

AGE-RELATED CHANGES IN INDIVIDUAL MUSCLE MITOCHONDRIAL PROPERTIES ARE OBSERVED BY CAPILLARY ELECTROPHORESIS WITH LASER-INDUCED FLUORESCENCE DETECTION

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In this report, single type I (soleus) and type IIb (gastrocnemius) fibers from skeletal muscle cross-sections of both young and old F344 rats were directly sampled and analyzed by capillary electrophoresis (CE) with laser-induced fluorescence detection (LIF). Due to its sensitivity and separation power, this technique can analyze individual organelles in nanoliter size samples. Here, we used CE-LIF to count mitochondria, measure chemical content, and describe their electrophoretic behavior in individual organelles in the same individual fiber sampled in three different serial cross sections. The results show that type IIb fibers from young rats contain at least twice as many mitochondria compared to individual fibers from old rats. For type I fibers, young rats have at least 10 times more mitochondria as compared to individual fibers from old rats. The number of mitochondria in both fiber types (I and IIb) is reduced with age. The relative amount of cardiolipin content in each mitochondrion is determined by fluorescently labeling organelles with 10-N-nonyl acridine orange which is a mitochondrion selective probe. Fluorescence intensity shows that type I fibers from young rats contain mitochondria with more cardiolipin as compared to type I fibers from old rats. Mitochondria electrophoretic mobility that is related to the electrical charge of the organelle also shows the heterogeneity between the fiber types for young and old rats. The meaning of electrophoretic changes is not presently understood. This report points to the possible use of CE-LIF in studying the mechanism(s) underlying the reduced aerobic capacity with age.