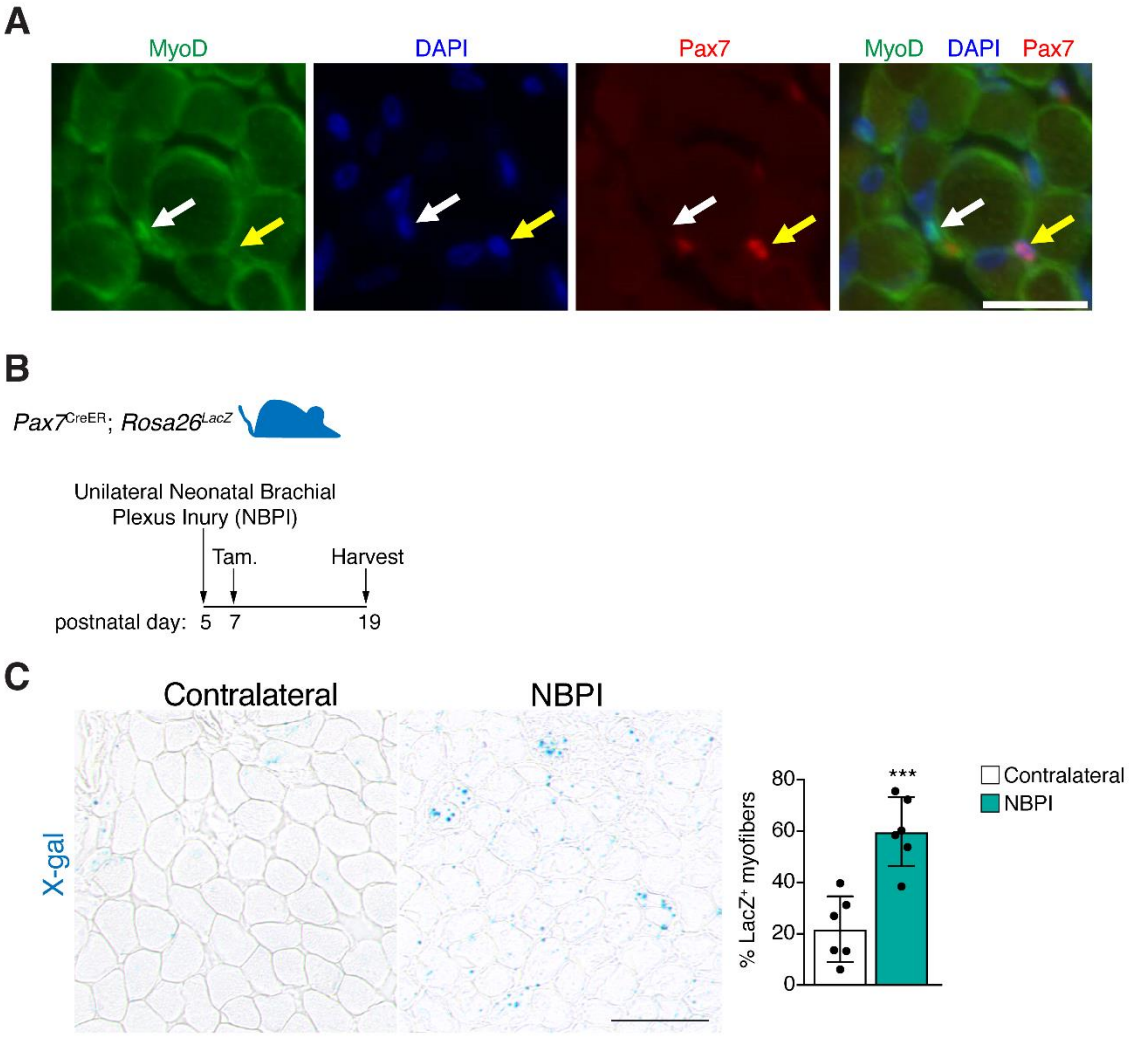
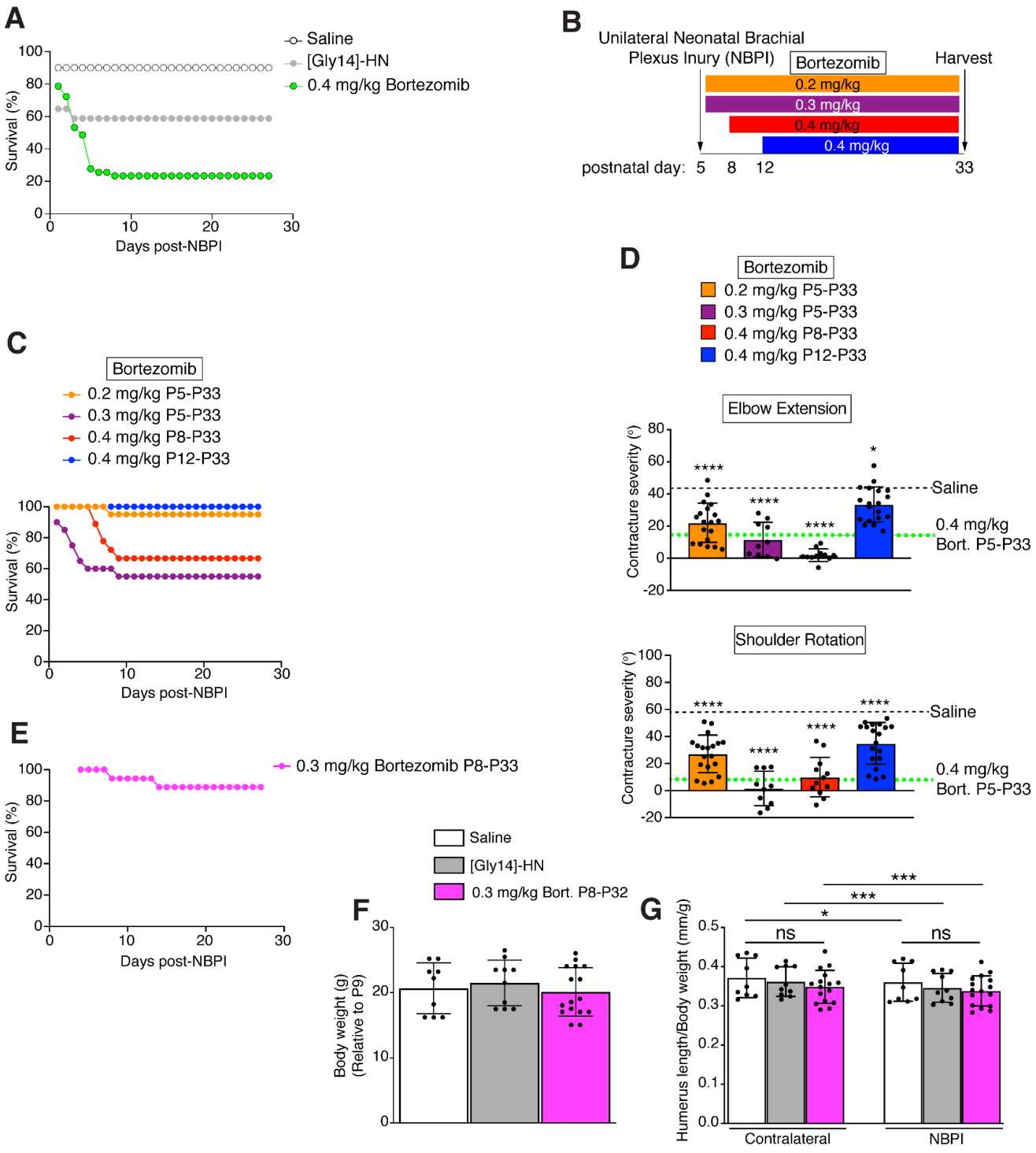
Supplementary Materials:



Supplemental Figure 1. Assessment of myonuclear accretion after NBPI. (**A**) Immunohistochemistry for MyoD and Pax7 in biceps 2 weeks after neonatal brachial plexus injury (NBPI). White arrows indicate a $MyoD^+$ $Pax7^-$ cell; yellow arrows indicate a $MyoD^-$ $Pax7^+$ cell. (**B**) Schematic showing use of *Pax7*^{CreER}; *Rosa26*^{LacZ} mice to label MuSCs at postnatal day 7 and track their incorporation into the myofiber. (**C**) Representative images (left) of X-gal stained contralateral and NBPI muscle. Quantification (right) of the percentage of $LacZ^+$ myofibers. Data are presented as mean ± SD. Statistical analysis performed with a paired, two-tailed Student's *t*-test. ***$P < 0.001$. Scale bar, 20 µm in (A), 50 µm in (C).



Supplemental Figure 2. Optimization of bortezomib dose and timing. (**A**) Survival of mice treated with saline, [Gly14]-HN, or 0.4 mg/kg bortezomib from P5-P33 (saline *n* = 9, [Gly14]-HN *n* = 10, 0.4 mg/kg bortezomib *n* = 11). (**B**) Experimental scheme to vary the timing and dose of bortezomib. (**C**) Percent of

surviving mice during the various bortezomib treatment regimens. (**D**) Severity of elbow (top) and shoulder (bottom) contractures after NBPI and treatment with bortezomib. The black dotted line is the average contracture severity from saline-treated animals and green dotted line is the average contracture severity from mice treated with 0.4 mg/kg bortezomib from P5-P33 (from Fig. 4c). Sample sizes for (C, D) are 0.2 mg/kg P5-P33 $n = 19$, 0.3 mg/kg P5-P33 $n = 10$, 0.4 mg/kg P8-P33 $n = 12$, 0.4 mg/kg P12-P33 $n = 19$. (**E**) Survival curve for the mice treated with 0.3 mg/kg bortezomib from P8-P33 ($n = 16$). (**F**) Body weight gain during treatment with saline, [Gly14]-HN, or 0.3 mg/kg bortezomib from P8-P33 (saline $n = 9$, [Gly14]-HN $n = 10$, 0.3 mg/kg bortezomib $n = 16$). (**G**) Humerus length normalized to body weight after treatment with saline, [Gly14]-HN, or 0.3 mg/kg bortezomib P8-P33 (saline $n = 9$, [Gly14]-HN $n = 10$, 0.3 mg/kg bortezomib $n = 16$), showing that humerus length is reduced by denervation but unaffected by bortezomib treatment. Data are presented as mean ± SD. Statistical analyses were performed in (D) with unpaired, two-tailed Student's *t*-tests comparing each treatment group to saline controls (from Fig. 4C), except bortezomib 0.04 mg/kg P12-P33 where Mann-Whitney *U*-test was used due to non-normally distributed data; with Mann-Whitney *U*-test in (F) due to non-normally distributed data; and with unpaired, two-tailed Student's *t*-test between groups and paired, two-tailed Student's *t*-tests between limbs of mice in each group in (G), except in comparisons involving the saline groups where Mann Whitney *U*-test and Wilcoxon signed rank test were used, respectively, due to non-normally distributed data in the saline-treated mice. Bonferroni corrections for multiple comparisons were performed in (G), and adjusted p-values are reported for those data. $*P < 0.05$, $***P < 0.001$, $****P < 0.0001$.