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Protein and organelle turnover is critical for cellular homeostasis and is predominantly mediated by autophagy. Disruptions in autophagy lead to the accumulation of dysfunctional organelles, such as the mitochondria. p62 (SQSTM1) is a selective autophagy chaperone protein which targets protein aggregates and damaged organelles to autophagosomes for degradation. Specifically in macrophages, p62 deficiency leads to the improper degradation of unnecessary material, leading to an inflammatory response through IL-1φsecretion and apoptosis, which are phenotypes characteristic of atherosclerosis. Herein we hypothesize that the accumulation of dysfunctional mitochondria in p62 deficiency is a mechanism which drives these phenotypes. In p62 knock-out (p62 KO) macrophages, we observed increased mitochondrial size, lower oxygen consumption, and decreased ATP production, suggesting a vital role for p62 in proper mitochondrial function. Our current focus is to define the changes in mitochondria-related cellular pathways, such as mitochondrial fusion/fission, glucose metabolism, mitochondrial protein transport, and apoptosis in p62 KO macrophages. We examined mRNA levels of proteins involved in those pathways using quantitative PCR. Our preliminary analysis suggests that p62 KO macrophages express glycolysis and mitochondrial fission genes at lower levels. In future experiments, we will validate our results on the protein level by Western blotting and test whether observed mitochondrial deficiency is the cause of induced IL-1β secretion and apoptosis in p62 KO macrophages. Taken together, our data suggest that p62 facilitates maintaining healthy mitochondria, and we hypothesize that mitochondrial dysfunction is the main cause of induced inflammation and apoptosis in p62 KO macrophages.