Supplemental Table 1. Baseline microCT metrics for Cx43$^{\Delta OCY}$ mice. Data is presented as mean ± SD. Columns not sharing a letter are significantly different by Sidak's post hoc following 2-way ANOVA. $ Significant main effect of sex; ^ Significant main effect of genotype; & Significant interaction of sex and genotype

	Metric	Female WT	Female Cx43$^{\Delta OCY}$	Male WT	Male Cx43$^{\Delta OCY}$
Epiphysis	TMD (g/cm^3)	0.813 ± 0.024^a	0.825 ± 0.035^a	0.810 ± 0.031^a	0.811 ± 0.036^a
	Tb.Th$^{\wedge}$ (mm)	0.089 ± 0.019^a	0.109 ± 0.024^b	0.081 ± 0.018^a	0.098 ± 0.026^b
	Tb.N$^{\$}$ (1/mm)	4.026 ± 0.406^a	3.924 ± 0.440^a	5.404 ± 0.499^b	5.629 ± 0.716^b
	Tb.Sp$^{\$}$ (mm)	0.208 ± 0.020^a	0.206 ± 0.034^a	0.123 ± 0.017^b	0.110 ± 0.020^b
Metaphysis	TMD (g/cm^3)	0.558 ± 0.059^a	0.569 ± 0.069^a	0.570 ± 0.058^a	0.553 ± 0.056^a
	Tb.Th$^{\wedge}$ (mm)	0.061 ± 0.014^a	0.071 ± 0.014^a	0.068 ± 0.012^a	0.076 ± 0.015^a
	Tb.N$^{\$\wedge\&}$ (1/mm)	2.559 ± 0.554^a	2.72 ± 0.644^a	4.147 ± 0.897^b	5.048 ± 0.960^c
	Tb.Sp$^{\$\&}$ (mm)	0.200 ± 0.038^a	0.223 ± 0.055^a	0.128 ± 0.042^b	0.098 ± 0.023^b
Diaphysis	TMD$^{\wedge}$ (g/cm^3)	1.134 ± 0.089^a	1.087 ± 0.077^a	1.148 ± 0.096^a	1.112 ± 0.090^a
	T.Ar$^{\$\wedge}$ (mm^2)	1.757 ± 0.139^a	2.499 ± 0.134^b	2.209 ± 0.283^c	3.049 ± 0.132^d
	Ct.Ar$^{\$\wedge}$ (mm^2)	0.859 ± 0.066^a	0.969 ± 0.083^b	1.008 ± 0.089^b	1.155 ± 0.170^c

Supplemental Table 2. Baseline microCT metrics for β-cat^{htΔOCY} mice. Data is presented as mean ± SD. Columns not sharing a letter are significantly different by Sidak's post hoc following 2-way ANOVA. $ Significant main effect of sex; ^ Significant main effect of genotype; & Significant interaction of sex and genotype

	Metric	Female WT	Female β-cat^{htΔOCY}	Male WT	Male β-cat^{htΔOCY}
Epiphysis	TMD$^{\$\wedge}$ (g/cm^3)	0.863 ± 0.033^{a}	0.844 ± 0.034^{a}	0.799 ± 0.031^{b}	0.785 ± 0.029^{b}
	Tb.Th$^{\$}$ (mm)	0.091 ± 0.013^{a}	0.088 ± 0.008^{a}	0.078 ± 0.012^{b}	0.076 ± 0.011^{b}
	Tb.N$^{\$\wedge}$ (1/mm)	4.006 ± 0.438^{a}	3.493 ± 0.474^{b}	5.075 ± 0.782^{c}	4.123 ± 0.652^{a}
	Tb.Sp$^{\$\wedge}$ (mm)	0.212 ± 0.022^{a}	0.236 ± 0.030^{b}	0.127 ± 0.021^{c}	0.164 ± 0.018^{d}
Metaphysis	TMD$^{\$}$ (g/cm^3)	0.567 ± 0.030^{a}	0.564 ± 0.027^{a}	0.531 ± 0.026^{b}	0.534 ± 0.021^{b}
	Tb.Th (mm)	0.067 ± 0.011^{a}	0.067 ± 0.010^{a}	0.064 ± 0.008^{a}	0.066 ± 0.008^{a}
	Tb.N$^{\$\wedge\&}$ (1/mm)	2.205 ± 0.454^{a}	1.735 ± 0.295^{a}	4.165 ± 0.894^{b}	2.969 ± 0.729^{b}
	Tb.Sp$^{\$\wedge}$ (mm)	0.250 ± 0.093^{ac}	0.333 ± 0.153^{a}	0.130 ± 0.061^{b}	0.196 ± 0.076^{bc}
Diaphysis	TMD$^{\$\wedge}$ (g/cm^3)	1.173 ± 0.042^{a}	1.148 ± 0.052^{a}	1.118 ± 0.067^{ab}	1.080 ± 0.068^{bc}
	T.Ar$^{\$}$ (mm^2)	1.768 ± 0.113^{a}	1.721 ± 0.144^{a}	2.281 ± 0.329^{b}	2.188 ± 0.185^{b}
	Ct.Ar$^{\$\wedge}$ (mm^2)	0.881 ± 0.056^{ac}	0.829 ± 0.066^{a}	1.022 ± 0.105^{b}	0.916 ± 0.057^{c}

Supplemental Table 3. Baseline microCT metrics for Cx43$^{\Delta OCY}$/β-cat$^{ht\Delta OCY}$ mice. Data is presented as mean ± SD. Columns not sharing a letter are significantly different by Sidak's post hoc following 2-way ANOVA. $ Significant main effect of sex; ^ Significant main effect of genotype; & Significant interaction of sex and genotype

	Metric	Female WT	Female Cx43$^{\Delta OCY}$/ β-cat$^{ht\Delta OCY}$	Male WT	Male Cx43$^{\Delta OCY}$/ β-cat$^{ht\Delta OCY}$
Epiphysis	TMD$^{\$}$ (g/cm^3)	0.796 ± 0.027^{a}	0.785 ± 0.026^{a}	0.767 ± 0.042^{b}	0.758 ± 0.037^{b}
	Tb.Th (mm)	0.064 ± 0.006^{a}	0.067 ± 0.008^{a}	0.061 ± 0.012^{a}	0.062 ± 0.014^{a}
	Tb.N$^{\$\wedge}$ (1/mm)	3.583 ± 0.370^{a}	3.749 ± 0.495^{a}	4.750 ± 0.654^{b}	5.200 ± 0.703^{b}
	Tb.Sp$^{\$}$ (mm)	0.201 ± 0.022^{a}	0.196 ± 0.021^{a}	0.122 ± 0.021^{b}	0.114 ± 0.017^{b}
Metaphysis	TMD$^{\$}$ (g/cm^3)	0.509 ± 0.025^{a}	0.500 ± 0.027^{a}	0.490 ± 0.031^{a}	0.481 ± 0.027^{a}
	Tb.Th (mm)	0.047 ± 0.005^{a}	0.049 ± 0.008^{a}	0.052 ± 0.008^{a}	0.050 ± 0.008^{a}
	Tb.N$^{\$}$ (1/mm)	2.243 ± 0.511^{a}	1.934 ± 0.516^{a}	4.101 ± 1.001^{b}	4.158 ± 0.937^{b}
	Tb.Sp$^{\$}$ (mm)	0.227 ± 0.042^{a}	0.520 ± 0.059^{a}	0.129 ± 0.034^{b}	0.124 ± 0.028^{b}
Diaphysis	TMD$^{\$\wedge}$ (g/cm^3)	1.103 ± 0.049^{a}	1.047 ± 0.047^{b}	1.063 ± 0.043^{b}	1.016 ± 0.033^{c}
	T.Ar$^{\$\wedge\&}$ (mm^2)	1.734 ± 0.159^{a}	2.348 ± 0.254^{b}	2.074 ± 0.235^{c}	2.969 ± 0.317^{d}
	Ct.Ar$^{\$}$ (mm^2)	0.799 ± 0.058^{a}	0.790 ± 0.070^{a}	0.938 ± 0.109^{b}	0.980 ± 0.135^{b}

Supplemental Table 4. Percent change from baseline values of microCT metrics for Cx43$^{\Delta OCY}$ mice following 21 days of HLS. Delta change values were analyzed via 3-way ANOVA. Data is presented as mean ± SD. $ Significant main effect of sex; ^ Significant main effect of genotype; % Significant main effect of HLS; ! Significant interaction of sex and genotype; # Significant interaction of sex and HLS; ~ Significant interaction of genotype and suspension; & Significant interaction of sex, genotype, and HLS

Region	Metric	Female WT Crl	Female WT HLS	Female Cx43$^{\Delta OCY}$ Crl	Female Cx43$^{\Delta OCY}$ HLS	Male WT Crl	Male WT HLS	Male Cx43$^{\Delta OCY}$ Crl	Male Cx43$^{\Delta OCY}$ HLS
Epiphysis	TMD$^{\%\wedge}$	2.217 ± 4.788	-4.723 ± 4.833	0.456 ± 2.251	-6.630 ± 4.701	1.000 ± 4.248	-6.750 ± 2.691	-1.34 ± 2.156	-7.658 ± 2.511
	Tb.Th$^{\%}$	-0.221 ± 16.164	-27.413 ± 13.267	-8.750 ± 17.214	-28.497 ± 16.006	1.702 ± 19.281	-31.908 ± 10.323	-7.915 ± 21.530	-36.118 ± 11.639
	Tb.N$^{\%\$\wedge\#\sim}$	-8.596 ± 10.663	-31.533 ± 13.948	-10.277 ± 6.797	-20.071 ± 9.113	-8.114 ± 8.604	-37.879 ± 12.811	-6.202 ± 6.567	-25.409 ± 7.253
	Tb.Sp$^{\%!\&}$	8.657 ± 9.181	28.184 ± 13.245	24.218 ± 21.646	23.584 ± 12.147	16.207 ± 26.232	40.205 ± 18.014	16.237 ± 23.757	45.957 ± 28.872
Metaphysis	TMD$^{\%\$}$	5.043 ± 4.961	-2.915 ± 6.220	4.916 ± 4.928	-3.664 ± 3.424	3.607 ± 6.174	-8.721 ± 4.303	-1.724 ± 10.396	-9.972 ± 11.058
	Tb.Th$^{\%\$}$	6.716 ± 20.825	-20.244 ± 21.477	0.679 ± 10.887	-20.861 ± 18.500	-2.751 ± 18.015	-32.126 ± 6.854	-14.616 ± 14.616	-35.808 ± 11.513
	Tb.N$^{\%\$\#}$	-26.483 ± 18.661	-45.279 ± 13.363	-24.248 ± 25.606	-39.969 ± 12.996	-14.729 ± 24.944	-42.495 ± 17.259	-19.393 ± 11.468	-46.075 ± 10.641
	Tb.Sp$^{\%\$}$	49.576 ± 54.159	72.714 ± 40.588	63.921 ± 47.263	68.050 ± 51.972	24.403 ± 55.172	66.861 ± 55.586	44.842 ± 49.703	99.702 ± 59.379
Diaphysis	TMD	-0.108 ± 2.110	-2.453 ± 2.640	-1.269 ± 1.931	-3.603 ± 2.394	-0.555 ± 3.293	-3.222 ± 2.458	-1.358 ± 2.807	-3.171 ± 2.850
	T.Ar$^{\%}$	1.752 ± 2.192	0.75 ± 1.427	0.624 ± 1.739	-0.057 ± 2.928	2.373 ± 2.653	-0.885 ± 4.458	1.889 ± 1.966	0.552 ± 0.727
	Ct.Ar$^{\%\wedge}$	-0.222 ± 7.433	-13.543 ± 8.087	-8.490 ± 7.143	-18.307 ± 7.683	1.119 ± 7.304	-10.490 ± 5.947	-1.430 ± 9.099	-13.241 ± 5.095

Supplemental Table 5. Percent change from baseline values of microCT metrics for β-cat^{htΔOCY} mice following 21 days of HLS. Delta change values were analyzed via 3-way ANOVA. Data is presented as mean ± SD. $ Significant main effect of sex; % Significant main effect of HLS; # Significant interaction of sex and HLS; & Significant interaction of sex, genotype, and HLS

Region	Metric	Female WT Crl	Female WT HLS	Female β-cat^{htΔOCY} Crl	Female β-cat^{htΔOCY} HLS	Male WT Crl	Male WT HLS	Male β-cat^{htΔOCY} Crl	Male β-cat^{htΔOCY} HLS
Epiphysis	TMD$^{\%\&}$	1.879 ± 3.788	-6.334 ± 1.779	2.369 ± 3.710	-6.953 ± 3.644	1.550 ± 3.915	-8.250 ± 4.237	-1.914 ± 3.425	-5.133 ± 2.842
	Tb.Th$^{\%\$\&}$	3.166 ± 4.758	-20.840 ± 5.556	4.967 ± 5.618	-23.644 ± 9.190	-1.266 ± 14.956	-37.950 ± 7.545	-9.190 ± 9.673	-28.738 ± 12.021
	Tb.N$^{\%\$\#}$	-6.738 ± 6.389	-29.410 ± 9.456	-9.510 ± 6.060	-33.529 ± 11.313	-2.812 ± 8.210	-39.725 ± 7.769	-5.552 ± 9.063	-44.581 ± 12.234
	Tb.Sp$^{\%}$	4.4933 ± 8.175	22.898 ± 10.187	10.228 ± 6.994	28.112 ± 13.727	9.881 ± 10.153	53.497 ± 19.383	8.877 ± 8.786	36.846 ± 7.702
Metaphysis	TMD$^{\%\&}$	0.897 ± 3.395	-2.282 ± 7.545	1.876 ± 3.005	-6.672 ± 7.540	2.221 ± 5.897	-8.577 ± 11.186	-1.384 ± 4.520	-4.145 ± 5.650
	Tb.Th$^{\%\$}$	8.893 ± 18.879	-15.330 ± 18.472	3.564 ± 8.724	-21.700 ± 16.806	-3.738 ± 12.077	-30.936 ± 19.229	-8.134 ± 10.044	-28.113 ± 11.173
	Tb.N$^{\%\$\#}$	-13.132 ± 7.596	- 23.44 ± 21.610	-11.339 ± 8.761	-33.789 ± 17.993	-19.778 ± 6.976	-44.376 ± 10.307	-14.269 ± 9.917	-54.027 ± 12.032
	Tb.Sp$^{\%}$	10.424 ± 17.533	57.713 ± 44.396	19.389 ± 14.246	48.607 ± 35.898	17.931 ± 21.495	65.631 ± 29.421	16.9335 ± 9.329	64.295 ± 28.209
Diaphysis	TMD$^{\%}$	-0.071 ± 0.828	-3.1985 ± 2.643	-0.131 ± 2.036	-3.840 ± 2.212	-0.381 ± 4.027	-1.017 ± 3.671	-1.361 ± 3.249	-3.508 ± 1.986
	T.Ar	2.453 ± 2.209	0.678 ± 0.725	2.678 ± 2.782	1.591 ± 2.242	1.766 ± 1.575	1.486 ± 2.042	2.054 ± 2.779	1.293 ± 1.231
	Ct.Ar$^{\%}$	3.165 ± 7.226	-16.367 ± 1.488	1.646 ± 10.293	-15.152 ± 10.613	1.166 ± 4.607	-11.869 ± 6.165	2.149 ± 8.794	-10.119 ± 8.858
	Cs.Th$^{\%\#}$	1.675 ± 6.422	-17.967 ± 1.867	0.731 ± 9.035	-16.760 ± 9.254	0.152 ± 3.333	-12.690 ± 7.425	0.608 ± 7.050	-10.899 ± 7.252

Supplemental Table 6. Percent change from baseline values of microCT metrics for Cx43$^{\Delta OCY}$/β-cat$^{ht\Delta OCY}$ mice following 21 days of HLS. Delta change values were analyzed via 3-way ANOVA. Data is presented as mean ± SD. $ Significant main effect of sex; ^ Significant main effect of genotype; % Significant main effect of HLS; ! Significant interaction of sex and genotype; # Significant interaction of sex and HLS; & Significant interaction of sex, genotype, and HLS

Region	Metric	Female WT Crl	Female WT HLS	Female Cx43$^{\Delta OCY}$/β-cat$^{ht\Delta OCY}$ Crl	Female Cx43$^{\Delta OCY}$/β-cat$^{ht\Delta OCY}$ HLS	Male WT Crl	Male WT HLS	Male Cx43$^{\Delta OCY}$/β-cat$^{ht\Delta OCY}$ Crl	Male Cx43$^{\Delta OCY}$/β-cat$^{ht\Delta OCY}$ HLS
Epiphysis	TMD$^{\%}$	3.733 ± 4.397	-4.840 ± 1.921	3.508 ± 5.487	-3.203 ± 5.614	1.063 ± 4.931	-2.898 ± 5.521	0.171 ± 6.620	-3.273 ± 7.491
	Tb.Th$^{\%\$\#}$	15.285 ± 11.332	-21.039 ± 7.141	17.171 ± 15.934	-25.401 ± 9.968	0.417 ± 23.677	-22.497 ± 22.243	2.946 ± 22.625	-16.353 ± 20.661
	Tb.N$^{\%\$}$	0.177 ± 10.878	-39.502 ± 14.204	6.649 ± 9.893	-37.556 ± 12.351	-2.962 ± 27.249	-44.349 ± 17.650	1.872 ± 11.214	-36.015 ± 16.744
	Tb.Sp$^{\%\$!\&}$	15.086 ± 6.108	29.537 ± 7.669	11.253 ± 10.814	39.2885 ± 7.561	18.116 ± 16.516	63.073 ± 27.682	14.573 ± 11.958	40.559 ± 26.642
Metaphysis	TMD$^{\%}$	5.396 ± 9.100	-2.768 ± 4.247	6.361 ± 5.396	-1.365 ± 9.994	4.748 ± 8.624	-3.842 ± 9.326	3.114 ± 8.048	-4.116 ± 10.617

	Tb.Th%$&	9.969 ± 12.732	-12.725 ± 10.788	21.167 ± 15.544	-20.529 ± 12.661	7.628 ± 15.913	-24.606 ± 18.731	7.442 ± 14.449	-20.700 ± 18.372
	Tb.N%$	-12.798 ± 12.767	-45.383 ± 10.744	-3.216 ± 19.351	-52.512 ± 8.644	-23.012 ± 12.891	-39.807 ± 15.765	-20.290 ± 19.456	-50.389 ± 19.805
	Tb.Sp%$^	19.041 ± 31.145	49.616 ± 26.011	32.424 ± 33.156	63.679 ± 26.210	22.7700 ± 24.543	59.770 ± 38.308	23.104 ± 30.089	78.449 ± 59.069
Diaphysis	TMD%$	0.013 ± 4.477	-1.248 ± 3.131	1.145 ± 4.518	-2..425 ± 4.804	1.941 ± 5.871	1.229 ± 6.797	4.346 ± 4.887	-0.012 ± 5.529
	T.Ar%#	2.771 ± 0.917	1.403 ± 0.389	4.898 ± 5.189	1.152 ± 2.594	2.084 ± 2.257	1.715 ± 1.142	2.514 ± 2.380	2.040 ± 0.868
	Ct.Ar%	3.337 ± 2.585	-12.850 ± 3.388	3.484 ± 4.980	-17.906 ± 4.678	1.612 ± 4.228	-11.201 ± 7.168	1.693 ± 7.578	-8.838 ± 7.858
	Cs.Th%	2.932 ± 3.313	-13.324 ± 4.365	4.224 ± 7.641	-19.100 ± 5.224	2.376 ± 6.596	-11.576 ± 9.250	4.261 ± 10.586	-8.817 ± 8.314