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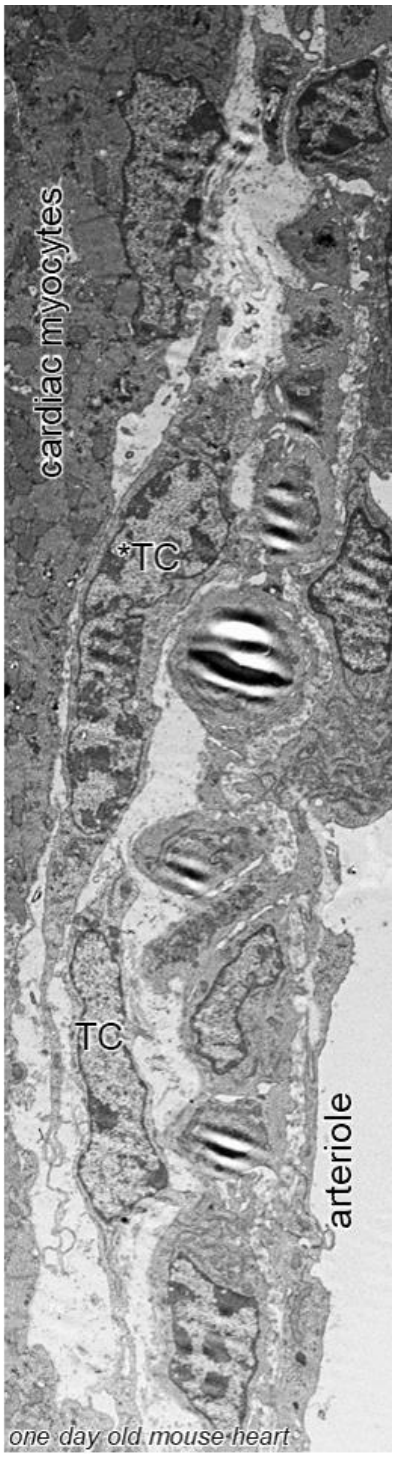
TELOCYTE IDENTITY – A DISTINCT CELL OR A DIFFERENT PHENOTYPE [TIDY]

Brief scientific report – 2023
PHASE 3. Telocytes in heart development and maturation

We used transmission electron microscopy to investigate the contribution of telocytes (TC) in heart development, focusing on E7.5, E8.5, E9.5, E10.5, E14.5 days and P0 - newborn. In the E7.5, E8.5, E9.5, E10.5 samples we could not find TCs in mouse embryos and there are no other studies to compare our results with. Moreover, for the E14.5 developmental stage of the mouse heart we did not identify cells with long extensions meeting the ultrastructural diagnostic criteria for TCs, as previously reported. Given that we used a single group of embryos from a single female, it can be assumed that there is a degree of variability in embryonic development spanning a one-day interval.



one day old mouse heart

TCs could be easily identified in the one-day old mouse heart (P0): numerous cells with very long extensions positioned between cardiomyocytes and with a greater concentration around vascular structures. A particular feature of the one day-old heart was the presence of numerous dividing cells. Differentiated cells could be identified within dividing cells: endothelial cells, pericytes, vascular smooth muscle cells, Schwann cells, cardiomyocytes and even TCs (image). Dividing TCs have not been previously reported.

TCs are involved, especially by means of their extensions (telopodes), in heterotypic intercellular contacts (between different cell types). These contacts do not form classical junctions, they belong to the class of molecular connections, small focal adhesions, most likely with roles in signaling.

The absence of TCs in the E14.5 stage and the large number of easily identifiable TCs in P0 indicate their origin in the proepicardial organ and explain the absence of this cell in the early developmental stages. The proepicardium comprises a heterogeneous group of cells that contribute to the development of cardiomyocytes, smooth muscle cells, fibroblasts, and even endothelial cells of cardiac vessels.

The presence of large numbers of TCs in the postnatal (P0) mouse heart, some in division, forming numerous focal contacts with various cell types, indicates their active role in perinatal cardiac development and the histological organization of the heart.

Our study indicates that TCs are cardiac resident cells, that their origin is most likely shared with other cardiac cells, from the proepicardium, and that cardiac TCs have high tissue specificity.