Apoptosis

(/ˌæ.pəp'toʊ.sɪs/; from Ancient Greek ἀπό apo, “away from” and πτῶσις ptōsis, “falling”) is the process of programmed cell death (PCD) that may occur in multicellular organisms.

Biochemical events lead to characteristic cell changes (morphology) and death. These changes include blebbing, cell shrinkage, nuclear fragmentation, chromatin condensation, and chromosomal DNA fragmentation.

In contrast to necrosis, which is a form of traumatic cell death that results from acute cellular injury, in general apoptosis confers advantages during an organism's lifecycle. For example, the separation of fingers and toes in a developing human embryo occurs because cells between the digits apoptose. Unlike necrosis, apoptosis produces cell fragments called apoptotic bodies that phagocytic cells are able to engulf and quickly remove before the contents of the cell can spill out onto surrounding cells and cause damage.

Between 50 and 70 billion cells die each day due to apoptosis in the average human adult. For an average child between the ages of 8 and 14, approximately 20 billion to 30 billion cells die a day.

Research in and around apoptosis has increased substantially since the early 1990s. In addition to its importance as a biological phenomenon, defective apoptotic processes have been implicated in an extensive variety of diseases. Excessive apoptosis causes atrophy, whereas an insufficient amount results in uncontrolled cell proliferation, such as cancer.

There are several methods to detect apoptosis using cleaved caspase-3 and each harbors its own advantages and disadvantages.

Inhibitor of apoptosis