Adaptive responses of mitochondria to mild copper deprivation involve changes in morphology, OXPHOS remodeling and bioenergetics

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Copper is an essential cofactor of complex IV of the electron transfer chain, and it is directly involved in the generation of mitochondrial membrane potential. Its deficiency induces the formation of ROS, large mitochondria and anemia. Thus, there is a connection between copper metabolism and bioenergetics, mitochondrial dynamics and erythropoiesis. Copper depletion might end in cellular apoptosis or necrosis. However, before entering into those irreversible processes, mitochondria may execute a series of adaptive responses. Mitochondrial adaptive responses (MAR) may involve multiple and diverse mechanisms for preserving cell life, such as mitochondrial dynamics, OXPHOS remodeling and bioenergetics output. In this study, a mild copper deficiency was produced in an animal model through intraperitoneal injections of bathocuproine disulfonate in order to study the MAR. Under these conditions, a new type of mitochondrial morphology was discovered in the liver. Termed the "butternut squash