

C111. A Loose Meshwork Of Special Connections: The Adhering Junctions Of Mammalian Valvular Interstitial Cells

Mareike Barth¹; Payam Akhyari²; Artur Lichtenberg²; Werner W. Franke¹

¹*Helmholtz Professor Group for Cell Biology, German Cancer Research Center, Heidelberg, Germany;* ²*Department of Cardiothoracic Surgery, University Hospital Jena, Jena, Germany*

OBJECTIVES: In view of the numerous ongoing projects in the field of heart valve tissue engineering for replacement surgery it is surprising to realize the limited cell and molecular biological basis of knowledge about valvular interstitial cells (VICs), in particular with respect to their cell-cell contacts.

METHODS: Using biochemical and immunolocalization methods as well as electron microscopy we investigated the proteins involved in VIC cell-cell contacts and their interactions with the extracellular environment.

RESULTS: We have determined that the adhering junctions (AJs) between VICs are composed of two Ca²⁺-dependent transmembrane glycoproteins, N-cadherin and cadherin-11, anchored in a typical cytoplasmic plaque comprising α - and β -catenin, plakoglobin and p120ctn, both in situ as in VIC cultures. Surprisingly, in cultured VICs but not in those of valve tissues, we have noted that their AJs de novo acquire the additional desmosomal plaque protein, plakophilin-2, an addition noted also in other mesenchymal cells characterized by elevated proliferation rates. Furthermore, VICs in situ form frequent, often very long filopodial cell processes and are accompanied by paracrystalline collagen bundles in the extracellular matrix. By electron microscopy, we have found frequent associations of such VIC filopodia with these collagen bundles, often in semi-ordered patterns, obviously a novel and widespread component of VIC-cell-matrix organization.

CONCLUSIONS: The valvular matrix is an interconnected, three-dimensionally ordered meshwork of VICs and collagen paracrystal bundles which are interconnected by mesenchymal type AJs and filopodial contacts.