In vivo imaging of juxtaglomerular neuron turnover in the mouse olfactory bulb

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Abstract:

As a consequence of adult neurogenesis, the olfactory bulb (OB) receives a continuous influx of newborn neurons well into adulthood. However, their rates of generation and turnover, the factors controlling their survival, and how newborn neurons intercalate into adult circuits are largely unknown. To visualize the dynamics of adult neurogenesis, we produced a line of transgenic mice expressing GFP in approximately 70% of juxtaglomerular neurons (JGNs), a population that undergoes adult neurogenesis. Using in vivo two-photon microscopy, time-lapse analysis of identified JGN cell bodies revealed a neuronal turnover rate of approximately 3% of this population per month. Although new neurons appeared and older ones disappeared, the overall number of JGNs remained constant. This approach provides a dynamic view of the actual appearance and disappearance of newborn neurons in the vertebrate central nervous system, and provides an experimental substrate for functional analysis of adult neurogenesis.

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