

&lt;S12-3&gt;

## Impacts of Arterial Calcification on Aortic Hemodynamics and Cardiac Function in Rats

Chen-Huan Chen

National Yang Ming University, Taiwan

Both vascular aging, characterized by increased arterial stiffness, and arterial calcification are associated with cardiovascular events and mortality. Greater arterial stiffness and arterial calcification often coexist in older people, suggesting a possible association between these two pathological processes. Arterial stiffening mainly involves degradation of elastin and deposition of collagen and may be exacerbated by arterial calcification in the media. However, the processes of arterial stiffening and calcification likely do not develop in parallel. It remains poorly understood how the process of arterial calcification affects arterial stiffness, ventriculo-arterial coupling, and the development of heart failure.

We conducted a comprehensive hemodynamic study on 4-week-old Sprague-Dawley male rats, divided in 3 groups: sham-operated, CKD (left nephrectomy and thermal electrocautery of the right kidney), and CKD+warfarin. Cardiac function and aortic hemodynamics were analyzed via simultaneous left ventricular (LV) pressure-volume and

central aortic pressure-flow measurements, respectively. Our preliminary results found that in the CKD+warfarin group, spotty calcium progressively deposited in the media of thoracic aorta and carotid artery and intima of renal artery. In contrast, there was no arterial calcification developed in the sham or CKD group. LV contractility, estimated by the end-systolic pressure-volume relation (ESPVR), declined in the CKD+warfarin group as compared with the sham and CKD groups. Aortic hemodynamics analyzed using the reservoir-wave analysis revealed that arterial calcification reduced aortic compliance (increased arterial stiffness) and stroke volume, while increased systolic pressure and asymptotic pressure, an indicator of increased arteriolar resistance.

Our preliminary data may support the hypothesis that arterial calcification increases both pulsatile and resistive loads and worsens ventriculo-arterial coupling and therefore precipitates the development of heart failure.