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## **Investigating the role of ACTC1 in placental development**

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The placenta is important for proper nutrient and oxygen exchange from mother to fetus. As the human placenta develops, single cytotrophoblast cells fuse into a large multinucleated cell (syncytiotrophoblast) covering the surface contacting maternal blood. Little is known about early placental development and which genes are responsible for guiding proper cell fusion. Previous work in our lab has investigated a gene called ACTC1, which encodes a cardiac actin required in formation of cardiac muscle. Defects in this gene are associated with idiopathic dilated cardiomyopathy, familial hypertrophic cardiomyopathy, and atrial septal defect. ACTC1 has been studied in cardiac development, but not in the placenta. Our hypothesis is that ACTC1 plays a role in cell fusion and is required for proper placental development. Previously, we have shown that ACTC1 is expressed during syncytium formation in the human placenta, and in trophoblast cells derived from human embryonic stem cells, a partial removal of this gene showed morphological changes and reduced cell fusion. The purpose of the current experiment is to determine whether ACTC1 is present in the mouse placenta at various points in gestation, specifically when syncytium is first forming (E8.5-10.5) and in the mature placenta (E11.5-E18.5). Immunofluorescence staining with an ACTC1 antibody showed specific signal in paraffin sections of a positive control tissue (mouse heart) and no expression in a negative control tissue (mouse pancreas). Preliminary results show that ACTC1 is expressed at gestational days 8.5 and 10.5 in parietal trophoblast giant cells but is not expressed in the mouse placenta at days 11.5 and 18.5. Contrary to expectations, ACTC1 was not expressed in developing chorion cells, which is not consistent with the hypothesis that ACTC1 plays a role in syncytiotrophoblast cell fusion in the mouse placenta. A future direction for this project would investigate placental development in an ACTC1 knockout mouse.