THE PILOMOTOR RESPONSE TO INTRADERMALLY INJECTED NICOTINE: AN AID IN EXCLUDING THE DIAGNOSIS OF LEPROSY [1]

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The pilomotor and sudomotor (gooseflesh and sweating) reactions to intradermal injections of highly diluted solutions of acetylcholine and nicotine salts have been shown by several workers, notably Stephen Rothman and his associates (3-6), to be of the nature of axone reflex responses which are abolished by denervation at the postganglionic level.

Loss of the sweat response to pilocarpine or acetylcholine in leprosy has been used by many workers (Muir, DeGotte, Jeanselme, Schujman, Arnold and others) as an aid in the diagnosis of that disease. It has been found useful in the study of small or nonanesthetic, hypopigmented, nonbacillate macules, and in the differentiation of the sensory dissociation of leprosy from that due to syringomyelia. All this has been reviewed in detail elsewhere (2) and need not be elaborated upon here.

Rothman suggested (7) that the pilomotor response to intradermally injected nicotine, which is much stronger than that produced by acetylcholine or its derivatives, might be as useful as the sweat test for this purpose. The simplicity of the procedure, and the stability of nicotine salts in aqueous solution, would be additional advantages over the other test. The only drawback is the fact that nicotine picrate or other nicotine salts are difficult to obtain in the market, at least in the U.S.A. This is mitigated, however, by the fact that a single milligram suffices for a thousand tests.[2]

TECHNIQUE

Nicotine picrate in 1:100,000 and 1:50,000 aqueous solution was injected intradermally, in 0.1 cc. doses, in several cases of known leprosy. In most instances the injections were made inside a macule (or an anesthetic area), and also, for control purposes, in the immediate vicinity. Surprisingly the gooseflesh response was often lacking in the latter site as well as in

[1] Read at the Tenth International Congress of Dermatology, held in London, July 1952.

[2] The author will be glad to send a supply to anyone interested in trying out this test.

the former, and another injection had to be made into a remote site in order to provide a positive "control" response. Infrequently even the latter was negative, in nonleprous as well as leprous persons. In many cases, and as a rule when the test was done with a view to excluding rather than confirming the suspicion of leprosy, a single injection was made at the edge of the visible lesion, the wheal extending for a few millimeters both inside and outside the edge.

A further modification employed in many cases was to paint one-half of the test area with Minor's solution (2% iodine and 10% castor oil in absolute alcohol), the injection being made where the edge of the lesion crossed the edge of the painted area. This permitted visualization of the sweat response, which followed the pilomotor one within a few seconds in most of the nonleprous cases.

TABLE 1.—*Pilomotor response to intradermally injected nicotine picrate 1:50,000 and 1:100,000 in 8 unselected cases of leprosy.*

Type of case	Pilomotor response		
	In distant control site	In site near lesion	Inside lesion or numb area
T_1, healed	+	±	0
L_2, healed	+	0	0
T_3	------	+	0
T_3	------	+	0
T_2	+	0	0
L_2	0	------	0
L_3	0	------	0
T_1	+	0	0

In most cases there was little or no difference between the response to the 1:50,000 dilution and that to the 1:100,000; what difference there was seemed to be in favor of the 1:100,000 strength.

RESULTS

No pilomotor or sweat response was obtained within the lesion or anesthetic area in any of the 8 cases of leprosy tested (Table 1). Most of the lesions tested in nonleprous persons gave the normal response, just as vigorous, or nearly so, within the lesion as in the normal surrounding skin (Table 2). A

notable exception to the latter rule proved to be the failure of the response in the facial lesions of several cases of achromia parasitica (alias impetigo sicca or erythema streptogenes); indeed, a failure of the pilomotor response was observed many times in the normal skin of the face.

This same curious unresponsiveness of the face has been reported previously for the sweat reaction to acetylcholine and methacholine (1), and there is still no explanation of it. Perhaps it is related to the familiar observation that anesthesia is prone to develop relatively late in the facial lesions of leprosy.

SUMMARY

The pilomotor (and sudomotor) response to intradermally injected nicotine picrate in 1:100,000 solution appears to be regularly abolished by leprous involvement of the skin, both within and near demonstrably involved areas.

It is not invariably observed even in normal skin, however, and is often absent on the face.

The stability of nicotine picrate in aqueous solution, and the fact that only this solution and a syringe and needle are required for the test, constitute distinct advantages of this test over the tests for sweat secretion.

TABLE 2.—*Pilomotor response to intradermally injected nicotine picrate 1:50,000 and 1:100,000 in nonleprous skin lesions.*

Diagnosis	Pilomotor response			
	In normal skin		In lesion	
	1:50,000	1:100,000	1:50,000	1:100,000
Vitiligo	+	+	+	+
Vitiligo	+	+	+	+
Seborrheic dermatitis	+	+	+	+
Seborrheic dermatitis	±	+	0	+
Lichen simplex	+	+	+	+
Pityriasis rosea	+	+	+	+
Erythema multiforme	0	+	0	+
Achromia parasitica	±	+	0	±
Achromia parasitica	0	±	0	0
Achromia parasitica	0	0	0	0

The pilomotor test shares with the sweat tests the advantage over the older histamine test of being as easy to read in highly pigmented skins as in white ones.

CONCLUSIONS

A normal pilomotor (gooseflesh) response to an intradermal injection of 1:100,000 nicotine picrate solution strongly suggests that the lesion within which it occurs is not due to leprosy.

Failure of the response to occur is of uncertain significance.

RESÚMEN

La reacción pilomotora (y sudomotora) a la injección intracutánea de una solución de picrato de nicotina al 1:100,000 parece estar completamente abolida en las lesiones leprosas y aún en áreas contiguas.

Esta reacción no se observa aún en piel normal invariablemente, y frecuentemente está ausente en la piel de la cara.

La estabilidad del picrato de nicotina en solución acuosa, y el hecho que solo se necesita ésta solución, aguja y jeringa, para la prueba, constituye una ventaja de éste método sobre otros para comprobar la secreción de sudor.

La reacción pilomotora comparte con la sudomotora, la ventaja sobre la prueba de la histamino, de ser fácil de leer tanto en pieles obscuras como en blancas.

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DESCRIPTION OF PLATE

PLATE (4)

FIG. 1. Hypopigmented macule on arm, clinically suggestive of a subtuberculoid macule but without evidence of thermal or tactile anesthesia.

FIG. 2. Same area about 10 seconds after intradermal injection of 0.1 cc. of 1:100,000 nicotine picrate solution. Gooseflesh response in the macule area is clearly shown, and strongly suggests nonleprous etiology of the macule. Note how far the reaction extends beyond the injection wheal, involving skin well beyond the area of the macule.

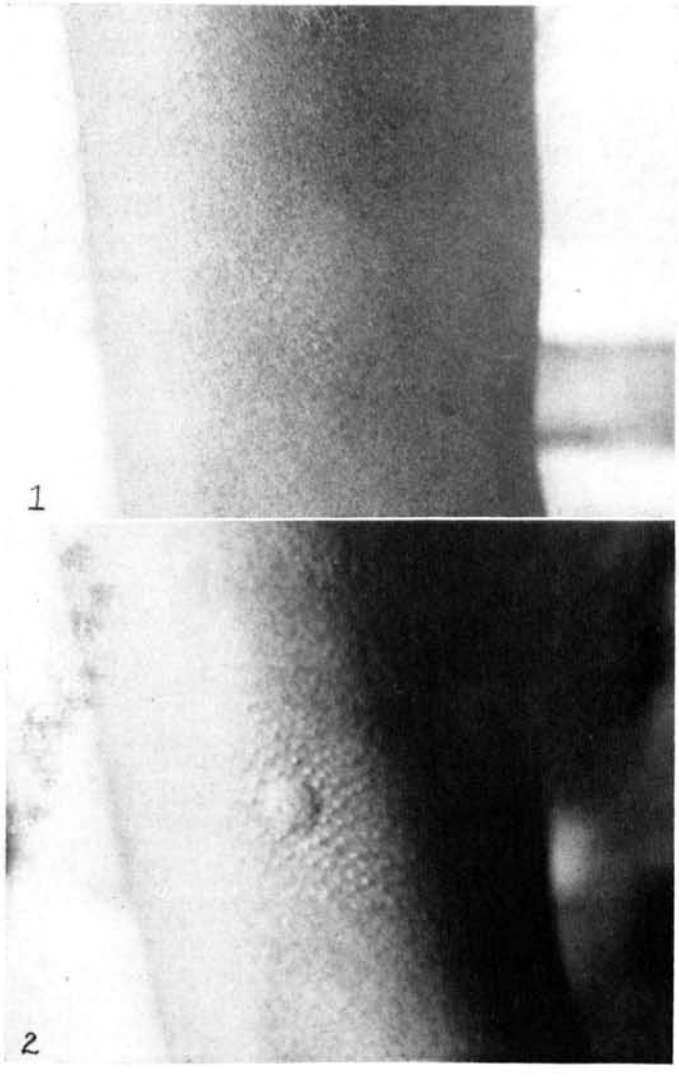

PLATE 4.