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ANAPHYLACTOID OEDEMA PRODUCED IN RATS BY CERTAIN DEXTRINS

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The author has previously shown the conditioning role of the anaphylactoid reaction in the calcification of the snout and paws of the rat after the injection of certain metallic compounds. The present experiments show that it is the dextrin fraction of these compounds which causes these anaphylactoid phenomena before the calcifying response. This fact deserves special attention since dextrin is frequently used in the preparation of certain drugs.

After administration of dihydrotachysterol the rat responds to the injection of certain metallic compounds by a typical syndrome characterized by heavy calcium deposits in the snout, paws and oesophagus (Selye, Gentile & Veilleux, 1961). These lesions develop over 2 or 3 days and they are preceded by an evanescent anaphylactoid reaction which immediately follows the injection of the compound.

After we had demonstrated the essential conditioning role of this initial anaphylactoid reaction in the later deposition of calcium (Veilleux, 1963), our attention was attracted by the fact that the metallic compounds used contained dextrin. Our first attempt to produce an anaphylactoid reaction with one particular dextrin was unsuccessful. We therefore resorted to dextrins of different origins which, in the present experiment, are compared as to their aptitude to induce an anaphylactoid reaction.

METHODS

We used four different dextrins which are identified by the letters A, B, C and D (Table 1).

Dextrin A is Bacto-Dextrin (Difco, Detroit). According to the manufacturer, it is a highly purified product obtained from potato starch. It contains low molecular weight dextrins and is substantially free from dextrose and maltose as well as the high molecular weight soluble starches (Cowles, personal communication).

We have been unable to obtain precise information concerning Dextrin B (No. 1297, Eastman Kodak, Rochester, N.Y.) but we think it is similar to Bacto-Dextrin since it behaves in a similar manner, at least with regard to the anaphylactoid response.

Dextrin C (Astra, A.B., Södertälje, Sweden) corresponds exactly to the substance used by this company in the preparation of its iron-dextrin compound Ferrigen. It is obtained from potato starch and its average molecular weight, measured by gel-filtration through " sephadex," was approximately 6,000 (Sjögren, personal communication).

Dextrin D (Testagar, Detroit) is the one used by this firm in manufacturing its thorium dioxide preparation known as Thorotrast. It is a tapioca extract which is lyophilized and

pyrogen-free. It contains approximately 2.5% of dextrose. Its molecular weight is not known, but is believed to be relatively low because of the low viscosity and high grade of conversion of Dextrin D (Carrigan, personal communication).

Eighty rats with a mean initial body weight of 100.4 g (range 98 to 104 g) were divided into eight equal groups and treated as indicated in Table 1.

The different dextrins, in 25% solutions, were injected intravenously (Groups 1 to 4) and intraperitoneally (Groups 5 to 8) in doses of 0.3 and 0.5 ml. respectively. The anaphylactoid oedema of the snout and paws was evaluated 0.5 and 1 hr after the injection in all groups and registered in terms of an arbitrary scale of 0 to 3 (0=no reaction, 1=minimal reaction, 2=moderate reaction and 3=maximal reaction).

RESULTS

The results clearly show (Table 1) that Dextrins A and B are completely devoid of any anaphylactoid properties by either route of administration (Groups 1, 2, 5 and 6; Fig. 1, 1). On the other hand, Dextrins C and D both elicit an anaphyl-

TABLE 1

ANAPHYLACTOID OEDEMA OF THE SNOUT AND PAWS OF THE RAT AS OBSERVED 0·5 AND 1 HR AFTER THE INJECTION OF FOUR DIFFERENT DEXTRINS (25% SOLUTION) BY EITHER THE INTRAVENOUS OR THE INTRAPERITONEAL ROUTE

Groups 1 to 4 received 0·3 ml. intravenously, and Groups 5 to 8 0·5 ml. intraperitoneally. See text for method of assessing anaphylactoid reaction

		Anaphylactoid reaction			
		0·5 hr		1 hr	
Group	Dextrin given	Snout	Paws	Snout	Paws
1	A	0	0	0	0
2	B	0	0	0	0
3	C	1·8	2·0	1·8	1·6
4	D	1·6	1·3	1·3	1·2
5	A	0	0	0	0
6	B	0	0	0	0
7	C	2·8	3·0	2·7	3·0
8	D	2·7	3·0	2·7	3·0

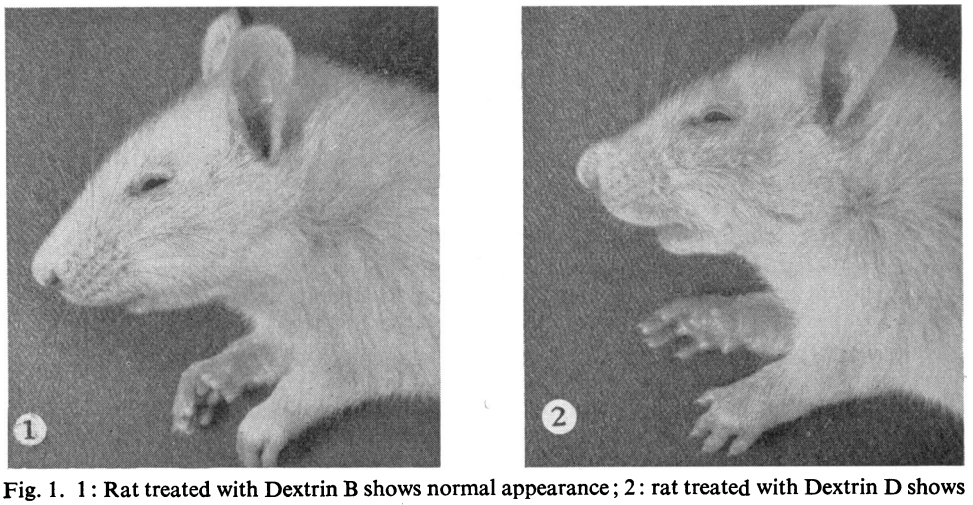

Fig. 1. 1: Rat treated with Dextrin B shows normal appearance; 2: rat treated with Dextrin D shows swelling of paws, lips and snout.

actoid oedema (Fig. 1, 2), the reaction being more marked when the substance is injected intraperitoneally (Groups 7 and 8).

DISCUSSION

Dextran has been well known for its anaphylactoid properties since Pulaski's first observation (Morrison, Bloom & Richardson, 1951), and similar clinical side-effects of iron-dextran in man have been mentioned occasionally (Callender & Smith, 1954 ; Koszewski & Walsh, 1958 ; Shafer & Marlow, 1959 ; Samuels, 1962). About 40 years ago, Hanzlik & Karsner (1920), in a survey of " anaphylactoid phenomena " in the guinea-pig, reported the occurrence of systemic anaphylactoid shock in response to the injection of dextrin, but this substance has not yet been found to elicit the characteristic anaphylactoid oedema of the snout and paws that we have just described. It is interesting to note that only certain dextrins of relatively low molecular weight are able to produce the reaction.

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