Figures and figure supplements

Branching morphogenesis in the developing kidney is not impacted by nephron formation or integration

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Figure 1. The proportion of ureteric bud tips associated with one or more connected nephrons as a product of developmental time. (A) Analysis of developing fetal and early postnatal kidneys in which the proportion of ureteric bud tips with 1 or more nephrons which had re-integrated into their associated ureteric bud tips are quantified (left y-axis, blue and orange bars; assessed at E12.5, 13.5, 14.5, 15.5, 17.5, 19.5, PN2 and PN3). The number of tips at each developmental stage is also shown (right y-axis; assessed at E11.5, 12.5, 13.25, 13.75, 15.5, 16.5, 17.5, 18.5, 19.5 and PN2). (B) Screen shots from a live imaging experiment of cultured Hoxb7-gfp kidneys tracking branching morphogenesis of the ureteric bud (green) and the formation and differentiation of renal vesicles into connected nephrons (white line). Time (h, hours) and scale are indicated.

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Figure 1—figure supplement 1. Screen shots from a live imaging experiment of cultured Hoxb7-gfp kidneys tracking branching morphogenesis of the ureteric bud (green) without overlays, showing nephron differentiation in phase contrast. Time (h, hours) and scale are indicated.

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Figure 2. The relationship between branching morphogenesis and developmental time. (A) Analysis of maximal terminal tip length and axial radius of the kidney shows no relationship between the two measures ($p=0.95$, lm linear regression in R) at different developmental time points (where $n = 6,5,7,5,5,4$ for increasing time points, respectively). (B) The distribution of tip branching generations showing the mean and SEM of kidneys at each developmental stage ($n = 6,5,7,5,5,4$ for increasing time points, respectively). The branching generation of a tip is the number of branching events along the path from the ureter to the tip extremity determined using Tree Surveyor software. (C) A digital projection of light sheet imaging of a whole kidney at E15.5 labelling the collecting duct (green, Trop2$^+$) and differentiating nephrons (red, E-cadherin$^+$,Trop2$^-$). (D) The direct relationship between nephron number and branch generations per tip shows no evidence for a reduction in branching associated with nephron integration. Generation number of tips with no (red), 1 (green) and 2 (blue) connected nephrons are indicated. Each tip is represented (open circle); mean (closed circle) and median (bar) are indicated.

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Figure 3. The relationship between cell proliferation nephron endowment. EdU labelling was used to quantify cell proliferation in the tip (A) and cap (B) cell niches. The number of nephrons, which are physically connected to the tips are detailed across three different developmental time points and the total number of nephric structures (connected and associated) are indicated in colour. Each data point represents a single cap or tip cell niche.

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