Regulators of second heart field development

Robert G Kelly

Developmental Biology Institute of Marseilles-Luminy, UMR6216 CNRS Université de la Méditerranée, Campus de Luminy Case 907, 13288 Marseille Cedex 9, France

Rapid extension of the embryonic heart tube during cardiac looping occurs by addition of cells from pharyngeal mesoderm to the elongating poles of the heart tube. These progenitor cells, termed the second heart field, are characterised by properties of elevated proliferation and differentiation delay with respect to initially contiguous differentiated cells in the cardiac crescent that give rise to the linear heart tube. Progressive addition of second heart field cells to the heart tube is regulated by signals from surrounding pharyngeal epithelia, neural crest cells and pharyngeal mesoderm itself, that together define the niche of these cardiac progenitor cells in the early embryo. Direct or indirect perturbation of second heart field development results in failure to extend the heart tube leading to cardiac alignment defects at later developmental stages including a spectrum of conotruncal defects seen in human congenital heart anomalies. Here data will be presented concerning three transcriptional regulators of murine second heart field development, the DiGeorge syndrome candidate gene Tbx1, Hes1 and Tbx3, loss of function of which impacts on outflow tract morphogenesis leading to congenital heart defects.