

## RENAL VEIN AND PERIPHERAL VEIN RENIN ASSAY IN PATIENTS WITH CHRONIC RENAL FAILURE ON MEDICAL AND HAEMODIALYSIS TREATMENT

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In addition to more usual therapeutic measures, bilateral nephrectomy has been employed to treat refractory hypertension in uraemic patients maintained on haemodialysis. The results of bilateral nephrectomy have been variable and indications for the procedure are not well defined.

If excess renin secretion exists in certain uraemic patients on periodic haemodialysis treatment, a specific indication for bilateral nephrectomy would be clarified. This study examines peripheral and renal vein renin levels in patients with stable chronic renal failure, patients with renal failure receiving haemodialysis treatment and in patients with essential and malignant hypertension. It appears that no systematic excess of renin secretion exists in the uraemic patients receiving haemodialysis treatment.

### MATERIALS AND METHODS

Four groups of subjects were studied for peripheral and renal vein renin activity: 11 patients with essential hypertension, 5 patients with malignant hypertension, 18 patients with stable chronic renal failure and 11 uraemic patients undergoing haemodialysis treatment. All patients received diets which contained less than 2.0 g sodium chloride for 3 days prior to the study.

Renal vein samples were obtained by employing the Seldinger technique for femoral vein catheterization and selective catheterization of the renal veins. The position of the catheter was confirmed by injecting a small amount of contrast media. When the position in the renal vein was established, the catheter was flushed with heparinized saline and a blood specimen taken after discarding the initial 5 ml of blood drawn through the catheter. Peripheral vein blood was obtained simultaneously.

A plasma aliquot of these specimens was acidified, dialyzed and incubated as described in the procedure of Pickens *et al.* (1965). The pressor activity of the extracts of plasma was determined by intravenous injection in pentolinium-treated rats and compared with that of angiotensin standards similarly injected. Values are expressed as nanogram of angiotensin II per 100 ml of plasma.

### RESULTS

Table I summarizes the renin levels in patients with essential hypertension. The mean value for peripheral vein renin was 270 (range 140–490) ng per 100 ml plasma. The mean value for renal vein renin was 450 (range 150–1,200) ng per 100 ml plasma.

Table II presents renin levels in patients with malignant hypertension. The peripheral vein renin ranged from 1,200 to 20,800 ng per 100 ml plasma and renal vein renin varied from 1,790–23,260 ng per 100 ml plasma. The groups are too small to express a meaningful average value but the increase in all values is clear.

TABLE I

*Peripheral vein and renal vein renin studies in patients with essential hypertension*

Patient	Age	Sex	BP mm Hg	PVR ng/100 ml	RRVR ng/100 ml	LRVR ng/100 ml
SB	42	M	180/110	205	490	260
EF	50	F	170/100	240	350	310
NG	40	F	200/120	264	760	1190
PJ	63	M	220/120	360	660	530
JG	64	M	190/120	488	690	830
WH	50	M	210/110	170	160	150
NL	63	M	210/110	225	250	180
IT	36	M	150/100	262	340	350
AT	55	M	210/110	343	900	740
JW	37	F	180/110	137	190	170
MW	51	F	180/110	260	220	290

PVR: peripheral vein renin

RRVR: right renal vein renin

LRVR: left renal vein renin

TABLE II

*Peripheral vein and renal vein renin studies in patients with malignant hypertension*

Patient	Age	Sex	BP mm Hg	PVR ng/100 ml	RRVR ng/100 ml	LRVR ng/100 ml
JB	35	M	250/150	20,800	23,260	20,800
JB	44	M	230/130	1,980	3,610	2,760
ER	31	M	230/130	1,950	3,610	2,760
GR	41	M	230/140	1,210	2,160	1,790
GS	57	M	250/160	4,990	6,520	6,670

The results in patients with stable chronic renal failure are listed in Table III. Mean peripheral vein renin is 550 (range 150–2,320) ng per 100 ml plasma. The mean renal vein renin value is 720 (range 200–2,320) ng per 100 ml plasma. Two patients (MZ and FW) demonstrated values which appear higher than those observed in patients with essential hypertension.

Table IV describes the studies in uraemic patients receiving haemodialysis treatment. The mean peripheral vein renin is 710 (range 270–2,280) ng per 100 ml plasma. The mean renal vein renin is 1,000 (range 300–2,990) ng per 100 ml plasma. Two patients (JB and JK) are observed with renal vein renin values which appear greater than those observed in patients with essential hypertension.

Data from the clinical categories are summarized in Figure 1.

## DISCUSSION

This study does not demonstrate a systematic increase in renin secretion in chronic renal failure as has been shown in malignant hypertension and renovascular hypertension. There is no apparent correlation between the height of the blood pressure and the renin concentration in renal veins in patients with renal failure.

Since renal vein renin concentration may vary widely in patients receiving haemodialysis, this is a measurement which should be made prior to bilateral nephrectomy. Without prospective evaluation, the variable effect of bilateral nephrectomy is difficult to interpret and hypertensive mechanisms unrelated to renin excess cannot be defined.

## RENAL VEIN AND PERIPHERAL VEIN RENIN ASSAY

An increased content of renin has been observed in diseased kidneys by Shibagaki *et al.* (1965) but the functional significance of this observation is difficult to interpret without a measurement of renin in venous blood issuing from these kidneys.

Malignant hypertension appears to be uniformly associated with renin excess. The syndrome of malignant hypertension in an uraemic patient is likely to be ameliorated by bilateral nephrectomy.

TABLE III

*Peripheral vein and renal vein renin studies in patients with stable chronic renal failure*

Patient	Age	Sex	Disease	BP mm Hg	PVR ng/100 ml	RRVR ng/100 ml	LRVR ng/100 ml
BA	14	M	Hypo	180/139	680	550	690
CB	20	M	Hypo	160/88	270	720	290
GB	42	F	HN	140/100	400	470	490
GG	63	F	Hypo	210/100	810	1,330	730
SG	25	F	DN	104/70	290	300	280
SG	35	M	DN	110/70	280	310	330
WG	65	M	GN	210/110	380	320	390
SK	49	M	HN	180/110	280	390	310
JM	51	M	GN	210/130	430	630	760
WD	23	M	GN	160/100	750	1,320	790
JP	41	M	GN	210/130	630	640	1,160
WS	37	M	GN	140/90	370	290	350
CS	26	F	GN	140/80	400	250	150
PT	42	M	GN	210/140	920	1,770	1,040
IV	37	F	Hypo	210/130	270	320	430
FW	38	F	OU	180/110	1,440	1,330	2,110
SW	65	F	Pyelo	170/100	150	—	300
MZ	49	M	GN	170/90	1,160	2,320	1,650

Hypo: Congenital hypoplastic kidney

HN: Hereditary nephritis

GN: Chronic glomerulonephritis

Pyelo: Chronic pyelonephritis

OU: Obstructive uropathy

DN: Diabetic nephropathy

PK: Polycystic kidney

TABLE IV

*Peripheral vein and renal vein renin studies in patients with chronic renal failure treated with periodic haemodialysis*

Patient	Age	Sex	Disease*	BP mm Hg	PVR ng/100 ml	RRVR ng/100 ml	LRVR ng/100 ml
JB	27	M	GN	210/120	960	2,990	1,970
LB	61	M	GN	160/100	1,030	1,370	1,190
FC	42	M	GN	190/120	340	490	300
HC	37	M	GN	140/100	330	330	390
JH	32	M	Pyelo	160/100	590	1,170	1,540
JK	28	F	GN	190/120	2,280	2,830	2,070
RM	25	M	Pyelo	180/100	690	340	—
VM	28	F	Hypo	210/130	300	450	300
JP	42	M	GN	220/130	670	1,140	1,280
LT	45	F	PK	120/70	270	—	310
WZ	43	F	PK	170/100	360	—	500

\* For explanation of the abbreviations used, see legend underneath Table III.

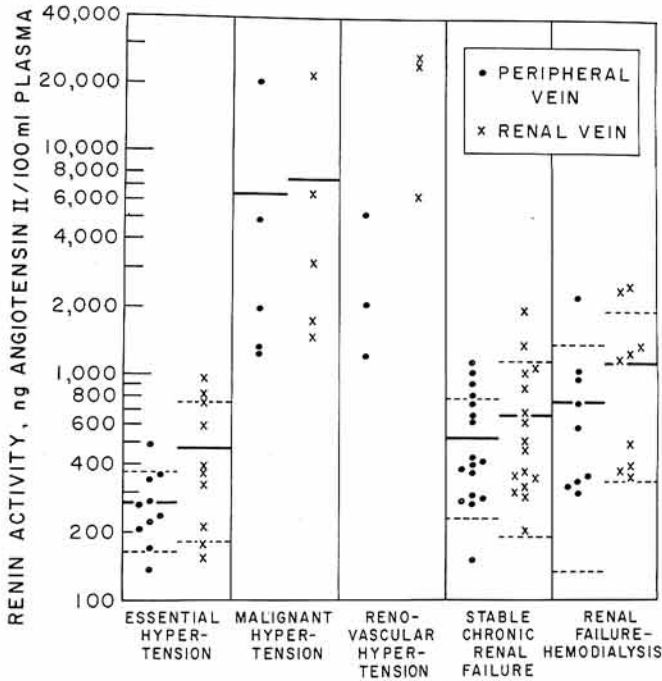


Fig. 1. Renin activity in peripheral vein and renal vein in patients with essential hypertension, malignant hypertension, renovascular hypertension, stable chronic renal failure and renal failure treated with intermittent haemodialysis.

Continuous line: mean value  
Dotted line: range  $\pm$  standard deviation

*Summary*

Renal vein and peripheral vein renin levels were measured in 29 uraemic patients: 18 with stable chronic renal failure and 11 with renal failure treated by periodic haemodialysis. The measurements do not demonstrate a systematic excess of renin secretion in patients with renal failure.

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