

# DETERMINATION OF RENAL PLASMA FLOW BY A SINGLE INJECTION OF <sup>131</sup>I-ORTHOIODOHIPPURATE AND TWO BLOOD SAMPLES: EVALUATION OF THE PRECISION OF THIS METHOD

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Single-injection techniques with radioisotopes for the determination of renal plasma flow have gained wide popularity in recent years due to their technical simplicity and lack of untoward effects. Results of these tests correlate favorably with the classic (PAH) clearance technique and direct renal blood measurement (1-6).

The purpose of this study is to evaluate the precision of this method on 20 patients using two determinations at short intervals.

## MATERIAL AND METHOD

Twenty paraplegic patients aged 23-72 years, who had permanent indwelling catheters for 1-6 years were chosen for this study. The subjects were randomly divided into two groups. The first 15 patients (Group A) were water loaded with 500 ml orally 30 min before the test. The other five patients (Group B) were examined after 10 hr of fasting. Both groups were in a horizontal position during the time of examination. One hundred microcuries of <sup>131</sup>I-orthoiodohippurate with a specific activity of 1  $\mu$ Ci/mg was injected in the antecubital vein at time zero, and two heparinized blood samples were obtained from the contralateral arm 8 and 17 min after injection. A tourniquet was applied exactly 15 sec before the venipuncture. A standard equal to the injected dose was counted along with the plasma samples in a well counter. The plasma values were plotted on semilogarithmic paper and extrapolated to time zero; the disappearance constant was calculated. The volume of distribution was obtained by calculating the algebraic fraction of the standard to the extrapolated value at time zero. This was then multiplied by the disappearance constant to obtain the clearance of hippurate from the plasma. The value obtained was expressed as ml/min/1.73 m<sup>2</sup>.

## RESULTS

Table 1 summarizes the results obtained.

<b>TABLE 1. RENAL PLASMA FLOW VALUES IN 20 PATIENTS</b>			
Patient No.	First deter- (ml/min/ 1.73m <sup>2</sup> )	Second deter- mination (ml/min/ 1.73m <sup>2</sup> )	X
<b>Group A</b>			
1	1,116	1,071	1,093 $\pm$ 22.5
2	935	910	922.5 $\pm$ 12.5
3	820	860	840 $\pm$ 20
4	845	795	820 $\pm$ 25
5	803	755	779 $\pm$ 24
6	760	760	760 $\pm$ 0
7	657	545	607.5 $\pm$ 34.5
8	634	578	606 $\pm$ 28
9	573	642	601 $\pm$ 56
10	492	523	507.5 $\pm$ 15.5
11	488	476	482 $\pm$ 6
12	410	437	423.5 $\pm$ 13.5
13	362	459	410.5 $\pm$ 48.5
14	188	222	205 $\pm$ 17
15	176	140	158 $\pm$ 18
<b>Group B</b>			
1	677	735	706 $\pm$ 29
2	699	697	698 $\pm$ 1
3	670	690	680 $\pm$ 10
4	320	370	345 $\pm$ 25
5	192	202	197 $\pm$ 5
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## DISCUSSION

The study reveals that the technique used has a high degree of reproducibility. To obtain this degree of precision there are two points which have to be dealt with very carefully: one is the uniformity in

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the preparation of the patients and the standard dose of hippurate. The second is the precise timing of the blood sampling, including the time of the application of the tourniquet. In patients with poor peripheral veins, a venous indwelling catheter is preferable.

Although the single-injection technique can be criticized on many theoretical grounds, the fact remains that it correlates well with values obtained from the standard PAH clearance. The demonstration by the present study of a high degree of precision further establishes its value as a practical means to evaluate renal hemodynamics. The many advantages of this method are obvious: simplicity of the clinical and laboratory manipulation, no need for urine collection, short time needed for the performance of the test, applicability to oliguric or anuric patients and repeatability of the test at short intervals of time without undue discomfort to the patient.

#### SUMMARY

Renal plasma flow was determined in 20 patients by a single injection of  $^{131}\text{I}$ -orthoiodohippurate using

two blood samples at 8 and 17 min to determine the slope. A second determination done in each patient revealed a high degree of reproducibility.

#### ACKNOWLEDGMENT

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