Fig. S1. Absolute and specific submaximal forces in the unfatigued state were unaltered in *Tfam* KO mice. Absolute (left panels) and specific (right panels) force production in response to 20 Hz stimulation. WT-11w, *n*=13; *Tfam* KO-11w, *n*=13; WT-14w, *n*=11; *Tfam* KO-14w, *n*=10. Data presented as individual values and mean±s.e.m. Significant difference *P*<0.05 (two-way ANOVA with Sidak’s post hoc test).
**Fig. S2. Absolute force decreased more rapidly during exercise in Tfam KO mice.** *In vivo* absolute force of the plantar flexor muscles during the fatiguing stimulation protocol at 11 weeks (left panel) and 14 weeks (right panel) in WT and Tfam KO mice. WT-11w, n=13; Tfam KO-11w, n=13; WT-14w, n=11; Tfam KO-14w, n=10. Values are mean±s.e.m. Significant difference *P*<0.05, **P**<0.01 and ***P**<0.001 (two-way ANOVA with repeated measures on contraction number and Tukey’s post hoc test).
Table S1. Metabolites at rest and at the end of the 10 min recovery period post-exercise in WT and Tfam KO mice.

| Metabolites                  | 11 weeks | 14 weeks |
|------------------------------|----------|----------|
|                              | WT       | Tfam KO  | WT       | Tfam KO  |
| [PCr]_rest (%)               | 100      | 100      | 100      | 100      |
| [PCr]_end recovery (%)       | 93±2     | 81±2***  #  | 95±2     | 78±5*** ### |
| Pi/(PCR+Pi)_rest             | 0.07±0.01| 0.17±0.01| 0.08±0.01| 0.25±0.04|
| Pi/(PCR+Pi)_end recovery     | 0.14±0.02| 0.32±0.02*** ### $ | 0.12±0.02| 0.42±0.04*** ### $$ |

WT-11w, n=13; Tfam KO-11w, n=13; WT-14w, n=11; Tfam KO-14w, n=9. Values are mean±SEM. Significantly different from rest (same age and same genotype) *P<0.05 and ***P<0.001. Significant difference between genotypes (same age and same condition) ##P<0.01 and ###P<0.001. Significant difference between ages (same genotype and same condition) $P<0.05. One-way ANOVA and Tukey’s post hoc test for all comparisons. PCr, phosphocreatine; Pi, inorganic phosphate.