

# Investigating the Role of Giant Mitochondria in Aging

Edgar A. Arriaga, Marian Navratil, Juan Feng, Xin Xu, Vrstislav Kostal

Department of Chemistry, University of Minnesota  
Minneapolis, MN, USA.

While there is ample evidence that mitochondrial dysfunction plays a pivotal role in human aging, the mechanisms underlying such a role have not been elucidated. One of the complications in solving such a puzzle has been the coexistence of mitochondrial subpopulations even within the same cell, which impedes the determination of chemical, biochemical, and physiological properties of each mitochondrial subtype. Giant mitochondria belong to a subtype that is characterized by morphological alterations and several-fold size increase and that becomes highly represented in aging postmitotic tissue, such as skeletal muscle. At the present time, the properties of giant mitochondria remain unknown or cannot be directly measured in mixtures of isolated normal and giant mitochondria. In this presentation we will describe cell engineered models and highly sensitive bioanalytical methods that are being developed to investigate the properties of giant mitochondria. Results from these studies have already revealed that giant mitochondria do not exchange material, have low membrane potential, and likely have altered proteomes. The applications of these methods to investigate mitochondrial properties in aging skeletal muscle will be highlighted.