Objective To explore the effects of irbesartan on activities of Na⁺-K⁺-ATPase, Ca²⁺-ATPase, Angiotensin II (AngII) and vascular remodelling in renal hypertensive rats (RHRs).

Methods Renovascular hypertension was induced by two kidney-one clip method. Eighteen RHRs were randomly divided into 3 groups: RHR model group (n=6), irbesartan treated group [30 mg/(kg d)], withdrawal group (n=6). Six rats were included in sham operation group. Blood pressure was measured before and after using irbesartan. Thicknesses of vascular wall (TVW) of thoracic aorta and mesenteric artery were measured after 8 weeks. ATPase activities were determined by enzymatic colorimetric method. AngII level was detected by radioimmunoassay.

Results Compared to the sham operation group, blood pressure, TVW, AngII levels of plasma and blood vessels were increased in RHR. The activities of Na⁺-K⁺-ATPase and Ca²⁺-ATPase were decreased in RHR. Blood pressure and the TVW of mesenteric artery were significantly decreased by irbesartan treatment. An increased AngII level and activity of Ca²⁺-ATPase in thoracic aorta and mesenteric artery were also found [thoracic aorta: (11.9±1.9) vs (7.5±1.6) μmol Fl/(h·mg pro); mesenteric artery: (11.6±1.9) vs (8.2±0.8) μmol Fl/(h·mg pro), both p<0.01]. No change of Na⁺-K⁺-ATPase activity was found after irbesartan treatment. After one-week discontinuation of treatment, blood pressure was significantly elevated, the activity of Ca²⁺-ATPase of thoracic aorta [(7.6±1.4) μmol Fl/(h·mg pro)] and mesenteric artery [(6.9±1.3) μmol Fl/(h·mg pro)] was decreased (both p<0.01). There was a significant negative correlation between AngII and the activity of Ca²⁺-ATPase in RHR.

Conclusions The vascular remodelling of RHR may be associated with decreased vascular ATPases activities. Irbesartan can reverse vascular remodelling partially by increasing Ca²⁺-ATPase activity.