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Urinary *N*-Acetyl-Glucosaminidase Excretion in Rats with Renovascular Hypertension[1] (40412)

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N-acetyl-glucosaminidase (NAG) is a lysosomal acid hydrolase, the urinary excretion of which is increased in toxic acute renal failure, transplant rejection and glomerulonephritis. NAG has been used previously as a marker of aminoglycoside nephrotoxicity in both man and experimental animals. The use of NAG as an indicator of renal injury has been previously reviewed (1). Recently Mansell *et al.* (2) reported that NAG was excreted in increased amounts in 10 of 12 patients with hypertension due to renal artery stenosis. Since NAG excretion in urine is easily measured they suggested that the enzyme might be a useful marker for the detection of renal artery stenosis. We have evaluated urinary NAG excretion in an animal model of renal artery stenosis.

Materials and methods. Fifty-two male Sprague-Dawley rats weighing 100 g were anesthetized with pentobarbital. The left kidney was exposed via a flank incision and a silver clip was placed around the left renal artery after the method of Byrom (3). In 15 rats the clip was only loosely placed around the renal artery. These animals served as controls. The rats were housed singly, fed Purina rat chow, and given tap water *ad libitum*. At 8 weeks, systolic blood pressure was measured by the tail cuff method. The animals were then placed in metabolism cages and 24-hr urine specimens were obtained. The urine was assayed for creatinine, protein and NAG excretion. Creatinine was measured by autoanalyzer (Technicon, Tarrytown, NY). Protein was measured by the Coomassie dye method (4) and NAG was assayed by an automated fluorimetric technique (1). The data were analyzed by Student *t* test for unpaired data and linear regression analysis.

Results. Data on the 15 control animals and 16 animals which developed the highest blood pressures are displayed in the table. Significant differences were observed in blood pressure and urinary protein excretion ($p < 0.01$); however, weight, creatinine excretion, and NAG excretion were not different.

The 21 rats which developed intermediate blood pressure elevations had blood pressures ranging from 175 to 246 mm Hg. In the entire population there was a direct correlation between blood pressure and urinary protein excretion ($r = 0.63$, $p < 0.001$); however, blood pressure and NAG activity were not correlated ($r = 0.25$, $p =$ N.S.).

Discussion. The data indicate that rats with two kidney Goldblatt hypertension, an accepted model of renovascular hypertension, developed considerable proteinuria, but failed to increase their urinary excretion of NAG. These data are at variance with the findings of Mansell *et al.* (2) who found that urinary NAG activity was increased in 10 of 12 patients with renal artery stenosis. The authors did not mention whether or not blood pressure was correlated with NAG excretion in their patients. In addition, it is not clear if their patients were receiving antihypertensive medications at the time the NAG determinations were made. The reasons for the discrepancy of our findings with those of Mansell *et al.* (2) are not clear. Possibilities include the effects of antihypertensive drugs and species differences. Our data do not suggest that urinary NAG activity is of value in the diagnosis of renal artery stenosis.

Summary. Preliminary observations in man have raised the possibility that the lysosomal acid hydrolase *n*-acetyl-glucosaminidase may be of value in identifying patients with renovascular hypertension. We conducted studies in an accepted animal model of renovascular hypertension. Although hypertensive animals developed proteinuria which was correlated with arterial blood pres-

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TABLE I. CHARACTERISTICS OF RATS WITH AND WITHOUT RENOVASCULAR HYPERTENSION (MEAN ± SD).

	Normotensive	Hypertensive	*P*
1) *n*	15	16	—
2) Blood pressure mm Hg	153 ± 11	287 ± 16	<0.001
3) Weight g	341 ± 24	335 ± 58	N.S.
4) Urine creatinine mg/24 hr	19 ± 10	18 ± 4	N.S.
5) Urine protein excretion mg/mg Cr	1.0 ± 0.4	8.6 ± 4.9	<0.001
6) Urine NAG μU/mg Cr	14.7 ± 10.5	18.9 ± 11.7	N.S.

sure, no increase in the excretion of *n*-acetyl-glucosaminidase was observed. These animal data do not suggest that *n*-acetyl-glucosaminidase is of value in the diagnosis of renovascular hypertension.

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