JCI The Journal of Clinical Investigation

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J Clin Invest. 1933;12(4):737-739. https://doi.org/10.1172/JCI100534.

Research Article

THE ACTION OF CERTAIN DIURETICS ON THE FUNCTION OF THE KIDNEY AS MEASURED BY THE UREA CLEARANCE TEST

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(Received for publication March 16, 1933)

A study of certain representative diuretics on renal function, as measured by the urea clearance test, has been undertaken to determine whether these substances have an accelerating or retarding action on the excretion of urea. Practically, it seemed important to know whether studies of kidney function may be carried out, without interference, during the often necessary administration of diuretics, or following the customary breakfast with coffee.

Addis and Drury (1) found that the maximum clearance was increased by the ingestion of caffeine albeit to a small degree. We have selected caffeine and diuretin as representative of the xanthine diuretics and salyrgan as representative of the organic mercury diuretics for this study.

METHOD

Patients suffering from mild hemorrhagic Bright's disease or essential hypertension without marked kidney damage, were studied. The urea clearance test was performed as directed by Möller, McIntosh and Van Slyke (2), except that the periods for urine collection and blood sampling were extended until diuresis occurred. The urine volumes of the first two periods usually fell below 2 cc. per minute and hence represent standard clearances. The diuretic was given at the point in the table marked by an arrow (←).

RESULTS

The results of the experiments are presented in Table I. Standard or maximum clearances are calculated when the corrected urine volume falls respectively below or above the augmentation limit of 2 cc. per minute.

DISCUSSION

Diuresis was sufficiently ample in most cases to assure that the diuretic was effective. In spite of the fact that in one case 10.7 cc. of urine were excreted per minute, as compared with 0.89 cc. before the diuretic, no change in the clearance occurred. The variations which occur are no more

than are ordinarily observed in any set of clearance values determined without a diuretic. We therefore conclude that neither the organic mercury diuretics, as represented by salyrgan, nor the xanthin diuretics exemplified by caffeine and diuretin, have any significant effect on the clearance test of kidney function in the doses we have employed.

SUMMARY

1. The diuretics, salyrgan, caffeine and diuretin, do not alter the ability of the kidney to secrete urea as measured by the urea clearance test in hypertensive and nephritic patients.

2. The urea clearance test may be carried without interference when diuretics are being administered or following the usual breakfast with coffee.

TABLE I

Action of diuretics on the urea clearance

Hospital number	Corrected urine volume	Blood urea nitrogen	Urea clearance	Hospital number	Corrected urine volume	Blood urea nitrogen	Urea clearance
	cc.	*mgms. per 100 cc.*			*cc.*	*mgms. per 100 cc.*	
			Caffeine 192 mgm. subcutaneously				
8333				8350			
Bright's	1.43	31.9	31.5	Essential	0.83	12.22	55.0←
disease	1.31		30.8←	hyper-	3.63		43.8
	1.65	32.1	40.7	tension	3.75	15.85	31.7
	3.23		33.6		3.52		36.4
8322				8416			
Arterio-	1.67	20.0	35.9	Essential	0.57	11.3	60.3
sclerotic	2.28		39.0←	hyper-	0.82	9.8	70.5
Bright's	3.12	19.0	40.6	tension	1.6		61.9
disease	4.49		43.5		1.3	7.8	68.2←
	1.66		33.2		3.6		72.4
			Diuretin 1.8 gram by mouth				
8349				8350			
Essential	1.35	8.3	175.0	Essential	1.38	15.13	38.9
hyper-	1.64		141.7←	hyper-	2.0		44.0←
tension	2.41	8.6	132.0	tension	5.0	15.81	44.4
	2.12		124.5		2.7		45.2
8326			←				
Essential	7.04	16.3	92.0	Essential	1.5	11.45	74.2
hyper-	3.06	18.3	58.0	hyper-	2.8		74.8←
tension	2.38		47.2	tension	12.3	13.28	82.2
					7.2		73.6

TABLE I—(*Continued*)

Hospital number	Corrected urine volume	Blood urea nitrogen	Urea clearance	Hospital number	Corrected urine volume	Blood urea nitrogen	Urea clearance
	cc.	*mgms. per 100 cc.*			*cc.*	*mgms. per 100 cc.*	
			Salyrgan 2 cc. intramuscularly				
8322 Arterio-sclerotic Bright's disease	1.24	22.7	49.0	8333 Bright's disease	2.07	33.8	59.2
	0.89		53.8←		2.82		34.8←
	3.65	25.1	35.7		1.12	30.3	38.1
	8.02		47.3		2.82		34.6
	10.7		56.2				
8322 Arterio-sclerotic Bright's disease	1.40	19.2	32.4←	8333 Bright's disease	0.91	23.4	45.1←
	4.53		51.6		2.92		38.0
	3.72		33.2		3.75	27.1	24.0
8322 Arterio-sclerotic Bright's disease	1.85	25.0	37.7←	8333 Bright's disease	1.03	14.5	50.6←
	7.31		52.8		1.69		52.2
	5.45	25.1	37.9		4.27	17.0	42.2
	6.33		49.4		4.32		42.5
	3.39		36.6				
8350 Essential hyper-tension	1.58	14.98	39.6←	8429 Essential hyper-tension	1.97	13.2	50.0←
	5.11		40.8		4.39		62.6
	4.60	16.6	39.0		7.41	11.8	52.4
	3.69		27.5		5.30		63.4
				8429 Essential hyper-tension	1.79	11.85	67.0←
					2.29		63.6
					9.21	11.83	73.6
					8.46		69.3
					4.44		63.2

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