investigated.

Figs. 2 and 3 illustrate the skin areas investigated. These areas were studied in a group of 27 Nigerian volunteers. The group was made up of 15 men, seven women of child bearing age and five school boys.

Table 1 gives a summary of the normal pattern of response to each of the six nylon threads in each of the areas studied. Each thread is applied three times in each test and the resultant number of stimuli felt is recorded for all 27 volunteers. If every stimulus delivered by a particular thread is felt by all 27 volunteers in a particular area then the result is scored as *M* or maximum response possible, i.e.  $27 \times 3 = 81$ . The table shows that nylon thread No. 6 is felt maximally in all areas in all subjects. Brow, cheek, chin, ear and back of knee have a high degree of sensitivity. In general the

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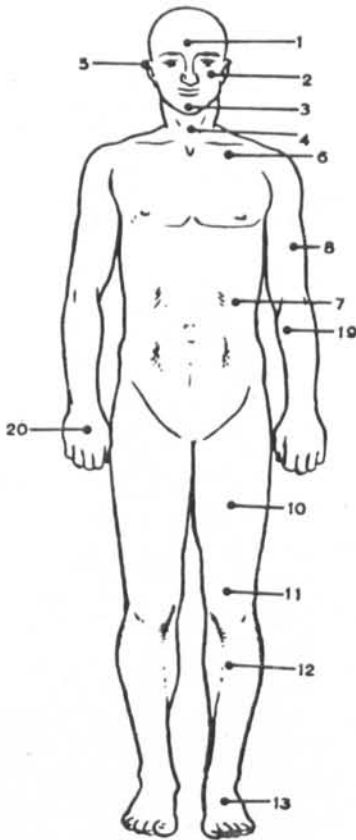


FIG. 2. Areas tested on the front of the body.

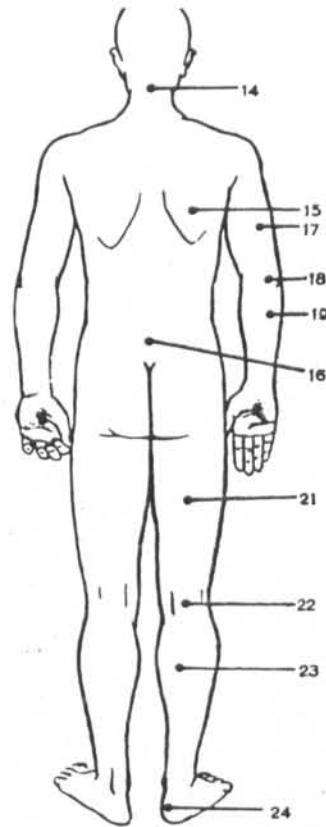


FIG. 3. Areas tested on the back of the body.

skin areas in the lower limb that were studied had a lower response rate than those in other parts of the body. Finally the very low response rate in the elbow region must be emphasized.

Next, 16 leprosy patients from among the patients attending the outpatient treatment centers of Katsina Province of Northern Nigeria were selected for sensory investigation. These will be considered in two groups. In the first group, consisting of four cases, it was possible to examine each patient before the onset of treatment, one year after the onset of treatment, and two years after the onset of treatment. At each investigation biopsy specimens of the tested skin area were taken and examined for the presence of mycobacteria and the distribution of nerve fibers. All patients in this group were treated with lepromin.

In the second group, consisting of 12 cases, only one examination was carried out

after the onset of treatment with DDS. Each patient was also tested with lepromin and examined by means of skin smears for the presence of mycobacteria.

The four leprosy patients in the first group were:

Case 1: A woman aged 20 with a single tuberculoid lesion on the flexor surface of the forearm and a positive response to lepromin.

Case 2: A man aged 30 with a number of borderline lesions on his face, arms and trunk, and a positive response to lepromin.


Case 3: A man aged 60 with multiple small macules all over his body and limbs and a negative lepromin response.

Case 4: A young man aged 18 with a generalized lepromatous infiltration of the skin of the whole body and a negative lepromin response.

Table 2 summarizes the results of the

TABLE 1. Results of skin testing in the normal group.

RESPONSES OF 27 SUBJECTS (15 MALES, 7 FEMALES, 5 CHILDREN), TO STIMULI WITH NYLON THREAD.						
	THREAD NUMBER					
	I	II	III	IV	V	VI
Brow	75					
Cheek	79					
Chin	77					
Anterior neck	70					
Below clavicle	63	79				
Over lower ribs	53	75				
Front of thigh	57	75				
Above knee	54	76	80			
Front of tibia	43	60	65			
Dorsum of foot	57	76	77			
Front of upper arm	58	68				
Flexor forearm	42	72				
Back of upper arm	46	74				
Elbow	0	0	14	46	80	
Back of forearm	78					
Back of hand	39	68				
Back of thigh	60	72				
Calf	32	57	79			
Over heel	28	51	77			
Ear						
Posterior neck	53	77				
Scapula region	60	76				
Lumbar region	54	73				
Back of knee						

 Maximum response by all subjects.

sensory testing in these four patients at three sites, namely, (a) the skin of the forearm lesion, (b) the skin beyond the lesion, and (c) the skin of the opposite forearm.

The first patient illustrates the pattern of response obtained in tuberculoid leprosy. The lesion was initially anesthetic while the unaffected skin on both forearms gave responses that were within normal limits. As the result of treatment, however, the lesion gradually became more responsive while the normal skin remained unchanged. Patient No. 2 at the first examination showed anesthesia of the lesion, but a greater number of responses to stimuli on the opposite forearm, compared with the control series. However, with treatment the number of responses from the lesion increased and the pattern from the skin of both forearms returned to normal. In the third and fourth patients the skin of both forearms consistently responded to all stimuli and this pattern was in no way altered by treatment.

In Group B, eight of the 12 patients showed a general lepromatous infiltration of the skin of the whole body. In spite of variable periods of treatment, mycobacteria could still be found in skin smears. All eight failed to respond to lepromin. In all eight patients the same increase in the number of responses to stimuli, as compared with the normal series, was observed, even though the skin areas tested ranged all over the body.

It is concluded that an increased number of responses compared with the normal established pattern indicates the presence of lepromatous leprosy, and that a progressively increasing number is an indication of lepromatous activation.

SUMMARY

A method of testing one aspect of cutaneous sensation in a roughly quantitative way is first described. Next the pattern of responses to this test in different parts of the body in a series of normal Nigerian volunteers is recorded, and these findings are contrasted with the results of testing cutaneous sensation in a series of leprosy patients who came from the same racial

TABLE 2. Results of skin testing in the leprosy series.

	1st Examination a. centre	2nd Examination b. normal beyond c. normal opposite	3rd Examination
CASE I			
Control			
CASE II			
Control			
CASE III			
Control			
CASE IV			
Control			

a. infiltrated skin right forearm b. infiltrated skin left forearm

and economic background as the control group.

In testing leprosy patients with circumscribed skin lesions the sensitivity of the skin in the center of the patch was compared with adjacent normal skin and with a similar area of normal skin from the opposite side of the body. In testing leprosy patients with lepromatous leprosy two simi-

lar skin areas, one on each side of the body, were compared.

It was found that patients with lepromatous leprosy manifest an increased cutaneous sensitivity as compared with the normal group, and that an increase in sensitivity in apparently normal skin in patients with borderline leprosy is indicative of a lepromatous conversion.