

SUPPLEMENTARY TABLES

Supplementary Table 1. Pearson correlation analysis of 18 mo old mice.

Parameters	Final body weight		Body weight change		BMAT/TA		Heart weight		Run distance	
	<i>r</i>	<i>p</i> -value	<i>r</i>	<i>p</i> -value	<i>r</i>	<i>p</i> -value	<i>r</i>	<i>p</i> -value	<i>r</i>	<i>p</i> -value
Final Body Weight			0.85	6.02E-10	0.61	2.36E-04	0.69	1.03E-05		
BW Change	0.85	6.02E-10			0.65	6.21E-05	0.95	2.93E-17		
BMAT/TA	0.61	2.36E-04	0.65	6.21E-05			0.53	1.64E-03		
Heart Weight	0.69	1.03E-05	0.95	2.93E-17	0.53	1.64E-03				
Heart Weight/BW	-0.63	8.09E-05	-0.63	7.90E-05	-0.57	6.05E-04	-0.48	4.96E-03		
SOL_Area	0.51	1.10E-02	0.42	4.27E-02			0.44	3.02E-02		
SOL_Muscle Mass/BW			-0.46	6.74E-03						
EDL_Muscle Mass/BW	-0.81	7.99E-09	-0.80	3.06E-08	-0.46	8.80E-03	-0.73	1.52E-06		
EDL_Static CM									-0.54	2.44E-02
EDL_Contracted CM									-0.62	8.33E-03
EDL_Total Fiber Number	0.46	2.43E-02							0.62	3.00E-02
EDL_Type IIX			-0.52	8.76E-03			-0.57	3.50E-03		
EDL_Submax_Fatigue	-0.46	8.79E-03	-0.43	1.67E-02						
EDL_Max_Fatigue	-0.40	2.5E-02	-0.42	1.91E-02						
Empty Lacunae									-0.69	3.91E-02
Co.Th	0.45	9.34E-03	0.41	1.88E-02						
Co.Area	0.61	1.67E-04	0.60	2.31E-04	0.41	1.95E-02	0.52	2.07E-03		
Ultimate Load									-0.79	1.09E-02
Total Work to failure			-0.55	2.22E-02			-0.61	8.82E-03		
MOI	0.50	2.76E-02							0.69	3.79E-02

Pearson correlation analysis of 22 mo old mice.

Parameters	Final body weight		Body weight change		BMAT/TA		Heart weight		Run distance	
	<i>r</i>	<i>p</i> -value	<i>r</i>	<i>p</i> -value	<i>r</i>	<i>p</i> -value	<i>r</i>	<i>p</i> -value	<i>r</i>	<i>p</i> -value
BW Change							-0.57	1.99E-02		
BMAT/TA							-0.53	3.54E-02		
Heart Weight/BW			-0.57	1.99E-02	-0.53	3.54E-02				
Total Lateral Heart Width					-0.65	6.60E-03	0.74	1.10E-03		
Left Ventricular Wall Thickness							0.59	1.54E-02		
SOL_Static CM	0.63	1.99E-02								
SOL_Contracted CM	0.64									
SOL_Max_Specific Force					0.52	4.05E-02				
SOL_Submax_Rate of Force Development	0.64									
SOL_Max_Zero Calcium	-0.64									
SOL_Submax_Zero Calcium	-0.68									
EDL_Static CM	0.69									
EDL_Contracted CM	0.82									
EDL_Max_Absolute Force	0.62									
EDL_Max_Specific Force	0.56									

EDL_Max_Rate of Relaxation	0.61					
EDL_Max_Rate of Force Development	0.60					
EDL_Submax_Rate of Force Development	0.55			-0.54	3.27E-02	
EDL_Max_Fatigue				-0.55	2.81E-02	
EDL_Max_Zero Calcium		0.58	1.87E-02			
EDL_Submax_Zero Calcium				-0.62	9.79E-03	
EDL_Max_Recovery from Fatigue		-0.58	1.91E-02	-0.53	3.43E-02	
EDL_Submax_Recovery from Fatigue						-0.83 1.11E-02
Tb. BV/TV	0.71					
Tb.Th				-0.67	4.56E-03	
Tb.N	0.72					
Tb.Sp	-0.62					
Tb.Conn.D	0.80					
Co.Th				-0.55	2.82E-02	
Nanoindentation_Young's Modulus	0.85					
Nanoindentation_Hardness	0.83	0.71	4.92E-02			

Supplementary Table 2. TUNEL assay of femurs from LBW/HBW mice with or without 6 mo endurance exercise.

GROUP	Category I (%)	Category II (%)	Category III (%)	Category VI (%)
CTRL				
CBW	35.0 ± 11.1 (23.7–55.2)	30.3 ± 5.7 (23.9–38.7)	27.4 ± 10.1 (12.2–42.1)	7.2 ± 5.5 (0.7–16.9)
LBW	40.2 ± 10.3 (31.8–55.2)	29.8 ± 7.0 (23.9–38.7)	23.7 ± 12.9 (12.2–42.1)	6.3 ± 7.3 (0.7–16.9)
HBW	29.9 ± 10.6 (23.7–45.7)	30.8 ± 5.2 (26.3–36.5)	31.1 ± 6.0 (24.9–39.4)	8.2 ± 3.9 (2.8–12.1)
VWR				
CBW	34.1 ± 17.0 (11.8–59.1)	28.5 ± 8.4 (17.7–42.9)	27.0 ± 6.6 (14.5–34.8)	10.4 ± 8.4 (1.4–25.9)
LBW	25.0 ± 10.7 (11.8–36.0)	27.4 ± 9.4 (17.7–37.0)	34.5 ± 2.6 (29.1–34.8)	16.1 ± 8.3 (6.4–25.9)
HBW	41.4 ± 18.6 (17.0–59.1)	29.4 ± 8.5 (22.4–42.9)	23.5 ± 6.9^{p=0.06} (14.5–31.3)	5.7 ± 5.5 (1.4–13.2)

Data are mean ± SD (range). Abbreviations: CTRL: control group; VWR: voluntary wheel running group; CBW: Combined groups; LBW: Low body weight group; HBW: High body weight group; Category I: Live, Category II: Dying, Category III: Apoptotic, Category VI: Empty lacuna. No significant differences were found compared to the corresponding CTRL, but a decreased trend of category III was observed in HBW/VWR mice ($p = 0.06$).

Supplementary Table 3. Femoral mechanical properties in LBW/HBW mice with or without 6 mo endurance exercise.

GROUP	18 mo old	
	CTRL	VWR
CBW	<i>N</i> = 8	<i>N</i> = 9
LBW	<i>N</i> = 4	<i>N</i> = 4
HBW	<i>N</i> = 4	<i>N</i> = 5
ULTIMATE LOAD (N)		
CBW	12.7 ± 2.5 (10.2–16.9)	13.1 ± 3.4 (7.0–17.8)
LBW	12.8 ± 3.0 (10.2–16.9)	13.6 ± 1.6 (12.4–15.8)
HBW	12.6 ± 2.3 (10.2–14.9)	12.8 ± 4.6 (7.0–17.8)
ELASTIC STIFFNESS (N/mm)		
CBW	57.3 ± 13.6 (43.0 – 82.4)	52.5 ± 14.5 (19.9–67.4)
LBW	54.2 ± 11.3 (43.0–69.9)	50.1 ± 21.9 (19.9–67.4)
HBW	60.4 ± 16.7 (46.4–82.4)	54.4 ± 7.1 (45.5–63.0)
ELASTIC MODULUS (GPa)		
CBW	6.0 ± 1.8 (4.9–10.1)	5.6 ± 1.6 (2.8–7.9)
LBW	6.4 ± 2.4 (5.0–10.1)	5.5 ± 2.2 (2.8–7.9)
HBW	5.6 ± 0.9 (4.9–7.0)	5.7 ± 1.3 (4.6–7.7)
MOMENT OF INERTIA (mm⁴)		
CBW	0.16 ± 0.06 (0.10–0.27)	0.14 ± 0.02 (0.11–0.17)
LBW	0.13 ± 0.02 (0.11–0.16)	0.13 ± 0.02 (0.11–0.16)
HBW	0.18 ± 0.07 (0.10–0.27)	0.15 ± 0.02 (0.13–0.17)

Data are mean ± SD (range). Abbreviations: CTRL: control group; VWR: voluntary wheel running group; CBW: Combined groups; LBW: Low body weight group; HBW: High body weight group; No significant differences were found compared to the corresponding CTRL.

Supplementary Table 4. Nanoindentation analysis of femurs from mice with or without long-term endurance exercise.

PARAMETER	18 mo old		22 mo old	
	CTRL (<i>N</i> = 4)	VWR (<i>N</i> = 4)	CTRL (<i>N</i> = 4)	VWR (<i>N</i> = 4)
Hardness (Gpa)	1.1 ± 0.6 (0.3–1.6)	1.6 ± 0.2 (1.3–1.7)	1.1 ± 0.6 (0.3–1.6)	0.4 ± 0.4 (0.2–1.0)
Young's modulus (GPa)	21.7 ± 12.6 (4.7–33.6)	30.2 ± 3.4 (25.4–33.4)	21.8 ± 11.8 (4.7–30.3)	7.4 ± 5.6 (4.3–15.8)

Abbreviations: CTRL: control group; VWR: voluntary wheel running group. No significant differences were found when compared to the corresponding CTRL.