Short Acidification Test and Its Interpretation with Respect to Age

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Dear Sir,

Agarwal and Cabebe [Nephron 26: 291, 1980] have shown in 16 persons in the age range of 29–86 years that the capacity of the kidneys to excrete an acid load is diminished in elderly subjects. Reduced ammonium excretion and a small pH gradient defect could be demonstrated in old subjects. However, our knowledge pertaining to the influence of aging on this renal function is limited, and normal values of urine pH , titratable acidity (TA) and ammonium excretion in individual decades of healthy subjects achieved under conditions of the short acidification test are not available.

We have studied this problem in 60 healthy volunteers in the age range of 18–70 years, using the short acidification test of Wrong and Davies. After 1-hour baseline urine collection ammonium chloride (0.1 g/kg body weight over a period of 30 min) was administered and subsequent by 5 1-hour periods were collected. We have tested the difference of urine pH , TA and ammonium excretion between the control period and the period in which the lowest urine pH was achieved. The results obtained are summarized in table I. From these data it is evident that the elderly individuals responded to acid loading by decreasing urine pH to the same level as young subjects did. TA excretion calculated per 100 ml C_{cr} before loading

Table I. Average values ($\pm$ SD) of urine pH , TA and ammonium excretion before (A) and after (B) acid loading (at the time of lowest urine pH)

Age, years

pH
 $\frac{1}{100} \cdot 100 \mu\text{mol/min/100 } C_{cr}$
 $\frac{1}{100} \cdot 100$
 $\frac{1}{100} \cdot 100$
 $\mu\text{mol/min/100 } C_{cr}$

B

B

B

18–20 (n= 10) 21–30 (n= 10) 31–40 (n= 11) 41–50 (n= 10) 51–60 (n= 11) 61–70 (n= 8)
 5.47 ± 0.71 5.56 ± 0.58
 ± 0.58
 ± 0.40 5.34 ± 0.64 5.44 ± 0.82

4.85** ± 0.24 4.74** ± 0.20 4.77** ± 0.15 4.79*** ± 0.29 4.69** ± 0.18 4.71* ± 0.15

15.46 ± 9.27 10.90 ± 5.82 10.13 ± 4.69 12.66 ± 3.85 19.75 ± 6.80 24.48 ± 13.93

22.60** ± 5.91

25.05** ± 7.74

20.03*** ± 5.72

25.33*** ± 7.66

25.76* ± 5.52

31.79 ± 5.10

24.43 ± 5.36 36.23*** ± 7.30

25.48 ± 10.62 27.42 ± 6.51 26.15 ± 4.09 27.33 ± 8.19 33.32 ± 11.93

40.52** ± 19.85

29.93 ± 7.20

33.03* ± 6.24

32.48 ± 9.74

40.79 ± 8.46

*p < 0.05; **p < 0.01; ***p < 0.001.

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increased with age ($r = 0.366$; $p < 0.01$) perhaps because there was no statistical difference in the absolute excretion of TA ($\mu\text{mol/min}$) between the elderly and young subjects, but GFR declined with age.

The renal response to an increase in $\text{I}^{\text{H}} \cdot 100$ after

$\text{I}^{\text{H}} \cdot \text{cr}$

acid loading was preserved in subjects up to 60 years. The subjects in the age group 61–70 years did not answer significantly in this respect. Ammonium excretion calculated per 100 ml Ccr before acid loading increased with age ($r = 0.255$; $p < 0.05$) perhaps for the same reasons as

$\text{U}_{\text{Ta}} \cdot \text{V}$

c

$\text{Unh}_4 \cdot \text{V}$

c

• 100 did. The renal response to an increase in

100 after acid loading was well expressed in sub-

jects in the age group 18–30 years. In older age groups the difference in $\text{I}^{\text{H}} \cdot 100$ before and after loading was

not significant with the exception of the borderline significance in the age group 41–50 years.

The presented results suggest that in healthy subjects up to 70 years the renal response to the used acid loading is preserved in

$\text{U}_{\text{Ta}} \cdot \text{V}$

decreasing urine pH. The ability to increase $\text{I}^{\text{H}} \cdot 100$

is altered in subjects above 60 years and the ability to

increase $\text{I}^{\text{H}} \cdot 100$ (in 5-hour time interval after loading)

appears to be altered already in the middle age group of healthy subjects.