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An Epithelial Precursor Is Regulated by the Ureteric Bud and by the Renal Stroma

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Abstract

Kidney epithelia develop from the metanephric mesenchyme after receiving inductive signals from the ureteric bud and from the renal stroma. However, it is not clear how these signals induce the different types of epithelia that make up the nephron. To investigate inductive signaling, we have isolated clusters of epithelial progenitors from the metanephric mesenchyme, thereby separating them from the renal stroma. When the isolated progenitors were treated with the ureteric bud factor LIF, they expressed epithelial proteins (ZO-1, E-cadherin, laminin α_5) and produced nephrons (36 glomeruli with 58 tubules), indicating that they are the target of inductive signaling from the ureteric bud, and that renal stroma is not absolutely required for epithelial development *in vitro*. In fact, stroma-depleted epithelial progenitors produced sevenfold more glomeruli than did intact metanephric mesenchyme (5 glomeruli, 127 tubules). Conversely, when epithelial progenitors were treated with both LIF and proteins secreted from a renal stromal cell line, glomerulogenesis was abolished but tubular epithelia were expanded (0 glomeruli, 47 tubules). Hence, by isolating epithelial progenitors from the metanephric mesenchyme, we show that they are targeted by factors from the ureteric bud and from the renal stroma, and that epithelial diversification is stimulated by the ureteric bud and limited by renal stroma.

Keywords

epithelia; progenitor; mesenchyme; induction; kidney; stroma

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