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Protein tyrosine kinase 7 regulates extracellular matrix integrity and mesenchymal intracellular RAC1 and myosin II activities during Wolffian duct morphogenesis

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ABSTRACT

Wolffian duct morphogenesis must be highly coordinated with its specialized function of providing an optimal microenvironment for sperm maturation. Without normal Wolffian duct morphogenesis, male infertility will result. Our previous study showed that mediolateral and radial intercalation of epithelial and mesenchymal cells respectively, were major drivers of ductal elongation and were regulated by protein tyrosine kinase 7 (PTK7), a member of the planar cell polarity (PCP) non-canonical Wnt pathway. To understand the mechanism by which PTK7 regulates cell rearrangement/intercalation, we investigated the integrity of the extracellular matrix (ECM) and the activity of intracellular cytoskeleton mediators following loss of *Ptk7*. Abnormal assembly of nephronectin, laminin, and collagen IV at the basement membrane and fibrosis-like deposition of fibrilla collagen in the interstitium were observed in *Ptk7* knockout Wolffian ducts. Further, the activity levels of RAC1 and myosin II, two cytoskeleton mediators, decreased in the *Ptk7* knockout mesenchyme compared to controls. In addition, *in-vitro* experiments suggested that alterations of ECM and cytoskeleton mediators resulted in changes in