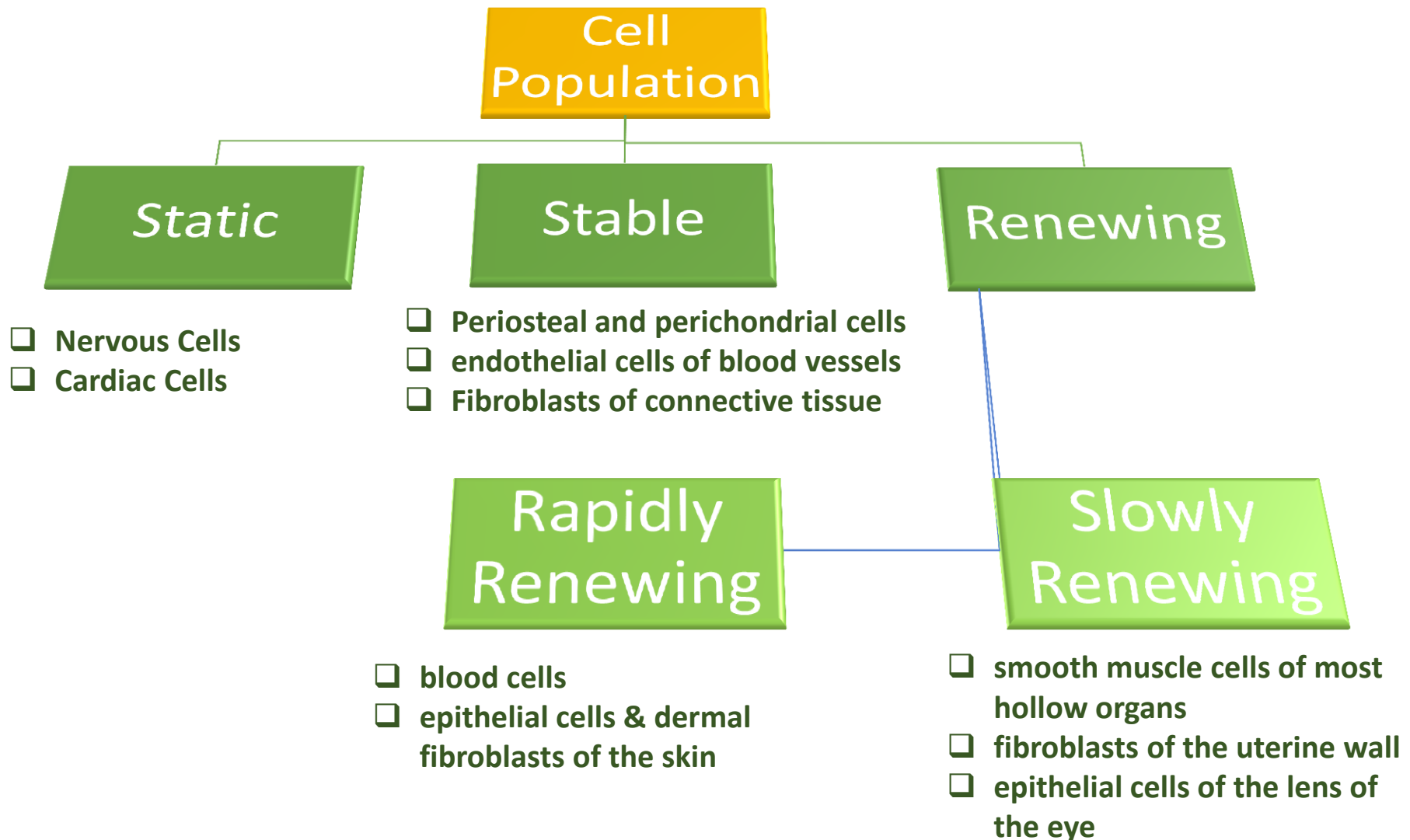


Cell Renewal & Cell Death

DEPARTMENT OF HUMAN ANATOMY – MUCOM 2020

CELL RENEWAL

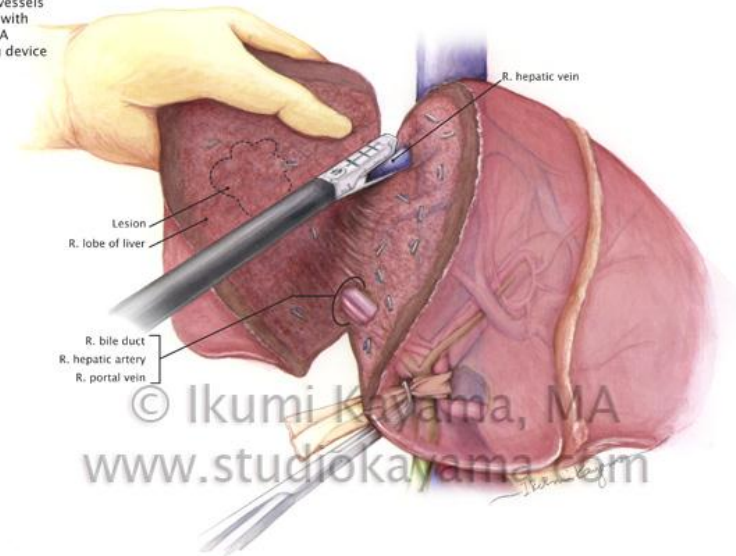


RESERVE STEM CELLS



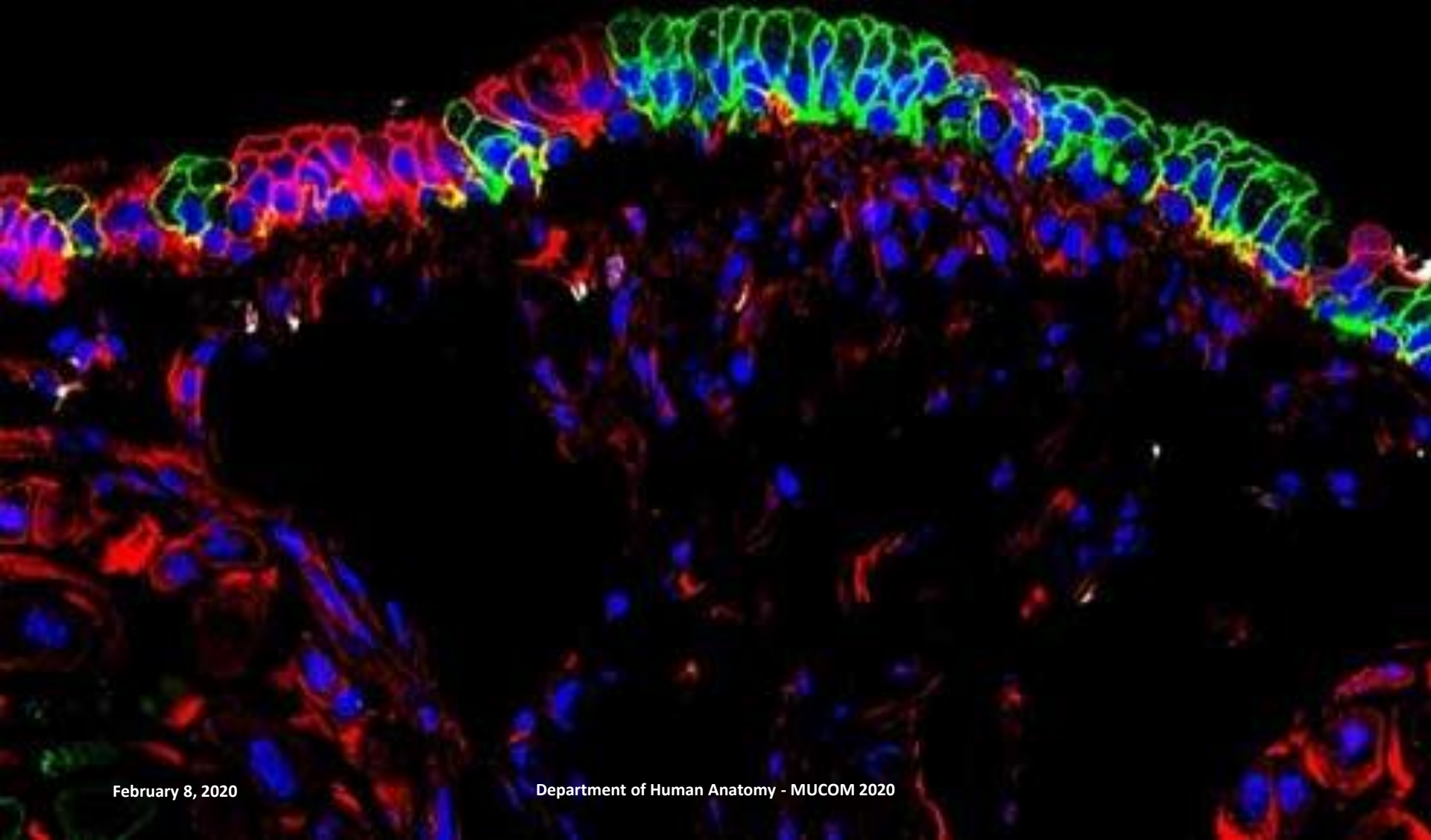
Wound Healing

6 Larger vessels divided with Endo-GIA stapling device



Replacement of removed tissue

Green colored cells are reserve stem cells



CELL DIVISION



CELL DEATH



HOMEOSTASIS



CELL ACCUMULATION DISORDERS:

- cancer
- lupus erythematosus
- glomerulonephritis
- viral infections



CELL LOSS DISORDERS:

- AIDS
- Alzheimer's disease
- Parkinson's disease
- aplastic anemia
- myocardial infarction

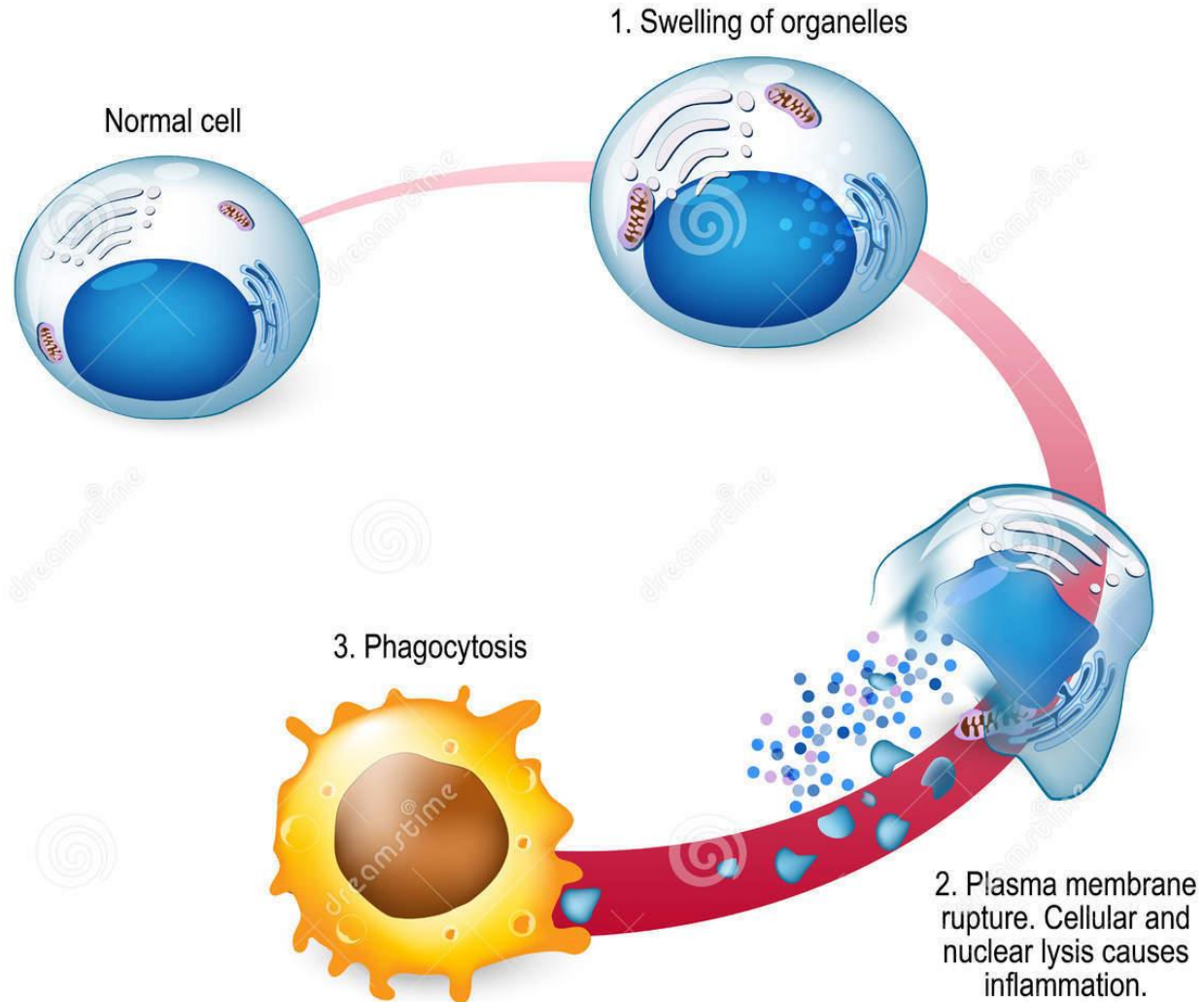
Cell death

```
graph TD; A[Cell death] --- B[Apoptosis]; A --- C[Necrosis];
```

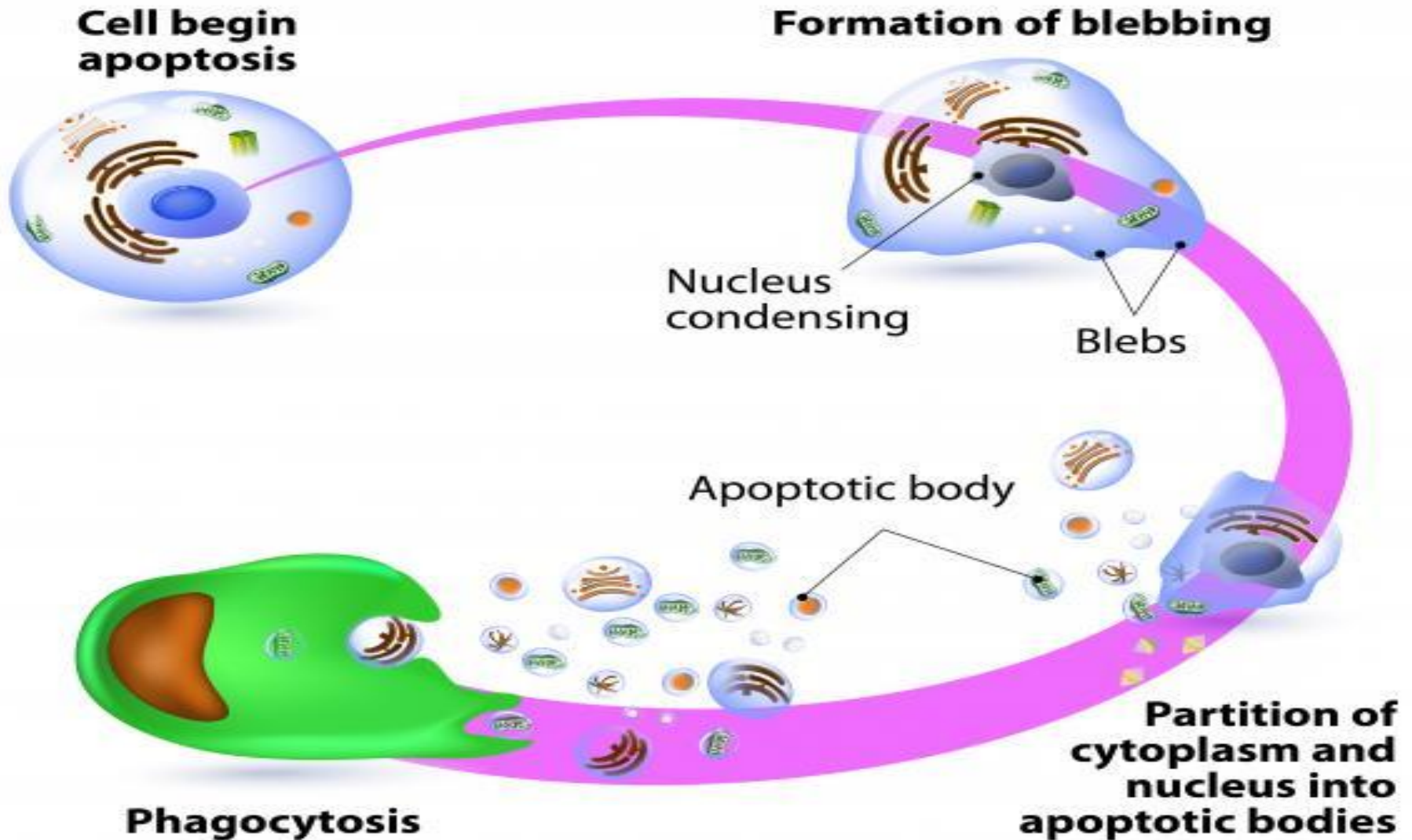
Apoptosis

Necrosis

NECROSIS



APOPTOSIS

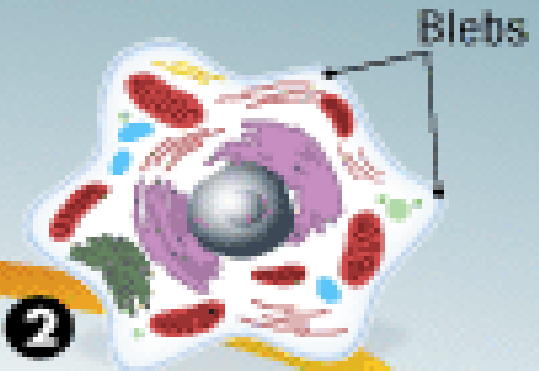


Apoptosis Process

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1 Cells damaged, stressed or triggered by body signals, begin apoptosis.



2 The cell begins to shrink and form blebs. Proteins are activated to break down cellular components.



3 Enzymes break down the nucleus and the cell emits signals to attract macrophages.



4 The cell breaks into several smaller pieces containing the cell components and destroyed nucleus.



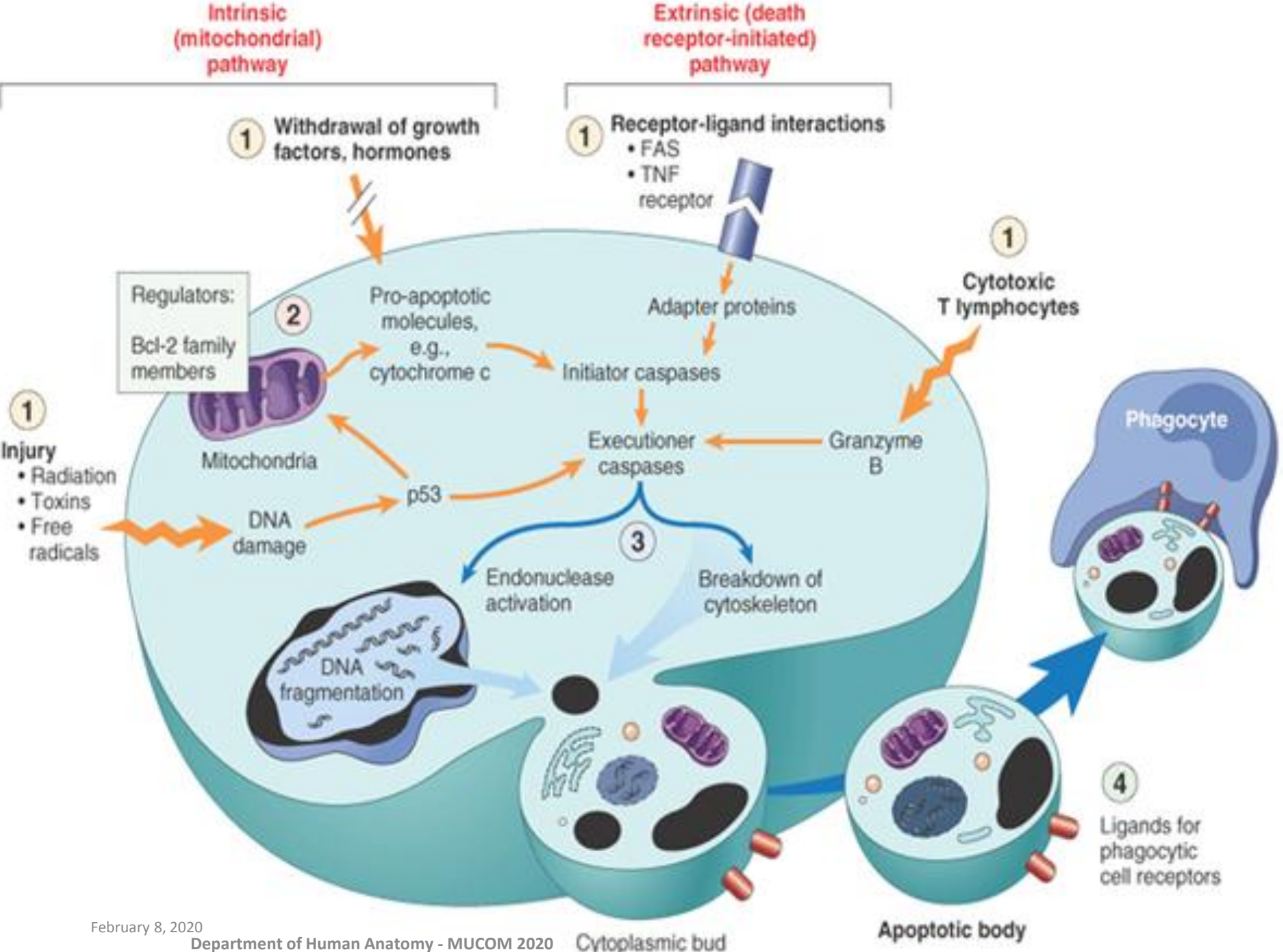
5 Macrophages recognize the cell parts and remove them from the body.

Regulation of Apoptosis

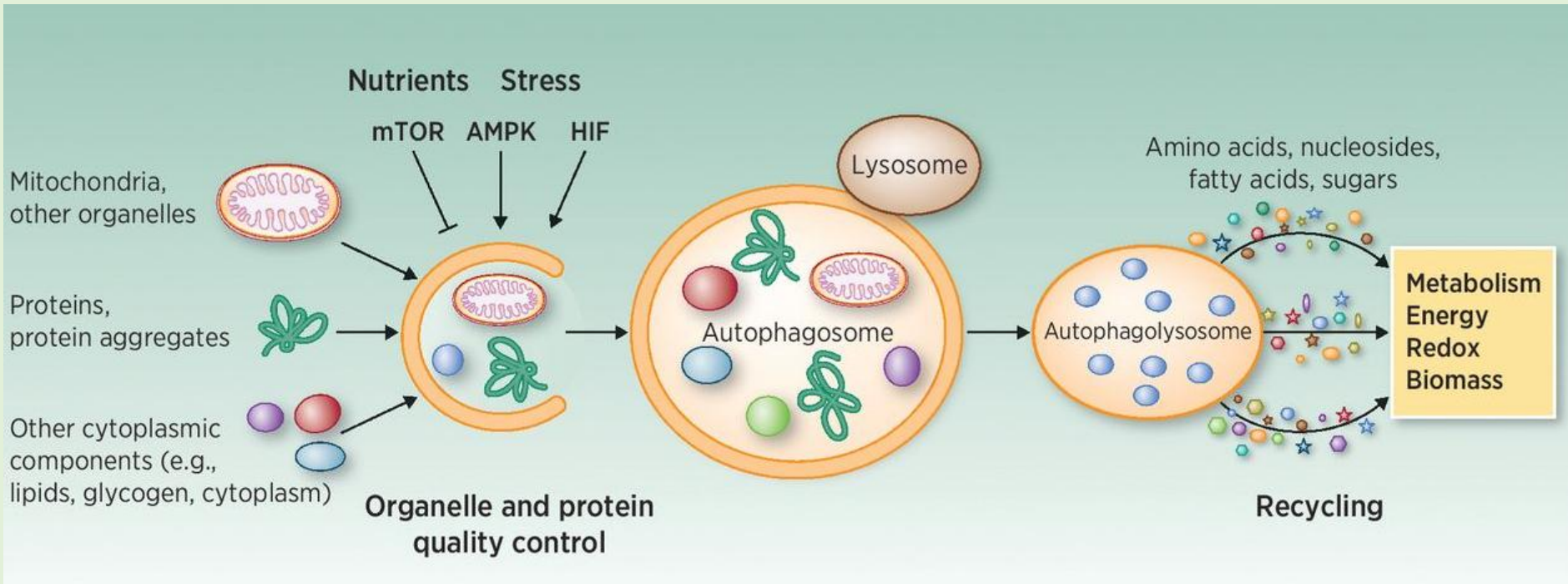
- ⊕ External activators: free radicals, oxidants, and UV and ionizing radiation.
- ⊕ Internal activators: oncogenes (tumor forming gene), tumor suppressors (such as p53), nutrient-deprivation antimetabolites and mitotic catastrophe.
- ⊕ Apoptosis inhibited by signals from other cells and the surrounding environment via so-called survival factors. These include growth factors, hormones such as estrogen and androgens, and interactions with extracellular matrix proteins.

Intrinsic (mitochondrial) pathway

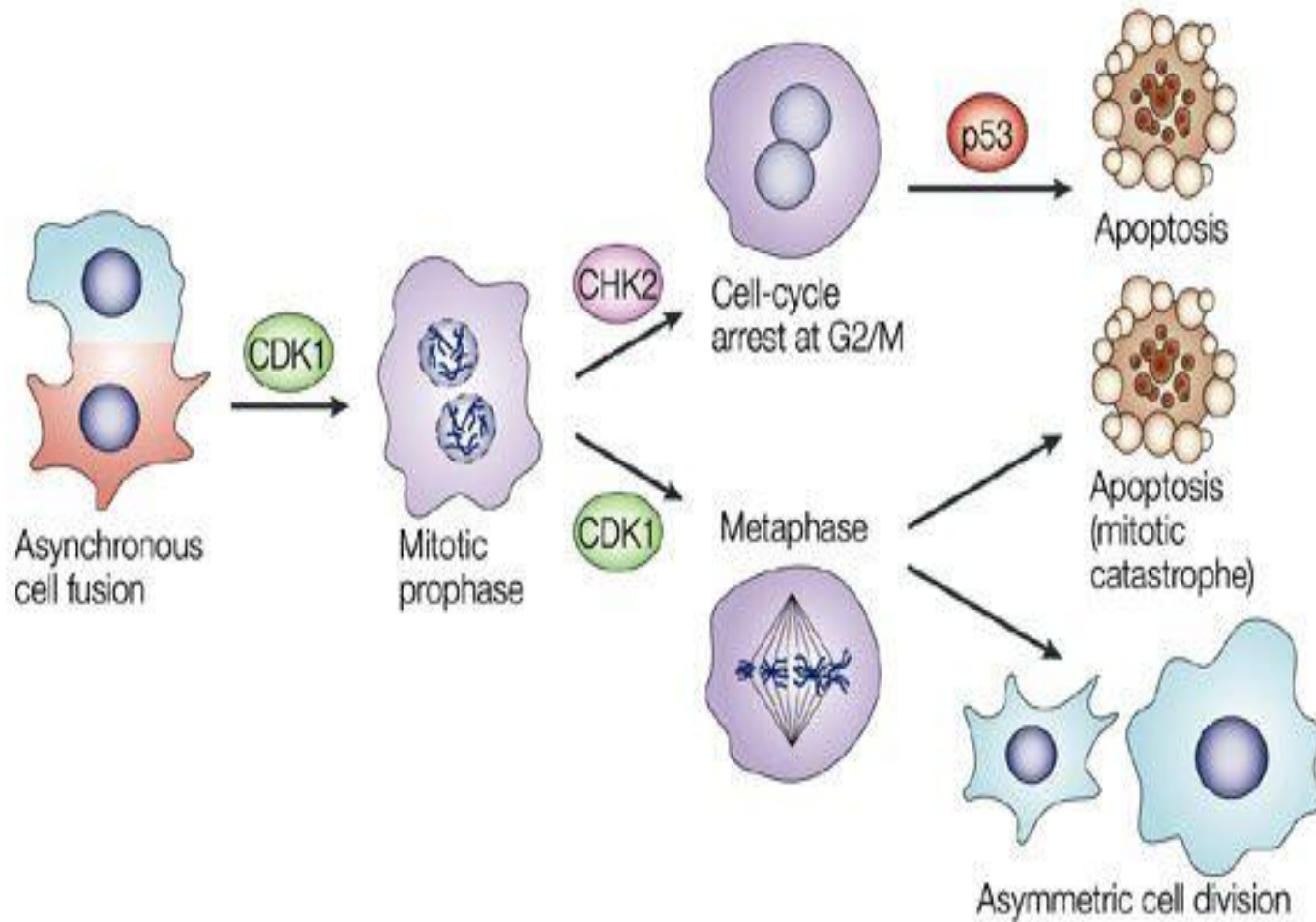
Extrinsic (death receptor-initiated) pathway

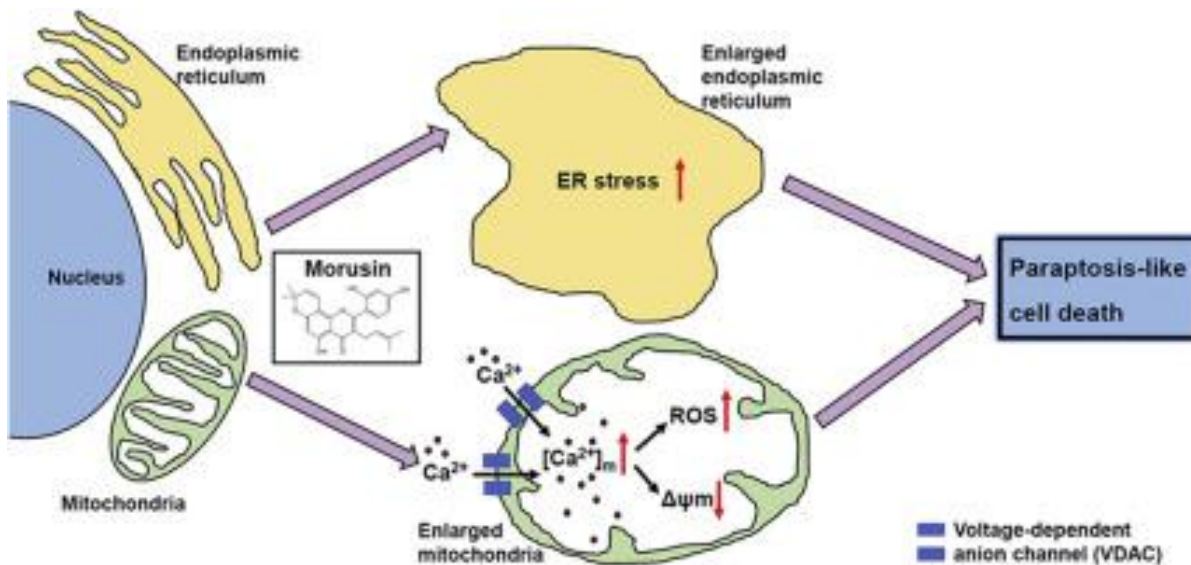


AUTOPHAGY

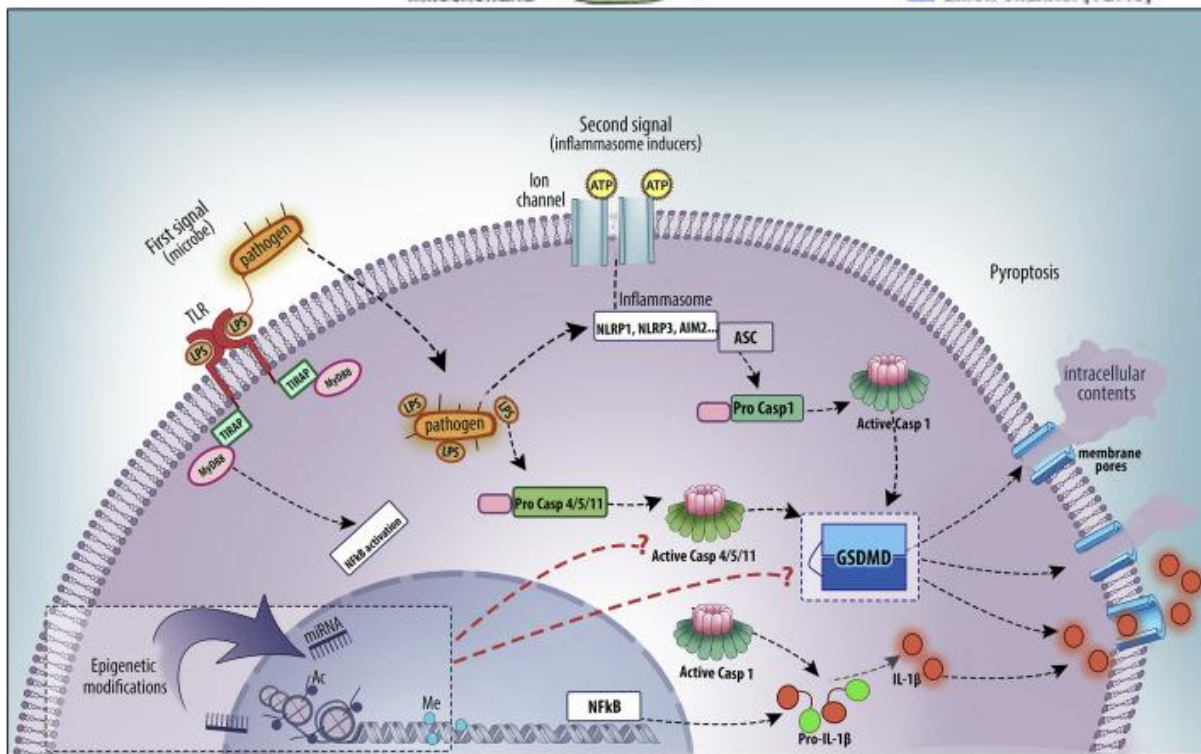


MITOTIC CATASTROPHE



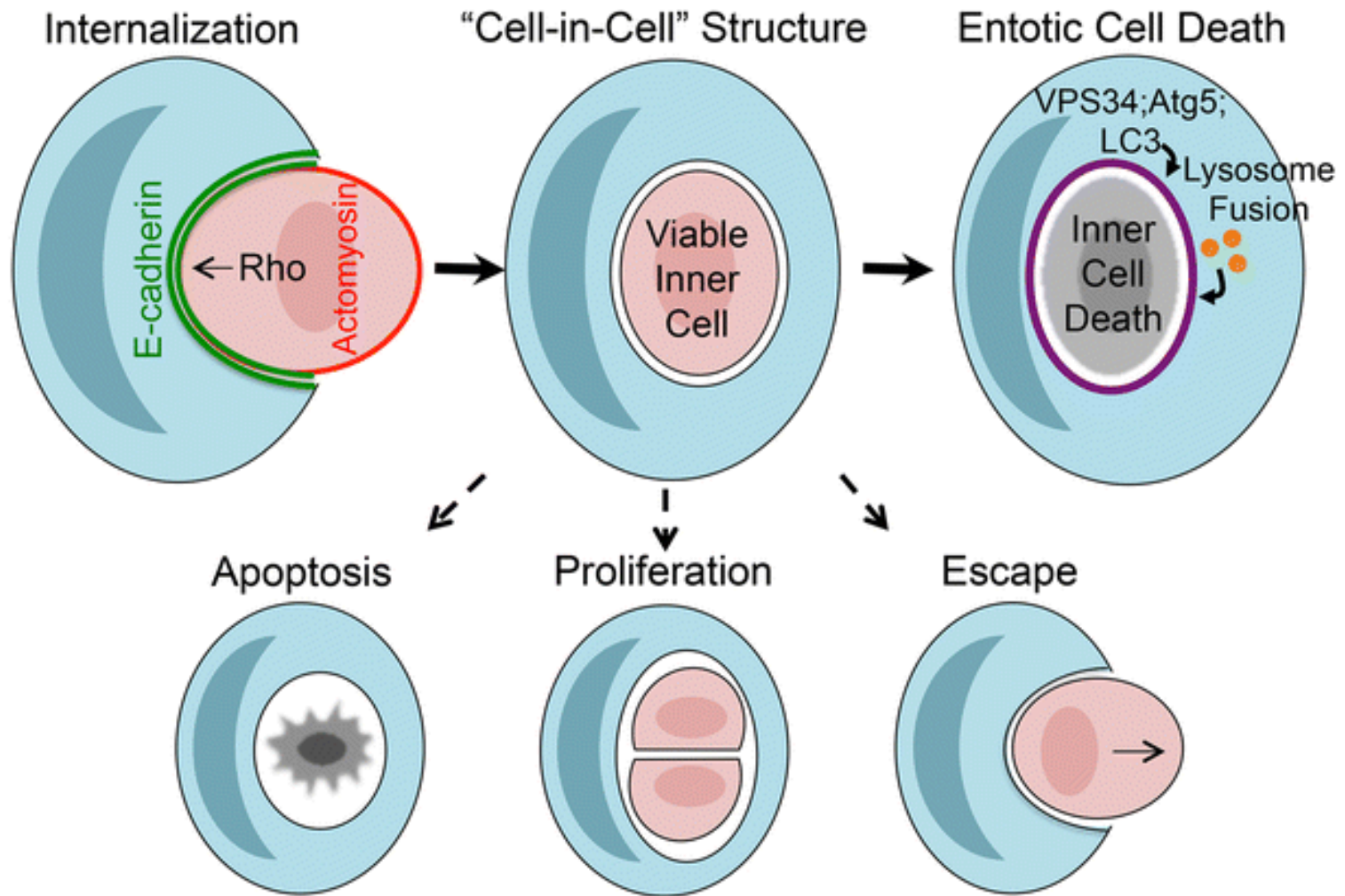


PARAPTOSIS



PYROPTOSIS

ENTOSIS



AGEING & CELLULAR SENESCENCE

- ⊕→ **Ageing** is a universal feature of biological organisms, defined by a gradual decline over time in cell and tissue function that often, but not always, decreases the longevity of an individual.
- ⊕→ **Cellular senescence** is defined by an irreversible arrest in cell proliferation when cells experience DNA damage at telomeres and a decrease in mitogenic signaling.

CELL SENESCENCE

