Mitochondrial Quality and Membrane Potential Detection

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A large number of studies have shown that mitochondria are closely related to apoptosis, in which the decrease of mitochondrial transmembrane potential (MMP) is considered one of the earliest events in the cascade of apoptosis. It occurs before the appearance of the characteristics of nuclear apoptosis (chromatin condensation, DNA fragmentation). Once the mitochondrial transmembrane potential collapses, apoptosis is irreversible.

JC-1 has two states of monomer and polymer, and their emission spectra are different. In normal cells, the membrane potential of mitochondria is higher, and JC-1 aggregates in the matrix of mitochondria to form polymers, which can produce red fluorescence. In the early stage of apoptosis, the mitochondrial membrane potential decreases and JC-1 could not accumulate in the mitochondrial matrix. At this time, JC-1 is a monomer and could produce green fluorescence.

The decrease of cell membrane potential can be detected by the transformation of JC-1 from red fluorescence to green fluorescence, and the change of JC-1 fluorescence color can be used as an early detection index of apoptosis. The relative ratio of red and green fluorescence is often used to measure the proportion of mitochondrial depolarization.

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https://www.mitochondriasci.com/detection-of-mitochondrial-quality-and-membrane-potential.html

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