STANDARDISATION OF TESTING PROCEDURES IN DERMATOLOGY*

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I feel honoured to have been invited for the Glaxo oration for the year 1981–82. I wish to present before you my attempts at standardisation of the testing procedures in Dermatology.

One of the common problems that we all face is, that often we are unable to objectively grade the severity of the disease in a particular patient. Such grading is of utmost importance to evaluate on subsequent follow up whether the patient is improving or deteriorating. This is particularly important when the effects of a certain therapeutic procedure are being evaluated.

The first disease situation that I would like to discuss is that of dermographic urticaria. This type of urticaria manifests with the appearance of urticarial wheals following scratching. The lesions are usually linear and are as a rule limited to the scratched area. The common method of eliciting dermographism is to stroke the skin of the patient with some blunt object such as the pen or the end of a key and look for whealing. Since the whealing in these cases depends upon the pressure used for stroking the skin and this pressure can vary from person to person and from time to time, the results of such stroking are not reproducible and therefore not dependable. To standardise the pressure employed during stroking, I have prepared a device which has been named *Dermographism Testing and Grading Device*.

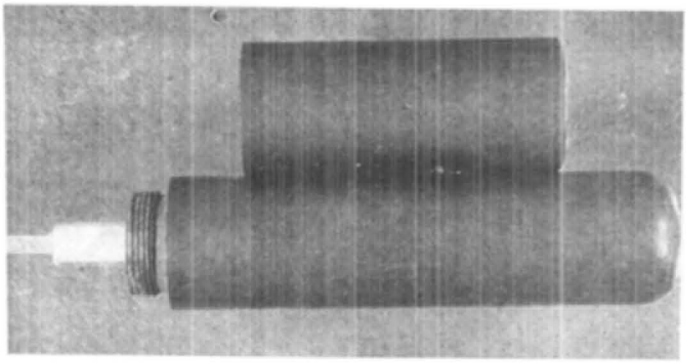

Fig. 1 The stroking device used for testing dermographism.

This device consists of two components, a stroking device (Fig. 1) and a template (Fig. 2). The stroking device essentially consists of a flat-edged stroker mounted on a spring. The degree of compression of the spring determines the pressure on the stroker during stroking. Stroking of the skin is done through the slits in the template and each slit allows a different pressure

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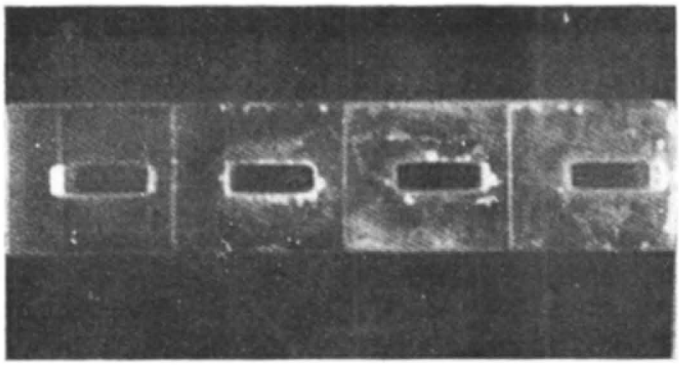

Fig. 2

The template used with the stroking device for testing dermographism.

to be used during stroking. The minimum pressure of stroking which leads to whealing is considered as the grade of dermographism. By using graded pressures, it has been possible to find a pressure which elicits dermographism in all patients having dermographic urticaria but not in the controls. It has also been observed that the minimum pressure required for eliciting dermographism varies in different patients. Moreover, the decrease in dermographic tendency during treatment can be monitored objectively with this device.

The second device, named the *Thermo-stimulator* (Fig. 3) is meant for patients having cold urticaria. Urticaria caused by cold stimuli is now well known to occur in three major forms, (1) familial cold urticaria, (2) secondary cold urticaria due to the presence of cryoproteins in the blood, and (3) idiopathic acquired cold urticaria. The attacks of urticaria in these cases are caused mostly during the winter season and can be initiated by exposure to cold winds, cold water bath, washing hands in cold water, getting drenched in the rain, sitting under a fan while sweating, entering an air-conditioned room, visit to a hill-station, taking cold foods or drinks, or touching cold objects. The common method of testing these patients has been to apply an ice-cube on the forearm skin and to look for whealing. An alternative method is to dip one hand in a bowl of cold water and see if it leads to whealing. It is obvious that in either of these tests, the cold stimulus is liable to vary from one test to the other. In designing the thermo-stimulator, the main attempt has been to standardise all parameters of the cold stimulus. In this test which is called the *Cryo-Stimulation Test (CST)*,

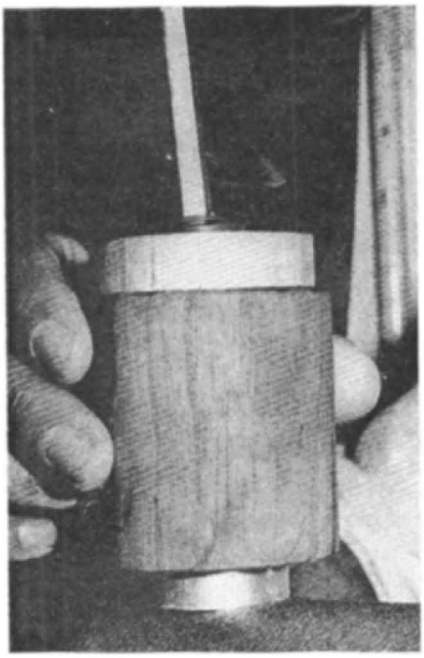

Fig. 3 The thermo-stimulator used for testing cold urticaria.

a 33 mm diameter circular area of skin on the patient's forearm is exposed to 0°C for exactly 2 minutes under a pressure equal to the weight

of the instrument which is 300 gm. The response of the stimulated skin is measured in terms of, (1) the maximum diameter of the erythematous reaction which occurs at this site, (2) the duration for which this erythematous reaction lasts, and (3) appearance of any wheal. The response in the normal and the other control groups is as a rule, less than 38mm erythema which lasts for less than 3 minutes. In contrast, the patients having cold urticaria have a response more than that in the normal controls. Some patients develop a well-defined wheal in the stimulated area. The whealing response can be further graded by filling the inner tube of the thermo-stimulator with water at different temperatures ranging from 0°C to 30°C and performing the cryo-stimulation test. The maximum temperature which produces whealing at the test site indicates the degree of hypersensitivity to cold. By determining this grade on subsequent occasions, it is possible to assess whether the patient is improving or deteriorating.

Next, I will switch over to the field of contact dermatitis. You are all aware that contact dermatitis can occur due to a variety of agents which include cosmetics, wearing apparel, jewellery, drugs used for local application, air-borne plant components and other chemicals present in the environment of industrial and other professional workers. The standard method of confirming the cause of contact dermatitis consists of applying patch tests with the suspected agents and reproducing miniature contact dermatitis at control sites. It is a very simple test but it requires a few standardisations. For instance, it is important to employ, (1) a standard concentration of each chemical, (2) an appropriate base for dissolving the chemical, and (3) an accurately measured volume of the antigen. It is well known that chemicals or extracts in the liquid state can deteriorate on storage. To obviate these difficulties and to make the technique of patch test still easier, I have prepared *Antigen-Impregnated-Discs* (AID) for patch test (Fig. 4). Each AID has been impregnated with a standard amount of the chemical antigen and dried. For doing the patch test, an AID carrying the required antigen is to be wetted with water and applied on the skin under the standard patch. Our studies show that the results of patch tests with AIDs are equivalent to those performed with the standard antigens and that the AIDs are stable for at least 1 year even when the environmental temperature is more than 40°C. Thus these AIDs can be stored at room temperature in any part of the country.

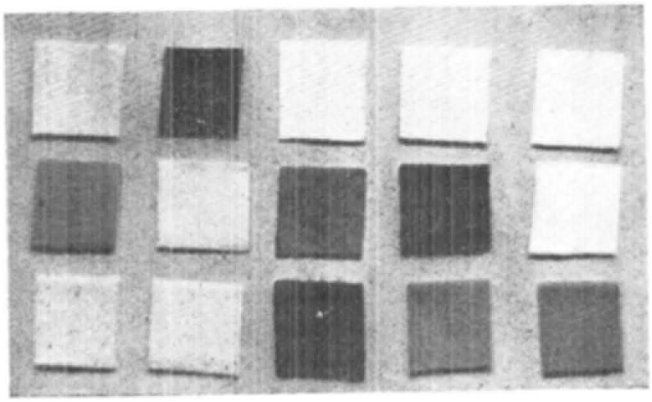

Fig. 4

The antigen - impregnated-discs incorporated with standardised amounts of different antigens.

There is, however, one limitation and that is, that the antigen-impregnated-discs can be prepared for only those antigens which are tested in the aqueous solution. For antigens which are tested in the form of an ointment, we have therefore, prepared *Antigen-Containing-Saucers* (ACS) (Fig. 5). Each ACS consists of a shallow saucer which contains a circular disc of lint impregnated with the required antigen. Different saucers containing their respective antigens are kept ready and applied on the skin of the patient whenever required.

Volatile substances, when applied on the skin for patch testing and occluded as in the standard patch test, can lead to primary irritant reactions. For testing with volatile substances therefore, it is important to ensure that the skin gets exposed only to the vapours of the antigen and the antigen does not get directly applied to the skin. For this, we have prepared *Antigen-Cups* (Fig. 6) for patch test in which case the antigen is soaked into a paper disc held at the base of an inverted cup. When such a cup is applied on the skin, the antigen remains at the base of the inverted cup while its vapours act on the skin.

Lastly, I wish to introduce to you, a set of three devices made for testing and grading the loss of cutaneous sensations. These devices are particularly useful in leprosy patients. It is well known that several patients having leprosy lesions do not have a complete loss of cutaneous sensations. In such a patient, whenever there is only a partial loss of the sensation, it is useful to grade the loss of the sensation, so that during follow up, it becomes possible to assess whether the

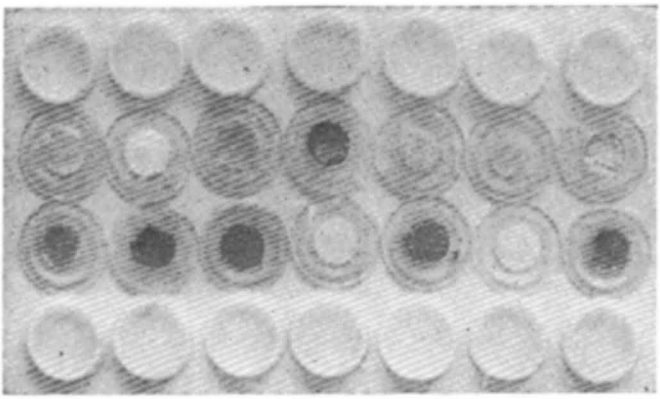

Fig. 5

The antigen - containing-saucers containing standardised amounts of the antigens for testing ointments.

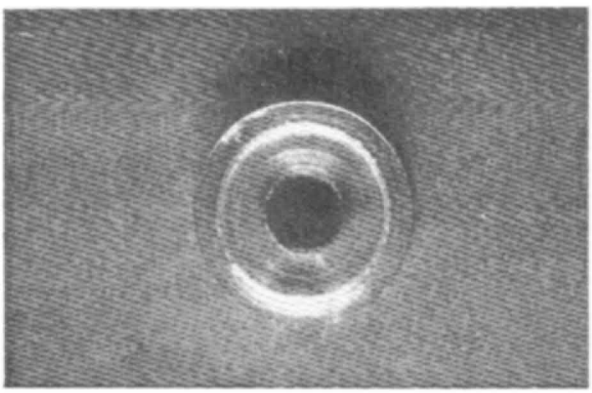

Fig. 6

The antigen-cups used for testing volatile substances.

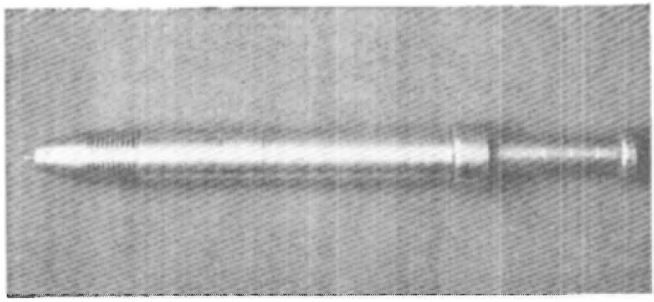

Fig. 7
The pain-sensation-testing-and-grading device.

sensory loss is incresing or decreasing. It is important to realise that the loss of cutaneous sensations in leprosy is partly due to the damage and degeneration of the nerve fibres and partly due to the inflammatory oedema and pressure on the nerve fibres. Whereas the loss of cutaneous sensations due to degeneration of the nerve fibres cannot recover, that due to the inflammatory oedema and pressure can recover in due course. With treatment, therefore, most of the cases are likely to show at least some recovery of the cutaneous sensations. Since the cutaneous sensations commonly tested in leprosy patients include the sensations of touch, pain and temperature, I have correspondingly made three devices, one for each sensation (Figs. 7,8,9). For each test, a standardised stimulus is applied to the skin and if the patient feels less, the strength of the stimulus is increased step-wise till that area

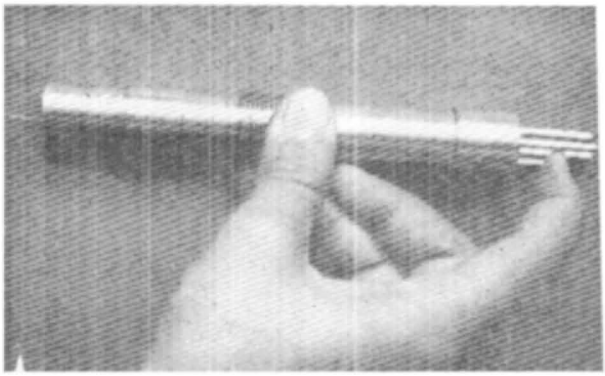

Fig. 8
The touch-sensation-testing-and-grading device.

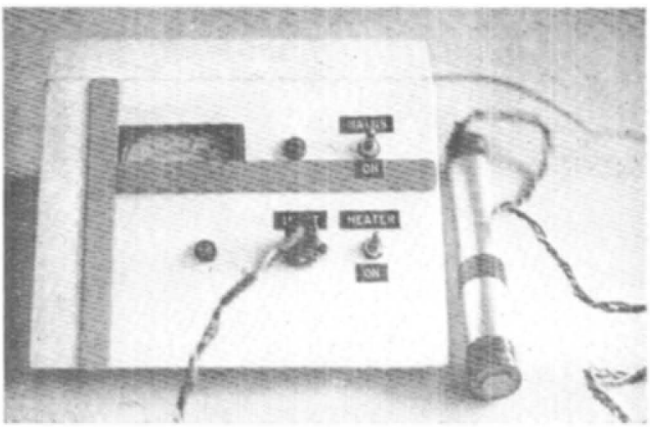

Fig. 9
The temperature-sensation-testing-and-grading device.

experiences the normal sensation. This tells us the grade of the sensory loss. In the case of the device for testing the sensation of temperature, there is provision for alternately heating and cooling a small circular disc with a simultaneous recording of its temperature. Sequential estimations of the grades of sensory impairment at specified sites in the lesions of leprosy, help to decide whether the patient is improving or deteriorating.

Friends, all these devices and methods which I have been talking to you are small and simple, but each of these is meant to help us make more accurate judgements about the progress of the diseases in the patients under our care. I have been personally using these devices and I hope these will be useful to you as well. Moreover, with further experience and demand, I am sure there will be further improvements in these devices to make them more useful. Please remember, that the car that you drive today is far different from the model that was made first.

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