

30. SQV-4 UDP-GLUCOSE DEHYDROGENASE IS TEMPORALLY AND SPATIALLY REGULATED TO CONTROL *C. ELEGANS* VULVAL MORPHOGENESIS

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The development of the *C. elegans* vulva requires the involution of epithelial cells and provides a model for organ morphogenesis. Mutations in *sqv* genes affect both vulval morphogenesis and embryonic development. In early L4 larvae defective in the *sqv* genes, the vulval extracellular space that separates the anterior and posterior halves of the vulva is reduced in size. We found that *sqv-4* encodes a protein similar to UDP-glucose dehydrogenases and showed that the SQV-4 protein specifically catalyzes the conversion of UDP-glucose to UDP-glucuronic acid, which is essential for the biosynthesis of chondroitin and heparan sulfate glycosaminoglycans. SQV-4 is expressed in the vulva and oocytes, among many other cells, and SQV-4 levels are dramatically increased in a specific subset of vulval cells during vulval morphogenesis. The changes in the size and shape of the developing vulva coincide with specific changes in the number and positions of vulval cells with increased SQV-4 expression. Animals carrying multiple copies of the *sqv-4* transgene have enlarged vulval extracellular space. The number of SQV-4-expressing vulval cells is decreased in *lin-11(lf)* mutants, which have a reduced vulval extracellular space. By contrast, SQV-4 expression is increased in a subset of cells that form pseudovulvae in *lin-12(gf)* mutants. Thus, vulval morphogenesis, in particular expansion of the extracellular space of developing vulvae and pseudovulvae, may require SQV-4 function in a subset of cells that form those structures. Furthermore, there is a positive correlation between the size of the vulval extracellular space and the number of SQV-4-expressing vulval cells and possibly the level of SQV-4 expression in vulval cells. We propose that the regulation of UDP-glucuronic acid production in a specific subset of vulval cells drives aspects of vulval morphogenesis.