

THE RELATIONSHIP OF NADH FLUORESCENCE LIFETIME AND MITOCHONDRIAL FUNCTION IN THE EARLY STAGE OF STAUROSPORINE-INDUCED APOPTOSIS

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Abstract: Mitochondria-mediated apoptosis involves a series of biochemical events including mitochondrial membrane potential (MMP) disruption, cytochrome *c* release, and various caspase activation. We have previously reported that NADH fluorescence lifetime significantly increased to the value of bound NADH fluorescence lifetime (~2-3 ns) immediately (5-15 min) after 1 μ M staurosporine (STS)-induced mitochondria-mediated apoptosis. The results suggested that this increased NADH fluorescence lifetime possibly related to mitochondrial function changes and may be a potential noninvasive optical probe for early cell death detection. In this study, we investigated the role of NADH fluorescence lifetime in the early phase of apoptosis and its relation with MMP and intracellular ATP level.

Results: After HeLa cell was treated with a lower dose (50 nM) STS, NADH fluorescence lifetime gradually increased up to 2 hours (Figure 1). This increased lifetime indicates that the

amounts of bound NADH increased with time. MMP was observed to increase at 8 hours then decreased to 50% at 48 hours after treatment. The intracellular ATP was observed to deplete to 50% at 24 hours after STS induction. Similar results were observed in H1299 cell line with 75 nM STS induction. The results suggested that NADH fluorescence lifetime changed before the dysfunction of mitochondria in oxidative phosphorylation

including MMP disruption and ATP depletion. NADH fluorescence lifetime may play a role in detecting mitochondrial function changes at the early stage of cell death.

