A Screening Test for Renovascular Hypertension by Means of Orally Active Angiotensin I Converting Enzyme Inhibitor, Captopril (SQ 14225)

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IMAI, Y., ABE, K., OTSUKA, Y., SAKURAI, Y. and YOSHINAGA, K. A Screening Test for Renovascular Hypertension by Means of Orally Active Angiotensin I Converting Enzyme Inhibitor, Captopril (SQ 14225). Tohoku J. exp. Med., 1980, 131 (3), 311-312 — Orally active converting enzyme inhibitor (Captopril, SQ 14225) was administered in a dose of 50 mg to 12 normotensive subjects (Group I), 26 essential hypertensive patients (Group II) and 8 renovascular hypertensive patients (Group III). In Group III, 5 of 8 patients had control plasma renin activity (PRA) similar to those in Groups I and II patients, but the PRA response to the administration of Captopril was greater in 7 of 8 patients than that in Groups I and II. These 7 patients had either bilateral or unilateral main renal artery stenosis. Captopril caused no increase in PRA in the remaining 1 who had unilateral renal artery stenosis with contralateral renal aplasia. It is concluded that this provocation test is useful as a screening procedure for the diagnosis of renovascular hypertension.

Recently, it has been reported that specific antagonists of angiotensin II or angiotensin I converting enzyme inhibitors (AICEI) augment the plasma renin activity (PRA). Gavras et al. (1978) reported that the increment of PRA 7 days after the administration of fixed dose of orally active AICEI (Captopril, SQ 14225) was much greater in patients with renovascular hypertension (RVH) than in patients with essential hypertension (EH).

The purpose of this study is to examine the response of renin secretion to acute administration of Captopril in patients with EH and RVH and to see if this provocation test of renin release is useful for the diagnosis of RVH.

Studies were performed in normotensive subjects (12 men) (Group I), patients with EH (8 women and 10 men) (Group II) and patients with RVH (4 women and 4 men) (Group III). The mean arterial blood pressure (MAP) in Group I ranged from 88 to 105 mmHg at the time of study. Routine screening tests of secondary hypertension were performed in Group II. As a rule, aortography was performed in Group II to rule out the renal vascular lesion. The diagnosis of stenotic lesions in Group III was made by angiographic findings of the renal artery. Bilateral renal artery stenosis was observed in 3 cases and unilateral in 4 cases. The Case 8 of Group III had left renal artery stenosis with right kidney aplasia. All antihypertensive drugs and diuretics were withdrawn at least 4 weeks prior to the study in all patients with EH and some cases in Group III. The study was carried out in fasted patients in the morning. The subjects were kept in supine position during the study period. Following at least 30 min recumbency, blood pressure and pulse rate were measured. At the end of this control period, blood was sampled for the measurement of control PRA, and 50 mg of Captopril were then administered orally. Measurement of blood pressure and pulse rate, and blood sampling were performed 1 hr (SQ1) and 2 hr (SQ2) after the drug administration. PRA was determined using radioimmunoassay of angiotensin I.

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Control value of PRA in Group I ranged from 3.4 to 20.0 ng/ml (10.7±1.1 ng/ml mean ±s.E.). Mean values of PRA at SQ1 and SQ2 were 15.9±2.1 and 19.3±2.1 ng/ml, respectively. These values were significantly higher than the control value (p<0.01). Control values of PRA in Group II ranged from 2.0 to 21.0 ng/ml (7.0±1.0 ng/ml). After the administration of Captopril, mean value of PRA significantly increased to 14.2 ±2.1 at SQ1 and to 15.8±3.4 ng/ml at SQ2, respectively (p<0.05). Fig. 1 shows

![Graph showing PRA response to 50 mg of Captopril](image)

Fig. 1. PRA response to 50 mg of Captopril in renovascular hypertensive patients. Solid circles, PRA in each renovascular hypertensive patients. Solid triangle, the Case 8 of Group III. Shaded area, the PRA response to Captopril in normotensive subjects and essential hypertensive patients. C, control; SQ1, 1 hr after Captopril administration; SQ2, 2 hr after Captopril administration.

the PRA response to Captopril in Group III. Control values of PRA in this group ranged from 8.0 to 62.0 ng/ml (23.7±6.3 ng/ml). The mean value was not significantly different from those in Groups I and II. Mean value of PRA at SQ1 (71.8±12.6 ng/ml) and SQ2 (99.0±20.7 ng/ml) were significantly higher than the control value (p<0.01). These values were significantly higher than those in Groups I and II at SQ1 (p<0.01) as well as at SQ2 (p<0.01). PRA value at SQ2 in 7 of 8 patients in Group III exceeded the range of those in Groups I and II. These 7 patients had either bilateral or unilateral renal artery stenosis. In only 1 patient (Case 8), Captopril resulted in no increase in PRA, and this case had unilateral renal artery stenosis with contralateral renal aplasia. The control MAP in Group III (134±5 mmHg) was not significantly different from that in Group II (126±2 mmHg). The increase in PRA in response to Captopril at SQ2 in Group III was significantly higher than that in Group II, in spite of no difference in decrease in MAP at SQ2 between Group II (−15±2 mmHg) and III (−17±3 mmHg).

In the present study, Captopril was used to determine the renin response for screening of RVH. Even though 63 percent of patients with RVH had PRA value at rest not different from those in normotensive subjects and patients with EH, the increase in PRA to Captopril administration was much greater in all patients with RVH except one than in normotensive subjects and patients with EH. These results are consistent with the study of Case and Laragh (1979) who reported that diagnostic discrimination was greatly enhanced by infusion of Salarasin or SQ 20881, which elicited marked reactive hyperreninemia in patients with RVH. It has been shown that AICEI increases the renin release through its interception of negative short feedback mechanism of the renin release. Therefore, there is a possibility that this negative short feedback mechanism may be different in RVH from that in EH, thus causing the hyperresponse in the renin release to Captopril in RVH.

References
