Type V collagen fibril affect the vasculature and tubulogenesis of developing kidney

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Our previous research showed that type V collagen fibril could improve cell migration, spreading and ECM remodeling when culturing adult porcine renal glomerular cells by using type V collagen as the scaffold. This discovery explores a new concept that the function of collagen does not always reside on cell stabilization. In order to elucidate the further function of type V collagen, we focus on the research on its role on kidney at the development stage. In vivo and in vitro experiments were conducted to investigate both the expression and the localization of type V collagen and its effect on the developing tissues in metanephroi. The results showed as following. (1) In vivo fluorescent immunology experiment and confocal microscopy observation indicated that type V collagen appeared during E11.5~E17.5 with the same tendency as the results observed in fluorescent immunology. siRNA knockdown experiment showed that the growth of ureteric bud was inhibited and no formation of vasculature. (2) In vitro experiment by culturing metanephroi in the media added with fluorescent labelled type V collagen molecules and fibrils showed significant collagen uptake into metanephroi. Type V collagen molecule elongated tubule branching while V fibril balanced tubule morphology. Interestingly, only V fibril could improve the formation of vasculature while V molecule scattered the endothelial cells. Taken together, V fibril plays an important role in the vasculature and tubulogenesis of the developing kidney.