TECHNICAL PAPERS

The Immediate Pressor Effect of Desoxycorticosterone Acetate[1]

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The relation of the adrenal cortex to arterial hypertension is a controversial one. In cases resembling Cushing's syndrome, however, the evidence that adrenal cortical hyperfunction is concerned in the production of arterial hypertension is suggestive. The administration of desoxycorticosterone acetate and sodium chloride has been reported to produce renal vascular lesions in rats (*4*) and to elevate the blood pressure of patients with arterial hypertension (*1*) and with Addison's disease (*3*). The blood pressures of normal individuals, when given similar quantities of desoxycorticosterone acetate and salt, also became elevated, but only after a long period of time (*2*). A factor in the adrenal cortex which contributes to vascular constriction has been postulated (*5*).

It was considered important to determine whether substances similar to adrenal cortical hormones had a direct vascular action. Therefore, 5 mg of desoxycorticosterone acetate, dissolved in 2.5 cc of propylene glycol, was injected intravenously into 5 normal subjects and 5 suffering from arterial hypertension. Blood pressure was measured by direct puncture of the brachial artery, using a Hamilton optical manometer. Blood content of the ear was measured by a photoelectric plethesmograph, and venous pressure by an optical membrane manometer. Changes were recorded on a photokymograph.

The injection of propylene glycol alone (2.5 cc) did not affect the blood pressure except in one instance, where its administration was accompanied by pain. The injection of DCA in the same quantity of propylene glycol was followed shortly by a significant rise in arterial pressure (Table 1) in the hypertensive individuals. The effect on the blood pressure of normal subjects was slight or absent.

TABLE 1

CHANGES IN BLOOD PRESSURE AFTER THE INTRAVENOUS INJECTION OF 5 MG OF DESOXYCORTICOSTERONE ACETATE (mm Hg)

	2.5 cc Propylene glycol			5 mg DCA			Min after DCA for maximum blood pressure change
	Before	After	Change	Before	After	Change	
Hypertensive subjects							
T.A. (m)				197/157	217/175	+20/18	10
F.W. (f)	208/131	213/134	+5/3	213/134	217/150	+4/16	16
L.C. (f)	237/110	232/127	−5/+17*	232/127	280/160	+48/33	10
M.L. (f)				207/88	225/112	+18/24	5
F.H. (f)	203/115	209/122	+6/7	209/122	217/145	+8/23	30
				191/105	203/115	+12/10†	10
Normal subjects							
C.C.‡ (f)	154/74	172/66	+18/−8	196/65	179/63	−17/−2	9
J.M. (m)	101/63	102/62	+1/−1	102/62	107/66	+5/4	14
					115/75	+13/13	32
L.H. (f)				120/60	132/61	+12/1	27
V.E. (f)	114/56	119/60	+5/4	119/60	120/64	+1/4	34
W.G. (m)	122/64	130/66	+8/2	136/66	133/66	+3/0	15

* Moderate pain in arm resulting from injection.
† After 5 mg of progesterone intravenously.
‡ Patient exhibited wide pulse pressure of undetermined cause.
Note: Blood pressure values are average of representative readings during ½–1 min. (m) = male (f) = female.

No significant changes were observed in venous pressure or in the volume of blood in the ear. Changes in cardiac output were estimated by the ballistocardiograph in four instances, and no significant differences were observed after injection of DCA. In two instances, lead 2 of the electrocardiogram was not altered.

In one case, 5 mg of progesterone, dissolved in 2.5 cc of propylene glycol, was administered intravenously and

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was followed by a less marked elevation of the blood pressure (Table 1).

The responses obtained were prolonged, lasting for the duration of the experiment—at least 30 min. In one instance, blood pressure measured by the auscultatory method 1½ hrs later, showed that the rise was maintained.

From these results it can be concluded that desoxycorticosterone acetate, where administered intravenously, acts as a pressor substance in hypertensive individuals.

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The Nasal Cavity of the Rat in Pharmacological and Other Experimentation

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Investigation of the effects of drugs on the mucous membrane of the nose has been encouraged by the fact that in various laboratory animals the nasal mucous membrane is easily accessible for such study. Furthermore, the effects of drugs can be observed without interference with the function of other vital organs.

The basis for this type of experiment is complete orientation as to (1) the normal anatomy and histology of the animal in question and (2) knowledge of pathologic conditions as they are encountered spontaneously, *i.e.* in the course of normal life under laboratory conditions or in the animal farms of the institutions, without exposure to experimental factors.

It has been felt that the progress of such experimental work requires more data concerning the normal conditions and the "spontaneous" pathologic phenomena. The present study has been made of the rat as one type of laboratory animal readily available and frequently used in experimentation with drugs. In order to obtain data from a cross section of the species, 40 young animals of both sexes and from different, but known, strains of various laboratories were used. Born in the respective laboratories, they had been employed solely for breeding purposes, and their diet had been a normal one, designed to maintain a high standard of general good health. After decapitation, a series of frontal sections were cut through the entire length of the nasal cavity.

Pathologic findings included: in the main cavity, hemorrhage (4 times), excessive mucus (3), excessive fibrin (25), suppuration (22); in the maxillary sinuses, hemorrhage (1), excessive fibrin (6), suppuration (8). In two of the rats in which the main cavity was regarded as normal, pus was found in the maxillary sinuses. Fibrin was designated as excessive on the basis of amount and unusual intensity of round cell activity around and within the meshes. Among others, the following additional pathologic findings were noted: abundance of goblet cells in large areas, cystlike empyemas between roots of turbinals, granulatory masses on the septum, formation of osteophytes by calcification of suppurative masses, foreign bodies probably of plant origin, with collateral inflammatory reactions. In some instances the choanae were completely blocked. With allowance of a wide margin for normal limits, pathologic changes were found in 24 animals (60%) (*2*).

Some anatomical peculiarities were noted of which no reports could be discovered (*1*):

(1) Characteristic of the region of the choanae in the rat is a *window in the septum* of the lower (respiratory) portion of the nasal cavity, representing a confluence of the two inferior meatuses of the respiratory half, immediately behind the vomeronasal organ. This renders any plan, using one nasal airway for experiments while leaving the other intact for comparison, illusory.

(2) Covered by the bifurcating canopy of the terminal laminae which connect the septum of the ethmoid part to the lateral nasal walls, a tentlike antechamber is formed. The nasal opening of the pharyngeal duct is located under this roof. The duct extends forward the length of the ethmoid part between the lower edge of its septum and the secondary (hard) palate. This portion, which may be called the *subseptal duct*, forms a singular connecting tube between the nose and the pharynx. In the region of the septal window, anterior to the nasal orifice of the subseptal duct, a crossroad is formed between (a) the anterior and posterior part of the nasal cavity, (b) the right and left nasal airway, and (c) the nasal and the pharyngeal cavities. The crossway is situated in the very center of the nasal cavity at the boundary of the anterior (respiratory) and posterior (ethmoid) sections. This disposition effects peculiarities of clearance, since secretions must be conveyed from the anterior section posteriorly and from the posterior section anteriorly to reach any outlet. The inadequacy of clearance accounts for the frequency with which foreign bodies tarry in the cavities, with fully developed collateral reactions as evidence of their long stay. Of more consequence is the difficulty in elimination of pathologic secretions. On the other hand, the slowing down of ventilation may be useful from the point of view of the macrosmatic analysis of the gaseous and liquid contents of the nasal cavities.

(3) Massive *lymphoid accumulations* in the mucosa of the two opposite lateral nasal walls mark the region of the anterior orifice of the subseptal duct. Thick cushions of lymph follicles, showing the typical structure, inclusive reticulization of the epithelium, and transmigration of lymphatic elements to the free mucosal surface follow as a solid mass the foremost section of the canal. The presence of lymphoid masses around the anterior orifice—hitherto overlooked—is understood better if one consid-