CONCEPT: CONTROL OF CELL DEATH

Overview

● **Apoptosis** is the process of _____ cell death

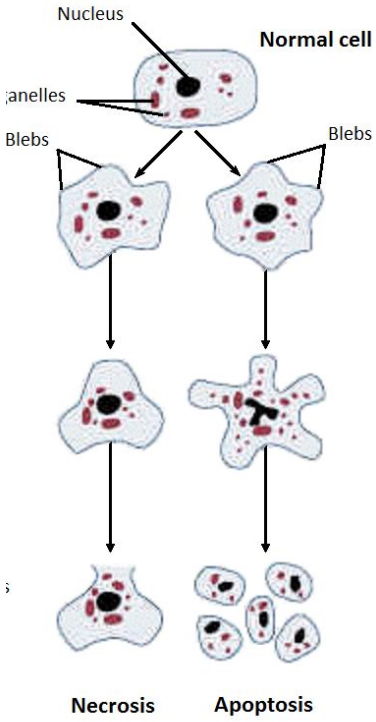
□ Important because it balances cell division

□ It's regulated death (neat and clean – doesn't damage any other cells)

1. The cell begins to degrade into blebs
2. Nuclear envelope degrades
3. DNA degrades
4. Cytoskeleton collapses
5. Cell is dismantled into small **apoptotic bodies**

□ Controlled extrinsically and intrinsically

EXAMPLE: Apoptosis vs. necrosis



● **Caspases** are the proteins responsible for _____ different parts of the cell

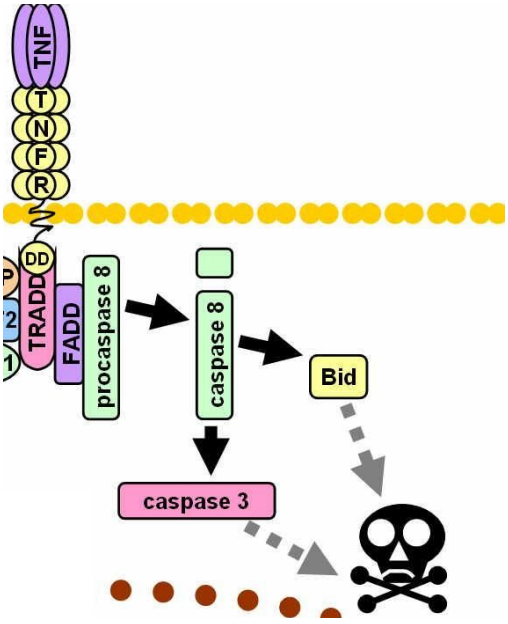
□ **Procaspases** are the precursor forms of caspase proteins

- The procaspase must be activated via cleavage

- Activated caspases can cleave and activate other caspases

□ **Inhibitors of apoptosis (IAPs)** bind and inhibit or cause degradation of caspases to block apoptosis

EXAMPLE: Caspases promoting apoptosis



Triggering Apoptosis

● **Intrinsic pathway** regulates apoptosis based on intracellular _____

□ **Bcl2 family** of proteins plays a major role in inhibiting apoptosis

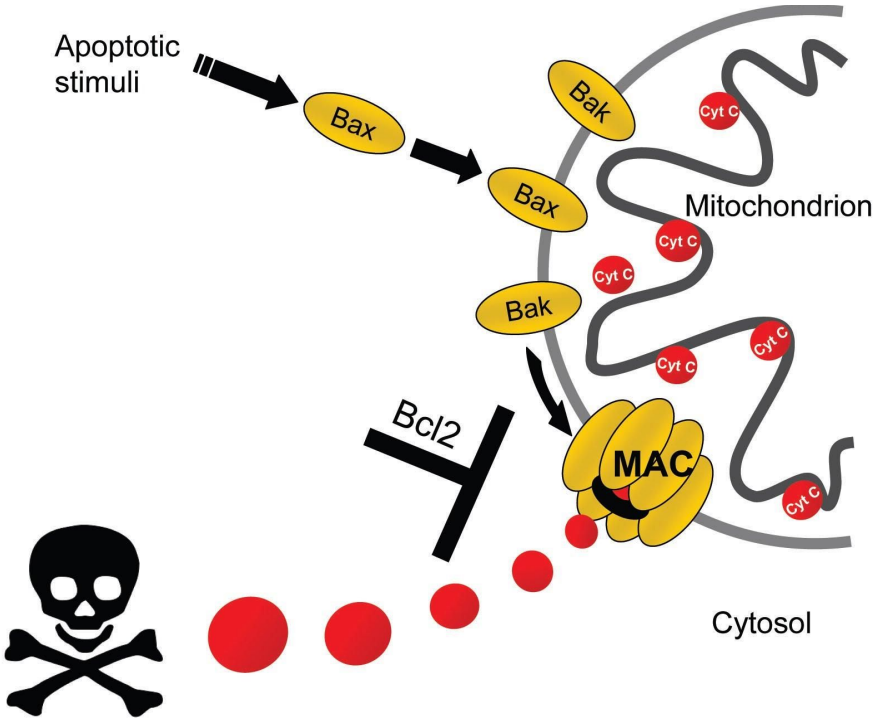
- Cytochrome C is released from mitochondria into cytosol

- Cytochrome C then binds to a variety of proteins that trigger apoptosis

- DNA damage results in release of Bax and Bad – which act to release cytochrome C

- Bcl2 can bind to Bax and Bad to prevent cytochrome C release and apoptosis

EXAMPLE: Intrinsic pathway of apoptosis



● **Extrinsic pathway** regulates apoptosis based on extracellular _____

□ **Death receptors** trigger apoptosis when activated

- Ex: Fas receptor – binds Fas (ligand)

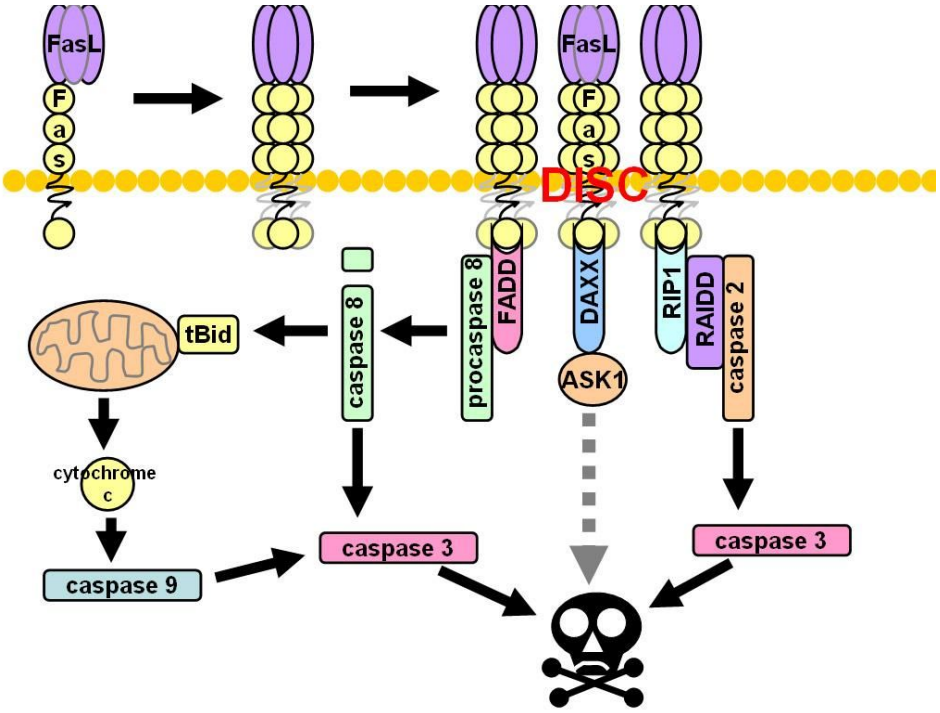
- Activates the *death-inducing signaling complex (DISC)* which stimulates apoptosis

□ **Survival factors** suppress apoptosis when activated

- Can inhibit Bad (which triggers intrinsic pathway)

- Can regulate Bcl2 family proteins

EXAMPLE: Fas receptor induction of apoptosis



PRACTICE:

1. True or False: Apoptosis can only be stimulated through intracellular signals.
    a. True
    b. False

2. In the intrinsic pathway of regulating apoptosis, Bcl2 controls what?
    a. It releases cytochrome C from the mitochondria
    b. It binds to cytochrome C and prevents its release
    c. It binds to Bad and Bax and prevents cytochrome C release
    d. It binds to Bad and Bax and triggers cytochrome C release

3. Which of the following suppresses apoptosis?
    a. Release of cytochrome C from the mitochondria
    b. Survival Factors
    c. Death Receptors
    d. Caspases