Real-Time Monitoring of Organellar Redox Events in Tumorigenic versus Non-Tumorigenic Cells

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Thiol redox homeostasis is central to the control of cell fate and is associated with various abnormal biochemical processes. Our research project aims to validate protocols and evaluate the performance of the GFP-based redox sensors when applied to cancer. We demonstrated that the sensor targeted to the ER of non-tumorigenic and tumorigenic cells is equally oxidized, while it is fully reduced in the cytosol. Our data revealed that mitochondrial as well as cytosolic redox homeostasis of mammalian cells is capable of restoring a reduced steady state redox environment within minutes after an acute oxidative insult is removed. We observed distinct oxidative responses of mitochondrial sensors expressed in isogenic porcine fibroblast 161-p53 and 161+p53 cancer cells after depletion of the glutathione pool with buthionine sulfoximine. This observation implies that the sensitivity of the sensor expressed in mitochondria of cancer cells exposed to glutathione depletion depends on alterations in p53 expression.