

Multiorgan characterization of inflammasome expression in a rat model of advanced heart failure

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Background: Targeting inflammasomes in heart failure (HF) may offer a novel therapeutic strategy. However, previous studies have mainly focused on myocardial inflammation, with limited data on inflammasome regulation and function in multiorgan dysfunction associated with advanced HF. Our study aimed to characterize the expression of inflammasome components in the myocardium, lungs, liver, and kidneys using a pressure-overload rat model of advanced HF.

Methods: rats underwent transverse aortic constriction (TAC) surgery and were monitored for 15 weeks. Animals displaying 2–3 clinical signs of advanced HF were classified as the TAC-HF group, while those with mild HF (0–1 signs) formed the TAC-M group. Sham-operated rats served as controls. Western blot analysis was used to assess inflammasome protein expression in the left ventricle (LV), right ventricle (RV), lungs, liver, and kidneys.

Results: Despite differences in clinical severity, all TAC animals developed comparable severe cardiac dysfunction. In the TAC-HF group, the inflammasome sensors absent in melanoma 2 (AIM2) and NLR family CARD domain-containing protein 4 (NLRC4) were upregulated in both the LV and RV compared to Sham group. In the lungs, AIM2 and NLR family pyrin domain-containing protein 3 (NLRP3) were elevated, while NLRC4 remained unchanged.

Inflammasome component expression was seemingly downregulated in the liver and unchanged in the kidneys of TAC-HF animals. In contrast, inflammasome alterations were largely absent in TAC-M animals.

Conclusion: Inflammasome expression exhibits organ-specific changes in advanced HF, suggesting a differential role in multiorgan dysfunction.

Keywords: transverse aortic constriction, advanced heart failure; end-organ damage; multiorgan dysfunction; inflammasome

Funding: RRF-2.3.1-21-2022-00003, TKP2021-EGA-23, European Union's Horizon 2020 Research and Innovation Programme (grant agreement no. 739593), Momentum Research Grant LP-2021-14 (to Z.V.V.), NKFIH K134939 (to T.R.) and FK134751 (to Z.V.V.), ÚNKP-22-3-I-SE-7 (to D.N.), ÚNKP-23-4-II-SE-26 (to Zs.O.)