Excretion of Hippuran into Acquired Renal Cysts in Chronic Hemodialysis Patient

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Dear Sir,

Acquired renal cystic disease (ARCD) is becoming important because of its complications such as bleeding and renal cell carcinoma [1–3]. These cysts are considered to originate mainly from proximal tubular epithelium, based on analysis of the chemical composition of cyst fluid [4,5] and the immuno histochemical examination [6,7].

We examined the excretion of Hippuran, a substance handled by glomerular filtration and tubular secretion, into the acquired cysts 20 and 100 min after intravenous injection in 2 patients.

The 1st patient, a 64-year-old man on hemodialysis for 13 years, underwent right-side nephrectomy because of ARCD complicated with renal cell carcinoma on June 11, 1985. Twenty minutes before nephrectomy (renal artery clamping) 70 μ Ci of ¹³¹I Hippuran were administered intravenously, and the blood was drawn at the time of artery clamping. Serum isotopic counts were 4,730 cpm/ml and the counts in four cysts were 270, 332, 420 and 427 cpm/ml in 1.3, 1.7, 1.0 and 1.5 ml of cyst fluid respectively (table 1). Therefore, the cyst fluid/serum ratio of Hippuran was 0.06–0.09 20 min after the administration.

Table 1. Hippuran excretion into the acquired renal cysts

Case No.	Time from injection to artery clamp in serum min	Hippuran counts in serum cpm/ml
		Hippuran counts in cyst cpm/ml
		Cyst fluid/serum Hippuran ratio
		creatinine
		Cyst volume ml

1 20 4,730

333

0.07

1.06

6.4

1.7

427

0.09

1.02

9.5

1.5

270

0.06

1.04

5.6

1.3

420

0.09

1.04

7.8

1.0

Mean $\pm$ SD

363 $\pm$ 75

0.08 $\pm$ 0.01

1.04 $\pm$ 0.01

7.3 $\pm$ 1.7

1.4 $\pm$ 0.3

2 100 8,613

1,937

0.23

0.98

11.3

2.5

3,268

0.38

0.98
13.1
0.4

1,040
0.12
0.99
12.6
9.5

4,374
0.51
0.99
14.3
1.5

4,045
0.47
0.97
10.7
0.5

876
0.10
0.96
18.1
1.0

1,813
0.21
0.99
13.1
0.4

3,428
0.40
1.02
13.7
0.5

3,608
0.42
0.99
16.6
0.5

3,804
0.44
1.01
11.6
1.2

2,982
0.35
1.00
16.0
0.25

1,468
0.17
0.99
14.4
0.5
2,720 ± 1,227
13.
Mean ± SD
1.6 ± 2.6
:2.2
0.31 ± 0.14 0.98 ± 0.01
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The 2nd patient, a 31-year-old man on hemodialysis for 15 years and 9 months suffered from ARCD with renal cell carcinoma. Left-side nephrectomy was performed on August 26, 1988. To examine Hippuran secretion, 80 μ Ci of 131 I Hippuran were injected 100 min before renal artery clamping. The serum isotopic count at the time of artery clamping was 8,613 cpm/ml. The counts in the cyst fluid of twelve cysts were between 876 and 4,374 cpm/ml (mean: 2,720 cpm/ml) in 0.25–9.5 ml of cyst fluid (mean: 1.6 ml) (table 1). The cyst fluid/serum ratio of Hippuran was 0.10–0.51 (mean: 0.31). Cyst fluid/serum ratios of sodium and creatinine were similar to those in a previous report [4] (table 1).

If the GFR in a single nephron is 65×10^{-6} ml/min, the expected Hippuran counts due to glomerular filtration can be calculated as follows [8]: $(65 \times 10^{-6} \text{ ml}) \times (\text{serum counts of}$

Hippuran/ml) $\times$ [time after injection (min)/cyst fluid volume (ml)]. From this equation, the excretion of Hippuran into the cysts due to glomerular filtration should be 4–6 cpm at 20 min and 6–224 cpm at 100 min. However, our results of 270–427 cpm in the cyst fluid after 20 min and 876–4,374 cpm after 100 min are far greater than the counts expected by glomerular filtration alone. Therefore, it is suggested that large amounts of Hippuran were secreted from the epithelium of the cyst wall. It is speculated that Hippuran secretion into the cyst fluid in patients with ARCD increases with time.

Wickre and Bennett [8] reported that β -amino hippuric acid (PAH) excretion into the proximal cysts in auto-somal dominant polycystic kidney (ADPKD) was 1.1–12.6% within 3.5 h after the injection and Muther and Bennett [9] found that 23% of the serum concentration of PAH appeared in the proximal cyst in ADPKD within 36 h. Comparing these results to ours, the secretion of PAH or Hippuran is greater in ARCD than in ADPKD. This Hippuran excretion is further evidence that the epithelial cells in ARCD function at a higher level of differentiation than those in ADPKD.

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