EVALUATION OF THE ANTIGEN-IMPREGNATED-DISCS FOR PATCH TESTS

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Summary

Antigen-impregnated-discs (AIDs) have been developed to standardise the amount of antigen used for each patch test and also to make the test far easier. In the first experiment, 800 patch tests were applied using AIDs prepared for *Parthenium hysterophorus*, nitrofurazone, nickel sulphate, potassium dichromate, mercurochrome, acriflavine, garlic and onion, and the results were compared with patch tests done with the corresponding standard antigens applied at the same time in the same patients. In 780 instances, the results were similar with both types of materials, the discrepancy being seen in only 20 cases. In a second experiment, AIDs prepared for nitrofurazone, garlic, nickel sulphate, *Calotropis procera*, mercurochrome and acriflavine were each divided into 3 groups and stored at room temperature, 10°C and 42°C respectively to study the stability of AIDs under different climatic conditions. The results of patch tests with each of these AIDs were compared with the standard antigens prepared at the same time and kept at 10°C. False negative patch tests were more frequent with the standard antigens indicating that AIDs are stable for at least 1 year at room temperature even when the environmental temperature is as high as 42°C.

Introduction

In carrying out patch tests for investigating the cause of contact dermatitis, it is very essential to observe certain precautions for accurate interpretation of the test results. The most important of these precautions include, (1) use of a specified concentration of each antigenic chemical, (2) to dissolve the antigenic chemical in an appropriate base, and (3) to use a measured volume of the antigenic solution for each test[1]. There are, however, several chances of a mistake. Firstly, the antigens in the solution form are liable to deteriorate on storage for prolonged periods. Secondly, evaporation of the base particularly when the antigen is dissolved in water or some other volatile base, will result in an increase in the concentration of the antigen and thus false positive results. Thirdly, any mistake in accurately measuring the correct volume of the antigen solution can lead to the use of either a larger or a lesser volume of the antigen resulting in false positive or false negative results. Fourthly, there are increased chances of contamination when the antigen is repeatedly drawn out from the same container.

To obviate these difficulties, one of us (JSP) developed the technique of preparing antigen-impregnated-discs (AIDs) for patch tests[2]. This technique essentially consists of uniformly impregnating standard sized paper discs with an accurate amount of the respective

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antigen. Such AIDs are stored in the dry state in ordinary plastic containers. For doing a patch test, the patch is prepared in the same way as for the ordinary patch test[1], but instead of incorporating the antigen into the smaller gauze piece/cotton, the gauze piece/cotton is soaked with a drop of water and one AID containing the respective antigen is pressed on the wet gauze piece/cotton. This wets the AID. This patch can then be applied on the back of the patient.

In order to check that the AIDs are a useful substitute for the standard antigen solutions/extracts, the following experiments were carried out.

Materials and Methods

In the first experiment, antigen-impregnated-discs were prepared for, (1) *Parthenium hysterophorus* extract, (2) nitrofurazone, (3) nickel sulphate, (4) potassium dichromate, (5) mercurochrome, (6) acriflavine, (7) garlic, and (8) onion. Patients suspected to have contact dermatitis due to any of these agents were tested by applying duplicate patch tests, one patch having been applied with the standard antigen solution/extract[1,3], while its duplicate was applied with the AID containing the corresponding antigen. The results were read after approximately 48 hours according to the standard procedures [1,3].

In the second experiment, AIDs were prepared for (1) nitrofurazone, (2) garlic, (3) nickel sulphate, (4) *Calotropis procera*, (5) mercurochrome, and (6) acriflavine. The AIDs prepared with each antigen were divided into three groups, one group of AIDs was stored at room temperature, the second group was stored in a refrigerator at approximately 10°C, and the third group was stored in an incubator at 42°C. This was done to study the stability of the AIDs and to determine if the AIDs will have to be stored in a refrigerator and whether there will be faster deterioration during summer or at places where the environmental temperature goes as high as 42°C. In each patient, patch tests were applied with an AID taken from each of the three groups, in addition to the standard solution/extract prepared at the same time as the AIDs.

Results

Results of the first experiment showed (Table 1) that in majority of the patients, the results of patch tests were similar with both types of antigens i.e. the AID and the corresponding standard antigen. In 303 cases the patch tests were positive with both types of antigens and in 477 cases, the tests were negative with both. In 20 cases, there was a discrepancy between the results of patch tests undertaken with the AID and its corresponding antigen solution/extract.

In the second experiment (Table 2) 23 patients were positive with nitrofurazone, 7 cases with mercurochrome, 4 cases with acriflavine, 9 cases with nickel sulphate, 8 cases with *Calotropis procera* extract and 12 cases with garlic extract. False negative results were seen in 7 cases with the standard solution/extract (4 cases with garlic extract, and 1 case each with *Calotropis procera* extract, nickel sulphate and mercurochrome respectively), in 1 case with the nitrofurazone AID stored at 10°C and in another case with a mercurochrome AID stored at room temperature. There were no false negative results in any of the patients tested with acriflavine.

Discussion

In the first experiment it was established that the AIDs give results comparable to the standard antigen. Discrepancies between the results of patch tests with the AIDs and the standard antigen were few and possibly due to chance.

TABLE 1

Comparison of the results of patch tests undertaken with the antigen-impregnated-discs (AIDs) and the standard antigen solutions/extracts (SA)

Antigen	Number of patients tested	SA+ AID+	SA — AID —	SA+ AID —	SA — AID+
Parthenium hysterophorus	153	108	41	4	—
Nitrofurazone	141	78	63	—	—
Nickel sulphate	141	41	98	2	—
Potassium dichromate	108	21	81	6	—
Mercurochrome	93	27	65	1	—
Acriflavine	85	3	82	—	—
Garlic	53	20	29	3	1
Onion	26	5	18	3	—
Total	800	303	477	19	1

TABLE 2

Stability of the antigen-impregnated-discs (AIDs) stored at various temperatures, compared to the standard antigen solutions/extracts (SA)

Antigen	Total number of patients who gave positive patch tests with				
	Antigen	Standard antigen solution / extract	AIDs stored at		
			Room temperature	10°C	42°C
Nitrofurazone	23	23	23	23	23
Mercurochrome	7	6	6	7	7
Acriflavine	4	4	4	4	4
Nickel sulphate	9	8	9	9	9
Calotropis procera	8	7	8	8	8
Garlic	12	8	12	12	12
Total number of patients who gave false negative result	—	7	1	1	0

In the second experiment, the standard antigen solution/extract was observed to give false negative results more frequently than the AIDs. This was more convincing in the case of garlic extract where preservability of the garlic AIDs was better than that of the garlic extract. The false negative results in the other cases, particularly those due to the two AIDs stored at room temperature and at 10°C respectively, are most likely due to chance because, it seems illogical to believe that an AID kept at 10°C or room temperature will deteriorate, while its counterpart stored at 42°C will not.

It can therefore, be concluded that the AIDs are stable for at least 1 year (the period of this study) and these can be stored at room temperature, even if the room temperature is as high as 42°C.

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