Supplementary Material

Radiation Induces Distinct Changes In Defined Subpopulations Of Neural Stem And Progenitor Cells In The Adult Hippocampus

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# Table S1. Acute effects of gamma-irradiation: 24 hr post-exposure

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Cell type** | **Mean cells (SD)\*** | **ANOVA** | **Sham vs. 1 Gy** | **Sham vs. 5 Gy** |
|  |  | **Sham** | **1 Gy** | **5 Gy** | **F and p values** | **Absolute 95%CI of diff.\*\*** | **Relative 95% CI of diff. (% of Sham)** | **Absolute 95%CI of diff.\*\*** | **Relative 95% CI of diff. (% of Sham)** |
| Survival of the stem cell pool | Total RGL cells | 10222 (645) | 9169 (1512) | 8443 (960) | F (2,10)=2.4 p=0.14 | -924 to 3029 p=0.33 | 9% incr. to 30% decr. | -304 to 3862, p=0.09 | 3% incr. to 38% decr. |
| Survival and proliferation of daughter progenitors | Total ANPs (GFAP-/ GFP+) | 25598 (7464) | 15341 (2946) | 9284 (1369) | F (2, 9)=12.3 p=0.0027 | 1569-18945 p=0.0235 | 6-74% decr. | 7625-25001 p=0.002 | 30-98% decr. |
| Survival of S/G2-IR cells (Parameter [a]) | BrdU RGLs | 201 (63) | 104 (53) | 54 (16) | F (2, 10)=9.4 p=0.0051 | 12-181 p=0.027 | 6-90% decr. | 58-236 p=0.003 | 29-117% decr. |
| BrdU ANPs | 2998 (394) | 1747 (385) | 193 (90) | F (2, 10)=72.9 p<0.0001 | 684-1818 p=0.0004 | 23-61% decr. | 2207-3402 p<0.0001 | 74-113% decr. |
| Proliferation (Parameter [b]) | EdU RGLs | 197 (55) | 58 (25) | 7 (8) | F (2,10)=33.3 p<0.0001 | 79-197 p=0.0003 | 40-100% decr. | 128-252 p<0.0001 | 65-128% decr. |
| EdU ANPs | 1672 (131) | 621 (138) | 70 (37) | F (2,10)=203 p<0.0001 | 854-1249 p<0.0001 | 51-75% decr. | 1394-1810 p<0.0001 | 83-108% decr. |
| Cell cycle reentering of S/G2-IR cells (Parameter [c]) | EdU/BrdU RGLs | 67 (32) | 13 (13) | 0 (0) | NA | \*\*\*mean diff. 54, SE of diff. 15, p=0.01 | 81% decr. SE of diff. 22% | \*\*\*mean diff. 67, SE of diff. 16, p=0.006 | 100% decr. SE of diff. 24% |
| EdU/BrdU ANPs | 811 (196) | 245 (155) | 0 (0) | NA | \*\*\*mean diff. 566, SE of diff. 117, p=0.002 | 70% decr. SE of diff. 14% | \*\*\*mean diff. 811, SE of diff. 98, p=0.0002 | 100% decr. SE of diff. 12% |
| Cell cycle progression of non-S-IR cells (Parameter [d]) | EdU-only RGLs | 129 (28) | 46 (18) | 7 (8) | F (2,10)=40.7 p<0.0001 | 50-117 p=0.0002 | 39-91% decr. | 87-158, p<0.0001 | 67-122% decr. |
| EdU-only ANPs | 861 (80) | 376 (65) | 70 (37) | F (2,10)=160 p<0.0001 | 377-595 p<0.0001 | 44-69% decr. | 677-906 p<0.0001 | 79-105% decr. |

\* Estimated for the whole DG volume; \*\* Dunnett’s test for CIs and correction for multiple comparisons after one-way ANOVA, multiplicity adjusted p values; \*\*\* t-test for each irradiated group vs. Sham, without assuming equal SD, correction for multiple comparisons using the Holm-Sidak method, with alpha=0.05.

# Table S2. Long-term effects of gamma-irradiation: 2 months post-exposure

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Cell type** | **Mean cells (SD)\*** | **ANOVA** | **Sham vs. 1 Gy** | **Sham vs. 5 Gy** |
|  |  | **Sham** | **1 Gy** | **5 Gy** | **F and p values** | **Absolute 95%CI of diff.\*\*** | **Relative 95% CI of diff. (% of Sham)** | **Absolute 95%CI of diff.\*\*** | **Relative 95% CI of diff. (% of Sham)** |
| Survival of irradiated labeled cells | EdU-labeled cells | 121 (91) | 49 (24) | 10 (18) | NA | \*\*\* mean diff. 72, SE of diff. 31 p=0.04 | 60% decr. SE of diff. 26 | \*\*\* mean diff.111, SE of diff. 35 p=0.008 | 92% decr. SE of diff. 29 |
| Neurogenesis | DCX cells | 11218 (3018) | 9832 (1357) | 6218 (2604) | F(2,12)=5.6 p=0.02 | -2461-5234 p=0.6 | 22 incr. to 47% decr. | 1152-8848 p=0.01 | 10-79% decr. |
| G category cells\* | 125 (29) | 77 (16) | 41 (15) | NA | \*\*\* mean diff. 48, t=3.2 df=8, SE of diff. 15 p=0.01, alpha>5% | 38% decr. SE of diff. 12% | \*\*\* mean diff. 84, SE of diff. 14, t=5.9 p=0.0004, alpha<5% | 67% decr. SE of diff. 11% |
| Proliferation  | BrdU-labeled RGLs | 83 (34) | 74 (38) | 78 (33) | F(2,20)=0.12 p=0.89 | -34 to 51 p=0.84 | 41% incr. to 61% decr. | -40 to 50 p=0.95 | 48% incr. to 60% decr. |
| BrdU-labeled ANPs | 2451 (707) | 2143 (548) | 1843 (444) | F(2,20)=2.0 p=0.17 | -380 to 996 p=0.47 | 15% incr. to 41% decr. | -122 to 1337 p=0.11 | 5% incr. to 55% decr. |
| Fraction of dividing RGLs from total RGL pool | BrdU RGLs / total RGLs | 1.3 % (0.7) | 1.3 % (0.6) | 1.3% (0.5) | - | - | - | - | - |
| Survival of the stem cell pool  | Total RGL cells | 6989 (2085) | 5790 (1029) | 5924 (784) | F(2,20)=1.7 p=0.21 | \*\*\* mean diff. 1199, SE of diff. 792, p=0.15 | 17% decr. SE of diff. 11 | \*\*\* mean diff. 1065, SE of diff. 842, p=0.23 | 15% decr. SE of diff. 12 |

\* Estimated for the whole DG volume, \*\* Dunnett’s test for CIs and correction for multiple comparisons, multiplicity adjusted p values; \*\*\* t-tests for each irradiated group vs. Sham, without assuming equal SD, correction for multiple comparisons using the Holm-Sidak method, with alpha=0.05.

# Table S3. Long-term effects of gamma-irradiation: 6 months post-exposure

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Cell type** | **Mean cells (SD)** | **t-test\*** |  **Sham vs. 5 Gy** | **Sham vs. 5 Gy** |
|  | **Sham** | **5 Gy** |  | **Absolute 95%CI of diff.** | **Relative 95% CI of diff. (% of Sham)** |
| Neurogenesis | DCX cells | 1974 (342) | 176 (80) | t=10.2 df=3.3 p=0.001 | 1269-2326 decr. | 9-117% decr. |
| Survival of the stem cell pool | Total RGL cells | 1210 (95) | 958 (192) | t=2.4 df=4.4 p=0.07 | 36 incr. to 540 decr. | %3 incr. to 44% decr. |
| 24-hr label-retaining | EdU-labeled RGLs | 32 (40) | 7 (14) | t=1.2 df=3.7 p=0.3168 | 36 incr. to 85 decr. | 113% incr. to 266% decr. |
| EdU-labeled ANPs | 491 (51) | 95 (85) | t=8.0 df=4.9 p=0.0005 | 268-524 decr. | 55% incr. to 107% decr. |
| 20-hr label-retaining | IdU-labeled RGLs | 28 (26) | 9 (13) | t=1.3 df=4.5 p=0.26 | 20 incr. to 57 decr. | 71% incr. to 204% decr. |
| IdU-labeled ANPs | 483 (143) | 88 (71) | t=5.0 df=4.4 p=0.0060 | 182-608 decr. | 38-126% decr. |
| 2-hr label-retaining | CldU-labeled RGLs | 10 (13) | 2 (5) | t=1.1 df=3.7 p=0.35 | 13 incr. to 28 decr. | 130% incr. to 280% decr. |
| CldU-labeled ANPs | 330 (190) | 61 (26) | t=2.8 df=3.1 p=0.06 | 30 incr. to 569 decr. | 9% incr. to 172% decr. |
| Total labeled RGLs | EdU+IdU+CldU | 69 (62) | 19 (26) | t=1.5 df=6 p=0.18 | 32 incr. to 134 decr. | 46% incr. to 194% decr. |
| Total labeled INPs | EdU+IdU+CldU | 1304 (133) | 244 (82) | t=6.8 df=6 p=0.0005 | 678-1443 decr. | 52-107% decr. |

\*Unpaired t test with Welch's correction, two-tailed p value with alpha=0.05.