



Introduction to Signal Transduction

IST-3.E.1

Signal transduction pathways influence how the cell responds to its environment.

IST-3.F.1

Signal transduction may result in changes in gene expression and cell function, which may alter phenotype or result in programmed cell death (apoptosis).

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**What are possible responses
from a signal transduction
pathway?**

What are possible responses from a signal transduction pathway?



- > Changes in gene expression**
- > Changes in cell function**
- > Results in change in phenotype**
- > Results in apoptosis**

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Describe the function of a transcription factor (& how it changes gene expression)

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Describe the function of a transcription factor (& how it changes gene expression)



Transcription factors bind to the DNA to assist with the binding of RNA polymerase

If the transcription factor binds, the rate of transcription increases as RNA polymerase binds more frequently/more stable binding

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**What is apoptosis?
What occurs?**

**What is apoptosis?
What occurs?**



Programmed cell death

This is a process of the cell digesting from the inside out. There is a major error in the cell or the cell is infected so to protect the organism the cells go through the process to rid of themselves. Also, this could occur due to development. The spaces between our fingers results from apoptosis.

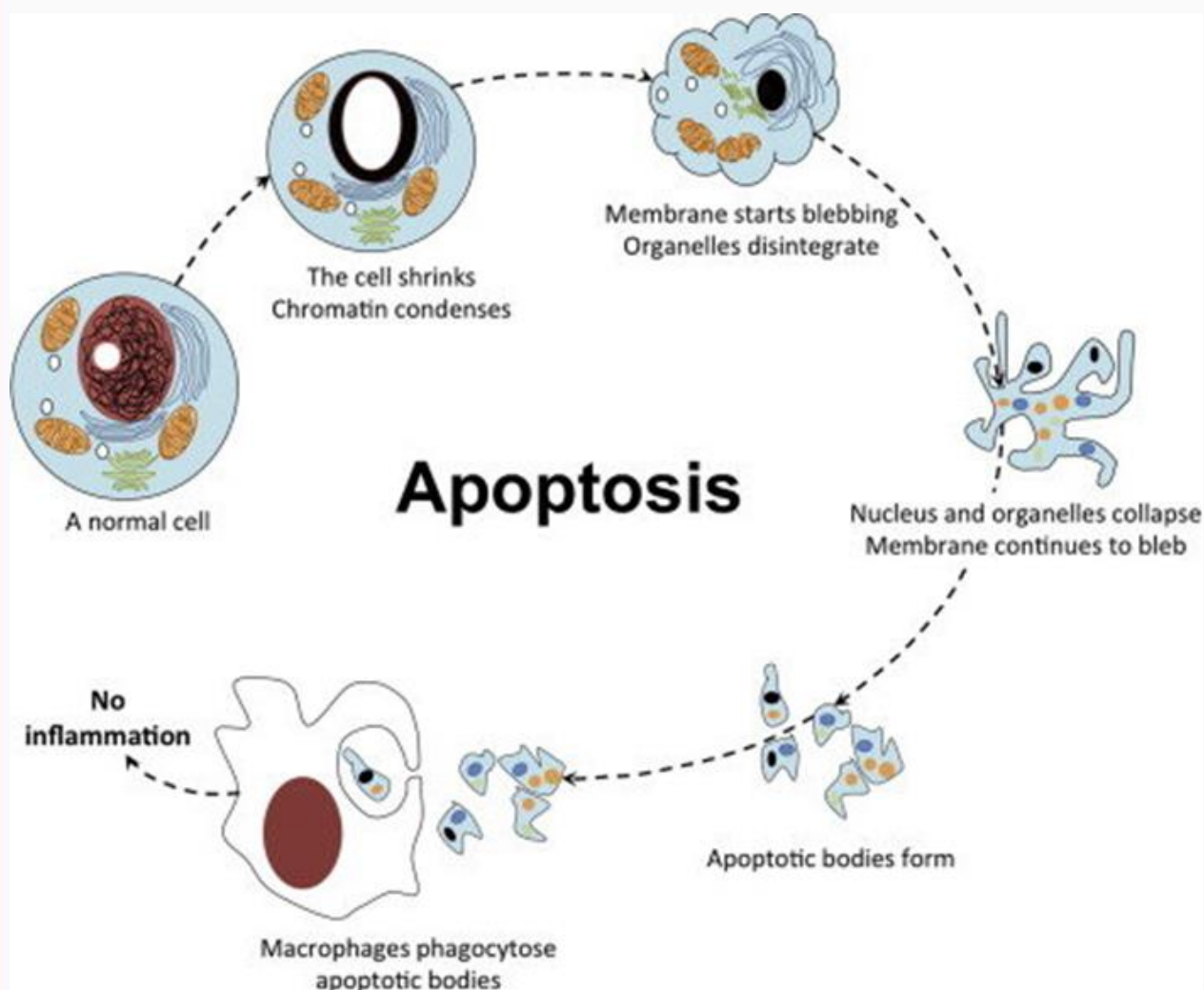
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What is apoptosis? What occurs?





What is apoptosis?

- A. Cell undergoing cellular division**
- B. Endocrine cell secreting proteins**
- C. Programmed cell death**
- D. Synthesis of ATP without glucose**

What is apoptosis?

C. Programmed cell death



Apoptosis is programmed cell death. The cell will activate nucleases and proteases which will break down nucleic acids and proteins, respectively. This forms blebs which will be consumed and broken down by macrophages.

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What happens during apoptosis?



What happens during apoptosis?

1

Apoptosis is initiated in response to cell damage or apoptosis-inducing signals.



2

Early apoptotic cells begin to shrink and chromatin is irreversibly condensed.



3

Apoptotic cells become fragmented and release signals to attract macrophages.



4

Cell fragments are separated into apoptotic bodies consisting of cytoplasm and tightly packed organelles.



5

Macrophages detect, engulf and remove apoptotic cell fragments from the body.



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**Binds to turn on or off gene
expression**

- A. DNA polymerase**
- B. Promoter**
- C. RNA polymerase**
- D. Transcription factor**

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**Binds to turn on or off
gene expression**

D. Transcription factor



Transcription factors will bind to the DNA to simulate or inhibit RNA polymerase binding to form the transcription initiation complex. Overall, transcription factors will regulate gene expression.