**Differences in mitochondrial fatty acid utilization and respiratory complex characteristics between meat-type and laying-type chickens**

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[Background] Skeletal-muscle growth rate is a major feature differentiating　between meat-type and laying-type chickens. Substantial ATP quantity is required during skeletal-muscle formation, wherein mitochondrial oxidative phosphorylation (OXPHOS) plays an important role. Our previous investigation demonstrated that meat-type chickens exhibited higher efficiency of OXPHOS in glycolytic muscle mitochondria provided with succinate, compared with laying-type chickens. [Objectives] This study evaluated mitochondrial respiratory capacity in the presence of different respiratory substrates as well as respiratory complex proportion and supercomplex (SC) formation levels, each of which affects OXPHOS efficiency, to investigate the relation between skeletal-muscle growth and mitochondrial characteristics. [Materials & Methods] The Pectoralis superficialis muscle (type IIB, glycolytic) was excised from 7-week-old male meat-type (Ross) and laying-type chickens (WLH), from which mitochondria were isolated. O2 consumption was evaluated in mitochondria provided with pyruvate (NADH-linked), succinate (FADH2-linked), palmitoyl-CoA (CPT1-dependent), or palmitoyl-carnitine (CPT1-independent) together with malate. Mitochondria were solubilized with either n-dodecyl-β-D-maltoside or digitonin, following which blue-native polyacrylamide gel electrophoresis (BN-PAGE) was conducted to determine individual respiratory complex proportion (C-I, -II, -III, -IV, -V) or SC formation levels.[Results] In the mitochondria incubated with palmitoyl-CoA, O2 consumption was higher in the laying-type chickens than the meat-type, while the difference was not observed in the mitochondria provided with the other substrates. C-III and C-V proportions and SC formation levels were higher in the laying-type chickens than in the meat-type. [Conclusions] The study showed that laying-type chickens exhibited a higher fatty acid oxidation and greater proportion of respiratory complexes in glycolytic muscle mitochondria than the meat-type chickens, which might be related to slower glycolytic muscle development.