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Th-AM-F9 ARE GAP JUNCTIONAL PITS AND PARTICLES COMPLEMENTARY STRUCTURES? Leszek Kordylewski and Ernest Page, University of Chicago.

Gap junctional (GJ) pits and particles are thought to be complementary structures; although it is well known that, in replicas of freeze fractured tissues, pits are more closely spaced and more highly ordered than particles, these discrepancies have been attributed to "plastic deformation" affecting the P-face particles more than the E-face pits. We have reexamined this explanation by studying complementary replicas (CR) of GJ in sheep cardiac Purkinje strands fixed with glutaraldehyde, cryoprotected with glycerol, freeze fractured with unidirectional shadowing using the Balzers apparatus, and photographed at original magnifications of 50,000 or 200,000 X with tilting on the goniometer stage of a Hitachi 600 electron microscope. Using several techniques for superimposing stereoimages of the complementary E- and P-faces, we found that pits fall between particles, not on them. In CR in which the numbers of pits and particles could be compared directly for defined corresponding (complementary) areas of E- and P-face in the same GJ, the ratio (number of pits/number of particles) ranged from 1.3 - 1.5. Similar ratios were found by measuring the number of particles or pits per unit area in rotary shadowed E- and P-faces of the same cardiac GJ prepared (without CR) using rotary shadowing, in which underestimation of P-face particle number due to apparent "fusion" of particles could be ruled out. We conclude that, whatever the role of plastic deformation, GJ pits and particles are not complementary structures and the pits do not lie on the same transmembrane axis as the particles. Supported by USPHS NHLBI Grants HL 10503 and 20592.

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