Supplementary Information

Running reorganizes the circuitry of one-week-old adult-born hippocampal neurons

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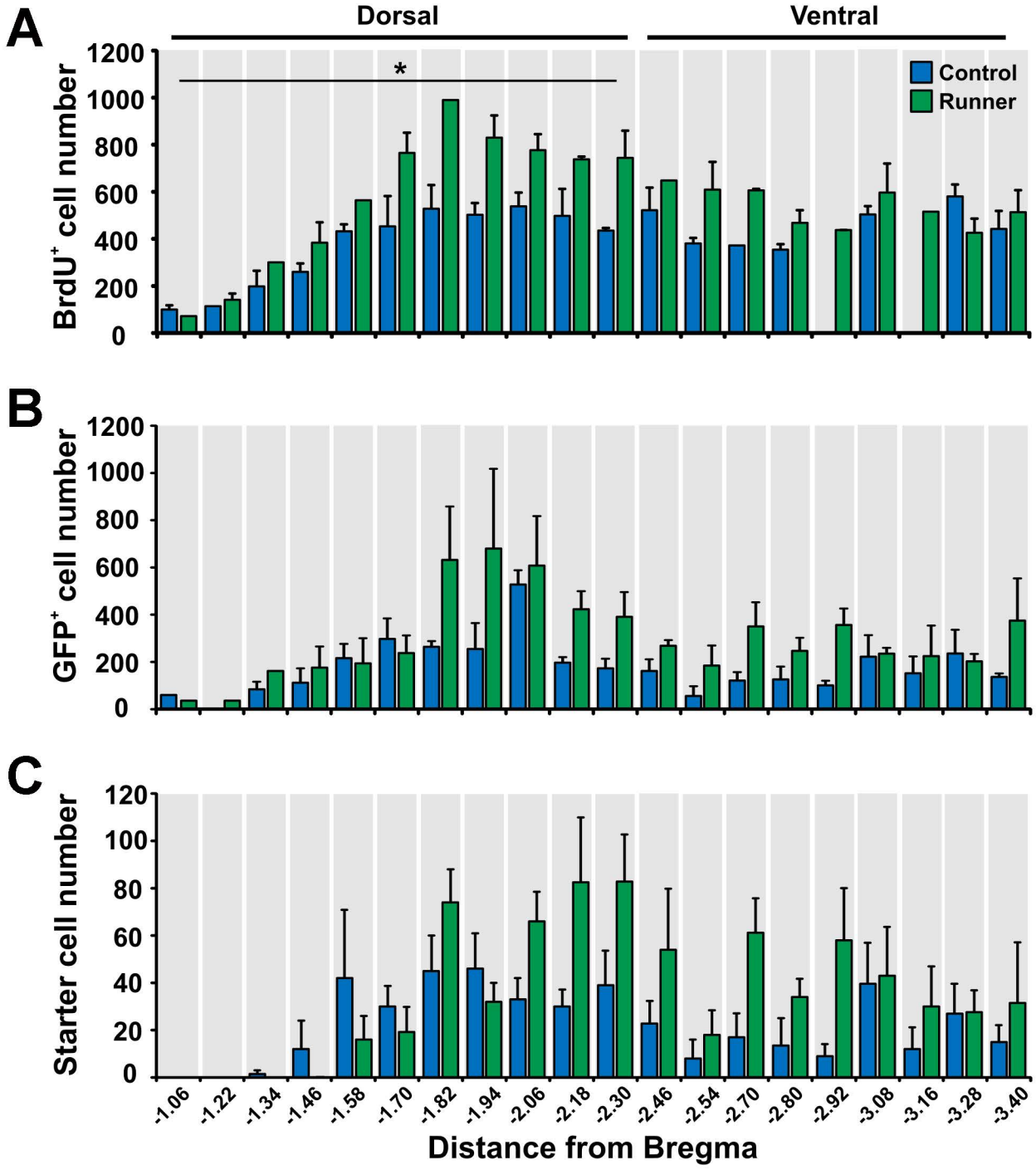
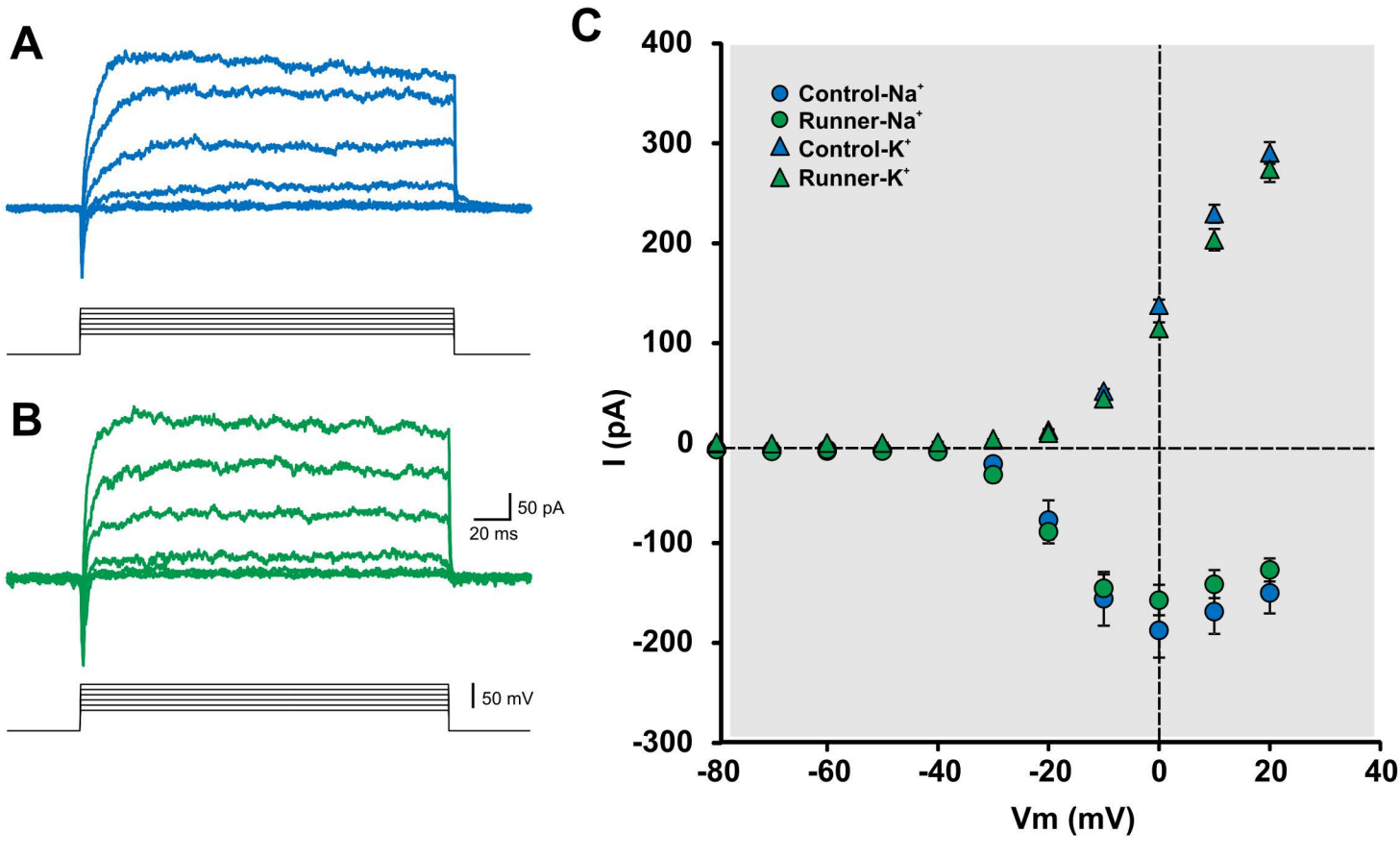
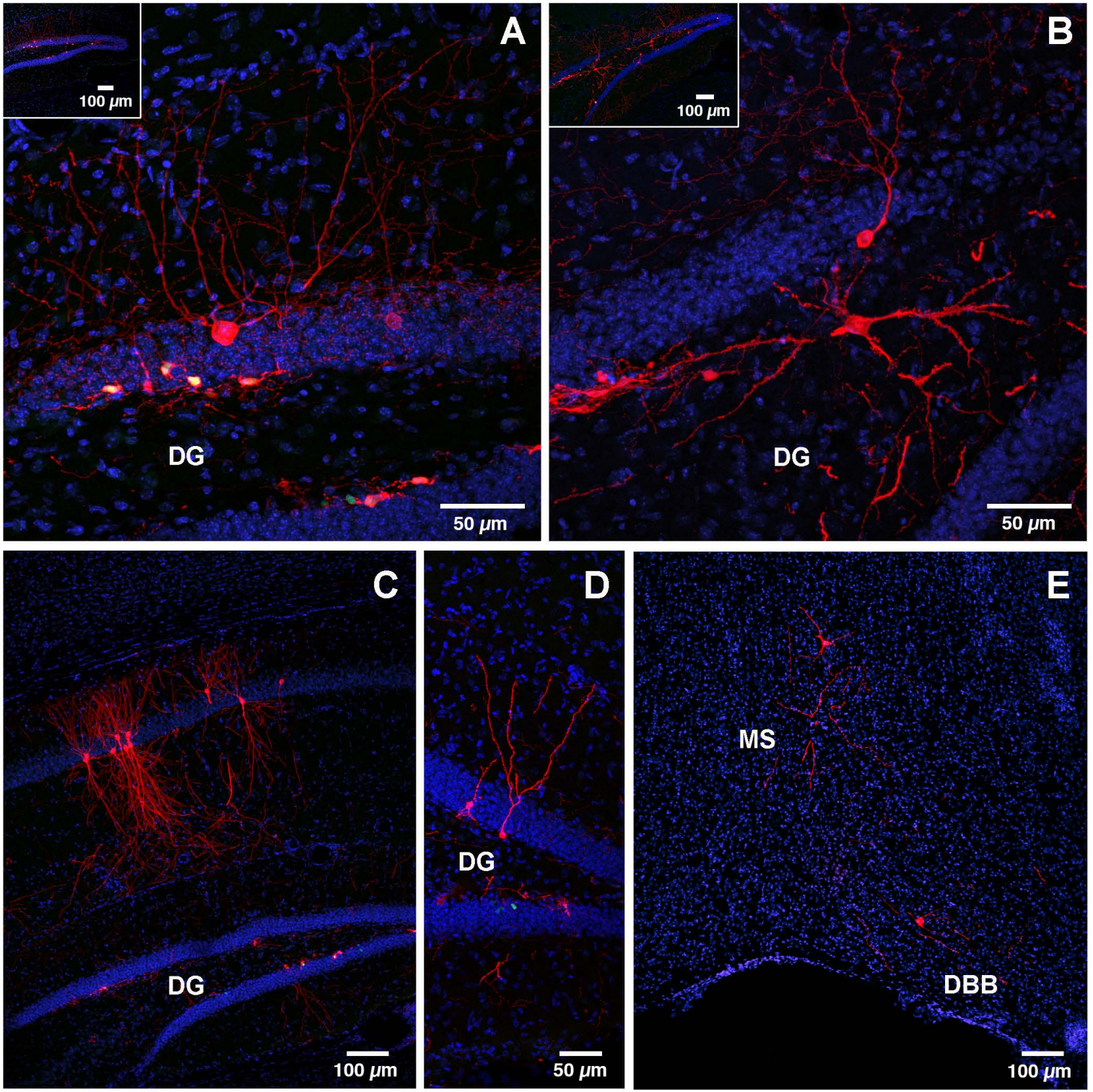

A
Dorsal
Ventral
*
Control
Runner
BrdU+ cell number
1200
1000
800
600
400
200
0
B
GFP+ cell number
1200
1000
800
600
400
200
0
C
Starter cell number
120
100
80
60
40
20
0
-1.06
-1.22
-1.34
-1.46
-1.58
-1.70
-1.82
-1.94
-2.06
-2.18
-2.30
-2.46
-2.54
-2.70
-2.80
-2.92
-3.08
-3.16
-3.28
-3.40
Distance from Bregma

Supplementary Figure 1. Running increases the number new granule cells in the dentate gyrus. (A) Dorso-ventral distribution of BrdU+ cells. Running significantly increases the number of $BrdU^+$ cells in the dorsal (1976 $\pm$ 163 cells, control; 2980 $\pm$ 218 cells, runner; $t_{(8)} = 3.43$, $P < 0.008$) but not in the ventral (2274 $\pm$ 206 cells, control; 2532 $\pm$ 204 cells, runner; $t_{(8)} = 0.77$, $P > 0.45$) dentate gyrus. (B) Retrovirally labeled GFP^+ cells and (C) Starter cells (GFP^+ retrovirus and MCh^+ rabies virus), throughout the rostral-caudal extent of the dentate gyrus of control and runner mice.


A
B
50 pA
20 ms
50 mV
C
Control-Na+
Runner-Na+
Control-K+
Runner-K+
I (pA)
Vm (mV)
400
300
200
100
0
-100
-200
-300
-80
-60
-40
-20
0
20
40

Supplementary Figure 2. Na^+ and K^+ currents of GFP^+ cells at 7-8 dpi. (A, B) Representative responses to voltage steps (-40 mV to +20 mV, 10 mV increments) of GFP^+ cells from (A) control and (B) runner mice. Traces show fast inward and slow outward currents. (C) Current-voltage (I-V) curve of peak inward current (circles) and the steady-state of the outward current (triangles) from GFP^+ cells of control and runner mice.


A
100 μm
DG
50 μm
B
100 μm
DG
50 μm
C
DG
100 μm
D
DG
50 μm
E
MS
DBB
100 μm

Supplementary Figure 3. Trans-synaptic tracing of immature adult-born GC inputs in 8-week-old mice. The inputs to one-week-old adult-born dentate granule cells in this cohort (n = 4, 8-week-old mice) were comparable to those observed in younger mice in this study. (A) Starter cells expressing GFP and MCh (yellow nuclei) and traced interneurons expressing MCh (red) in the dentate gyrus. In addition, traced (B) mossy cells, (C) pyramidal cells, (D) mature GCs and (E) basal forebrain cells expressing MCh were detected. DG, dentate gyrus; MS, medial septum; DBB, diagonal band of Broca. Nuclei were stained with DAPI (blue).