irritants will result in reactions on any skin. This does not mean that patch testing should not be performed with dilute solutions of chemicals that in stronger concentration are primary irritants. There are published lists of concentrations of chemicals that dermatologists have used as patch tests to determine hypersensitivity. The use of these concentrations, together with the time they are left on the skin, is an attempt to avoid the primary irritant action of the chemical.

While the majority of occupational dermatoses are caused by primary irritants, about 20 per cent are caused by substances that do not have a primary irritant action on the skin. These chemicals that are not primary irritants are responsible for by far the large majority of cases of contact dermatitis among the public caused by wearing apparel, cosmetics, ornaments, etc. They induce a specific skin allergy and thus cause dermatitis. They are called sensitizers. It is well known that many chemicals that are primary irritants, for instance, formaldehyde, bichromates, mercuric salts, and phenols, are also sensitizers.

The ordinary diagnostic patch test consists in applying a small portion of the suspected substance to a site of normal skin of the patient. This is covered with innocuous impermeable material, which is then sealed to the skin by adhesive plaster. There have been many modifications proposed in order to overcome certain objections.

With liquids the diagnostic patch test is performed in the following manner. Saturate a piece of four-ply gauze about $^3/_4$ inch square, and apply it to unflamed skin on the arm or back. The liquid should not be permitted to trickle from the patch site. For insulation a $1^1/_2$-inch square piece of nonwaterproof cellophane is used. (Waterproof cellophane consists of regenerated cellulose coated with a water-insoluble resin.) This is sealed to the skin with a piece of adhesive plaster about 3 inches square; when smaller pieces of adhesive plaster are used patches are often lost or there is insufficient contact of the test substance with the skin. The reactions that may result from the adhesive plaster are separated from those resulting from the test substance by the uninflamed skin which is in contact with the cellophane only. In performing a number of patch tests, care should be taken to avoid overlapping of adhesive plaster, which will cause intensification of the adhesive plaster reaction.

In performing patch tests with powders, the powder is placed on a piece of gauze in order to keep the reaction localized. If the gauze is moistened it holds the powder better than when dry.

In patching with solids it is not necessary to use gauze. When solids insoluble in water are used for patching we have found it best to dissolve them in a solvent, making a saturated solution and wetting a piece of gauze with this solution. The gauze is then allowed to dry before placing it on the skin. This procedure deposits the precipitated finely divided substance on the gauze and thus brings about better contact with the skin. When the insoluble solid is of a resinous character the solution may be painted directly on the skin, the solvent allowed to evaporate, and the cellophane and adhesive plaster applied. In such cases if the resin adheres firmly to the skin it is not necessary to cover it with the cellophane and adhesive. The technique of patching with ointments is the same as for liquids.

While solvents are primary skin irritants, they sometimes also act as sensitizers. When it is desired to find out whether a solvent is causing dermatitis by its action as a sensitizer, patch tests may be performed as follows: mix equal parts of the solvent with equal parts of a bland oil such as liquid petrolatum or corn oil, in order to buffer its primary irritant action, and patch as for liquids.

It is usually sufficient to leave the patch on for 24 hours, but sometimes when patching with low concentrations or with weak sensitizers it may be necessary to leave the patch on for three or four days. (Do not leave on more than five days; the patient may by that time become sensitized to the patch.) This is especially true of fabrics that contain no strong irritants and to which most people do not react. The reactions should be read not only upon the removal of the patches but every day for at least five days thereafter. This is of special importance in testing fabrics.

It is sometimes advisable to use a so-called artificial perspiration to moisten the test substance because the H-ion concentration of the perspiration, especially in such areas as the axillae, may play a role in the solubility of the irritant under investigation. The pH of axillary sweat is usually on the alkaline side and that on the body proper is on the acid side; pH can vary from 5 to 8. To approximate the pH of the perspiration, acidify water with acetic acid and alkalinize another sample with ammonia.

2. *Interpretation and Reading of Patch Tests*

It requires considerable experience to interpret correctly the reactions produced by patch tests. Since the patch test was first introduced, grading of the patch test reactions has been attempted in ranges between 1+ and 4+. For instance, a 1+ reaction indicated an erythema on the area of skin to which the chemical was applied; a 2+ reaction indicated erythema and edema; a 3+ reaction indicated erythema, edema, papules, and a few vesicles; a 4+ reaction indicated erythema, edema, many vesicles, and even ulceration.

Such a method of recording a positive patch test is useful perhaps in indicating the degree of sensitivity to the specific concentration and amount of the chemical used. Additional information and interpretation can be obtained if patches with differing concentrations are applied. The degree of reaction will be greatest at the site of greatest concentration. Reactions that are not present when the patch is removed but become manifest less than five days after the patch was applied are delayed reactions. Delayed reaction means either that there is present a low degree of specific sensitivity or that a weak concentration of the sensitizer was used.

The true allergic reaction as a rule increases rather than decreases in intensity for 24 to 48 hours after the patch test is removed. Reactions of primary irritation with few exceptions tend to subside after the removal of the irritant.