Meninges are a reservoir for new functional neurons of the cortex.

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Whether new neurons are added in the postnatal cerebral cortex is still debated.

We have found that meninges contain a rare neurogenic cell population that gives rise to cortical neurons early after birth in the murine brain in vivo. Using multiple lineage tracing approaches, we found that most of the meninges-derived neurons belonged to the PDGFRß-lineage. Single cell transcriptomic analysis identified a PDGFRß+ meningeal cell population with distinct transcriptome signatures characteristic of (i) neurogenic radial glia-like cells (resembling neural stem cells in the SVZ), (ii) neuronal cells, and (iii) a cell type with an intermediate phenotype, possibly representing radial glia-like meningeal cells differentiating to neuronal cells.

Birth-dating experiments revealed that these neurogenic meningeal cells are generated during embryonic development between E13.5 and E16.5. The embryonically derived meningeal progenitors remain largely quiescent, and in the first days after birth, they migrate to the cortex and differentiate to cortical neurons, without further proliferation. The resulting neurons are electrically functional and integrated into local microcircuits. These findings broaden the concept of brain plasticity since they indicate that quiescent embryonically-born neural progenitors may contribute to add new functional neurons to the postnatal cortex. Meningeal-resident neural precursors represent a new potential therapeutic target for neurodegenerative diseases.