The crucial role of CDH11 in the pathogenesis of Ang-II-induced atrial fibrosis and vulnerability to atrial fibrillation

Qunshan Wang  
Wei Cao  
Shuai Song  
Guojian Fang  
Yingze Li  
Yi Wan  
Yue Gu

Introduction: Atrial fibrosis, the hallmark of structural remodeling associated with atrial fibrillation (AF), is characterized by abnormal proliferation of atrial fibroblasts and excessive deposition of extracellular matrix. Cadherins are thought to play a role in EMT, as cells classically display loss of epithelial characteristics and markers. Emerging studies suggest a role for cadherin-11 (CDH11) in the process of wound healing, corroborated by detecting increased CDH11 levels in subcutaneous and lung fibroblasts stimulated to differentiate into myofibroblasts. However, the effect of the CDH11 on AF is unclear.

Methods: The expression of CDH11 was examined in the left atria of AF patients and Ang-II-induced atrial fibrosis mice. Animal cell level separation C57BL/6 wild mice and C57BL/6 Cad-11-/- knock out mice (1-3 days) of primary fibroblasts cultured, further using TGF-β1 drugs to intervene in fibroblasts. The effects of flow cytometry, scratch experiments, and invasive experiments on the proliferation, migration and attack ability of heart fibroblasts were evaluated. The animals were implanted with Ang-II pumps in the 8-week-old male C57BL/6 Wild and C57BL/6 Cad-11-/-, thus constructing an Ang-II-induced model of atrial fibrosis in mice and establishing a corresponding control group. The expression of gene CDH11 in left atrium tissue in each group of mice was evaluated using a semi-quantitative RT-PCR method. The technique evaluated the expression level of CDH11 and extracellular matrix and related fibrosis protein in the left atrium of mice, the color of the left atrium tissue Masson of the mice evaluated the collagen fiber content of the left atrium tissue, and the echocardiogram examination evaluation of data on the size change and heart failure index of left atrium in mice.

Result: The results of this study reveal that we demonstrate that CDH11 has significant increased in atrial muscle of AF patients, and atrial fibrosis mice and in the cells models, resulting in fibroblasts activation and migration. Animal cell level CDH11 can promote the conversion of heart fibroblasts in mice to muscle fibroblasts, while animals have found significant reduction in atrium fibrosis in the mouse pump model.

Conclusion: These data indicate that CDH11 plays an important role in atrial fibrosis and TGF-β1 induced endothelial-interstitial transformation. This evidence suggests that CDH11 may be one of the targets of treatment against atrial fibrosis.