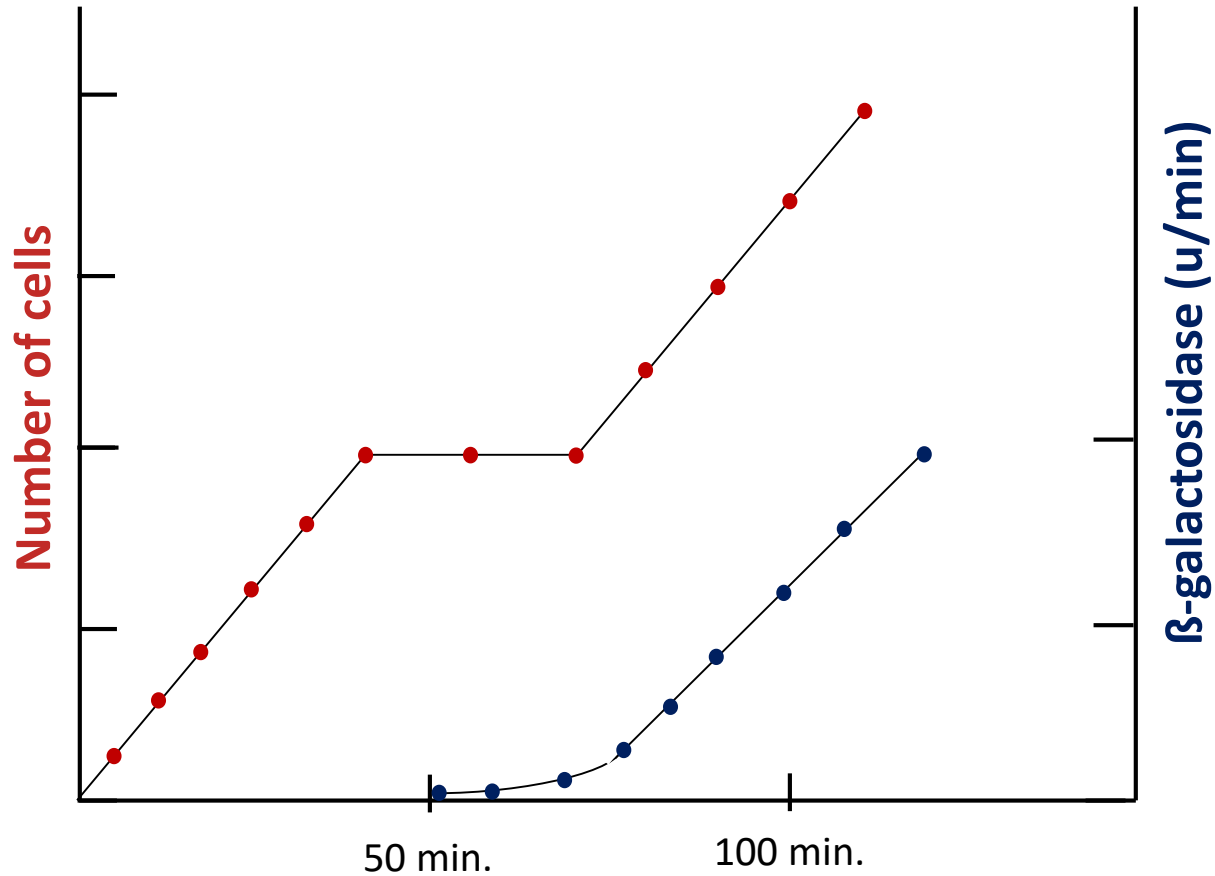


# **Regulation of gene expression**

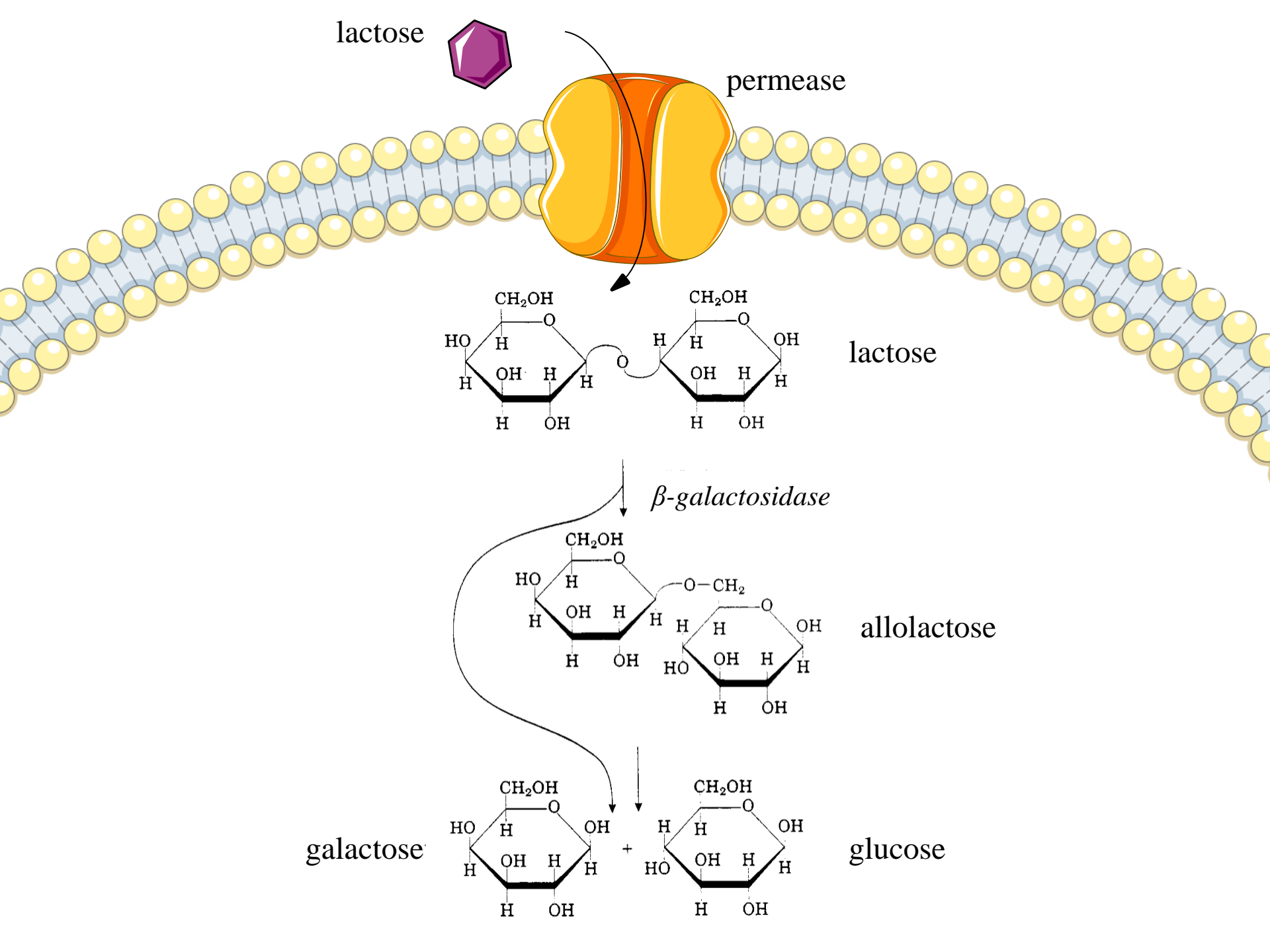
3<sup>th</sup> week

# Jacob / Monod experiment – NC 1965

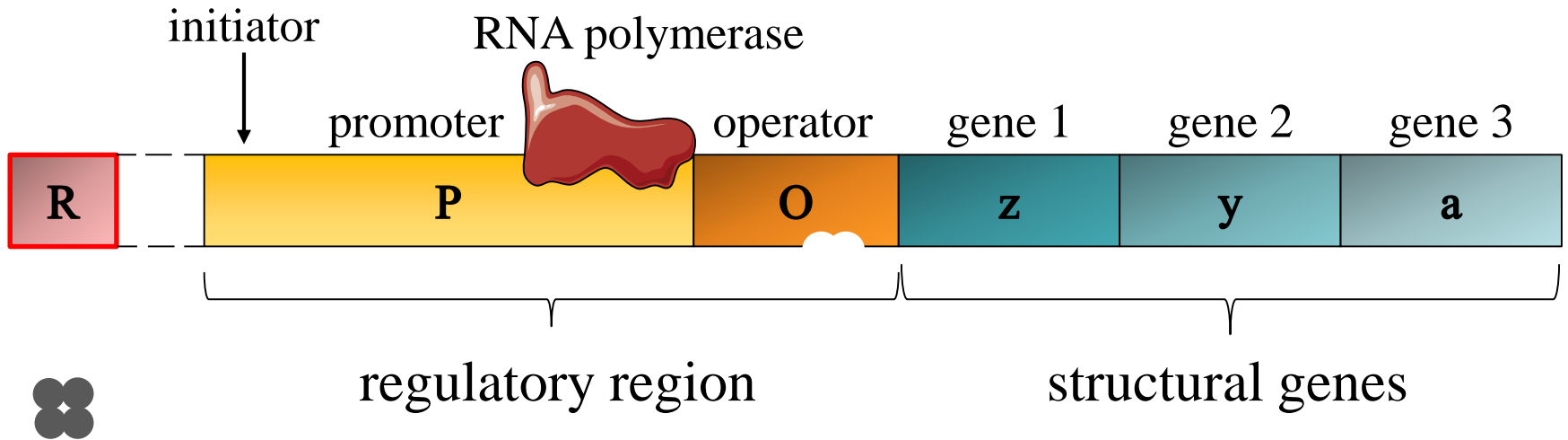


●●●●● Number of cells

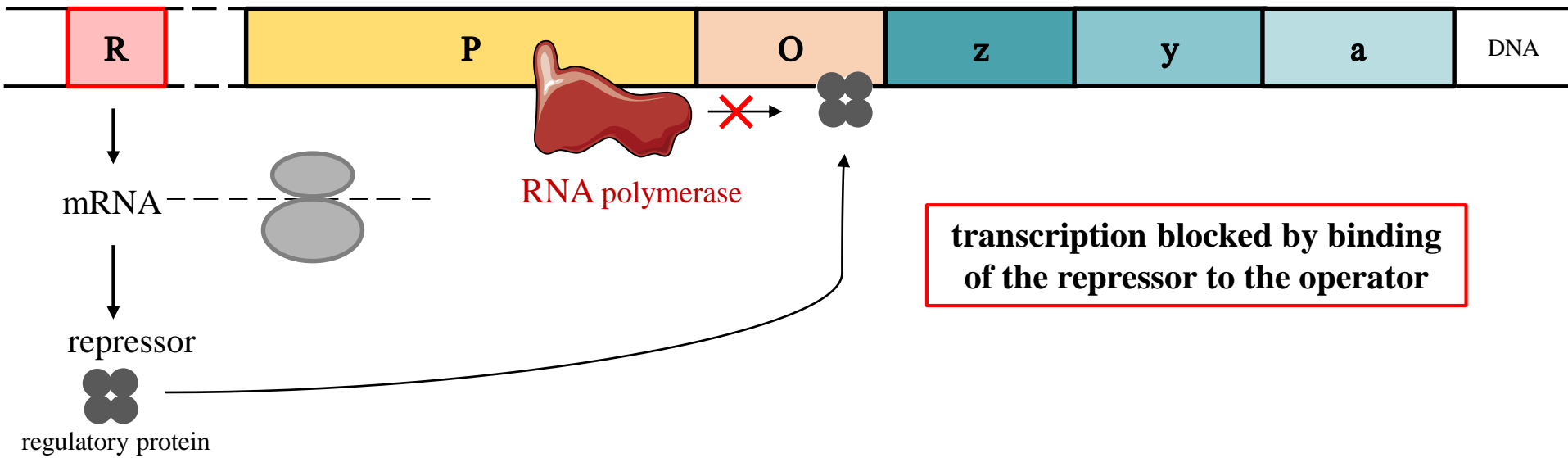
●●●●●  $\beta$ -galactosidase activity



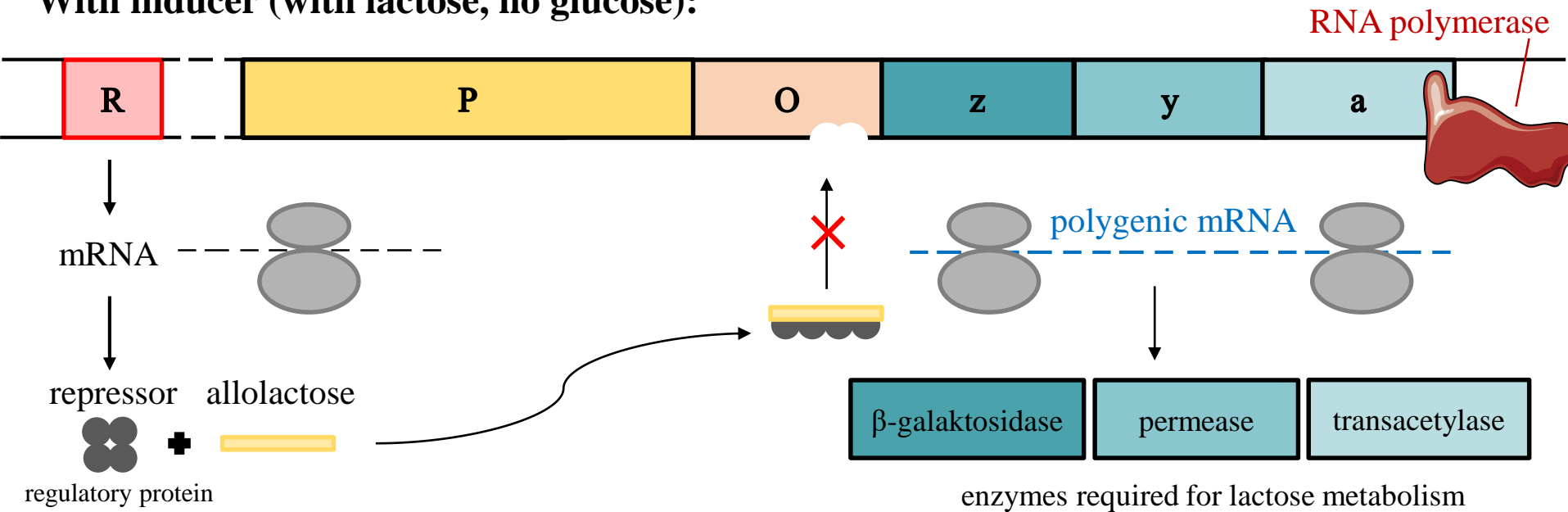
# Lac operon



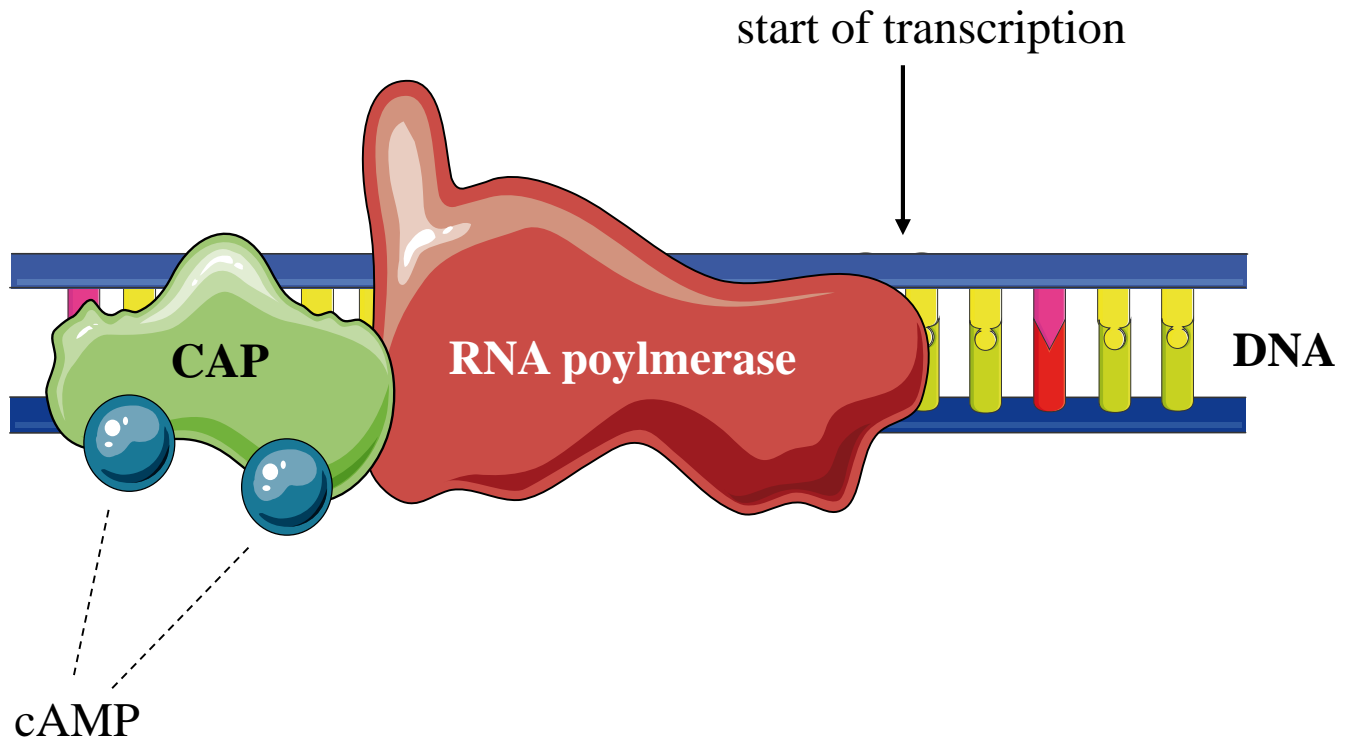
## Without inducer (no lactose, with glucose):



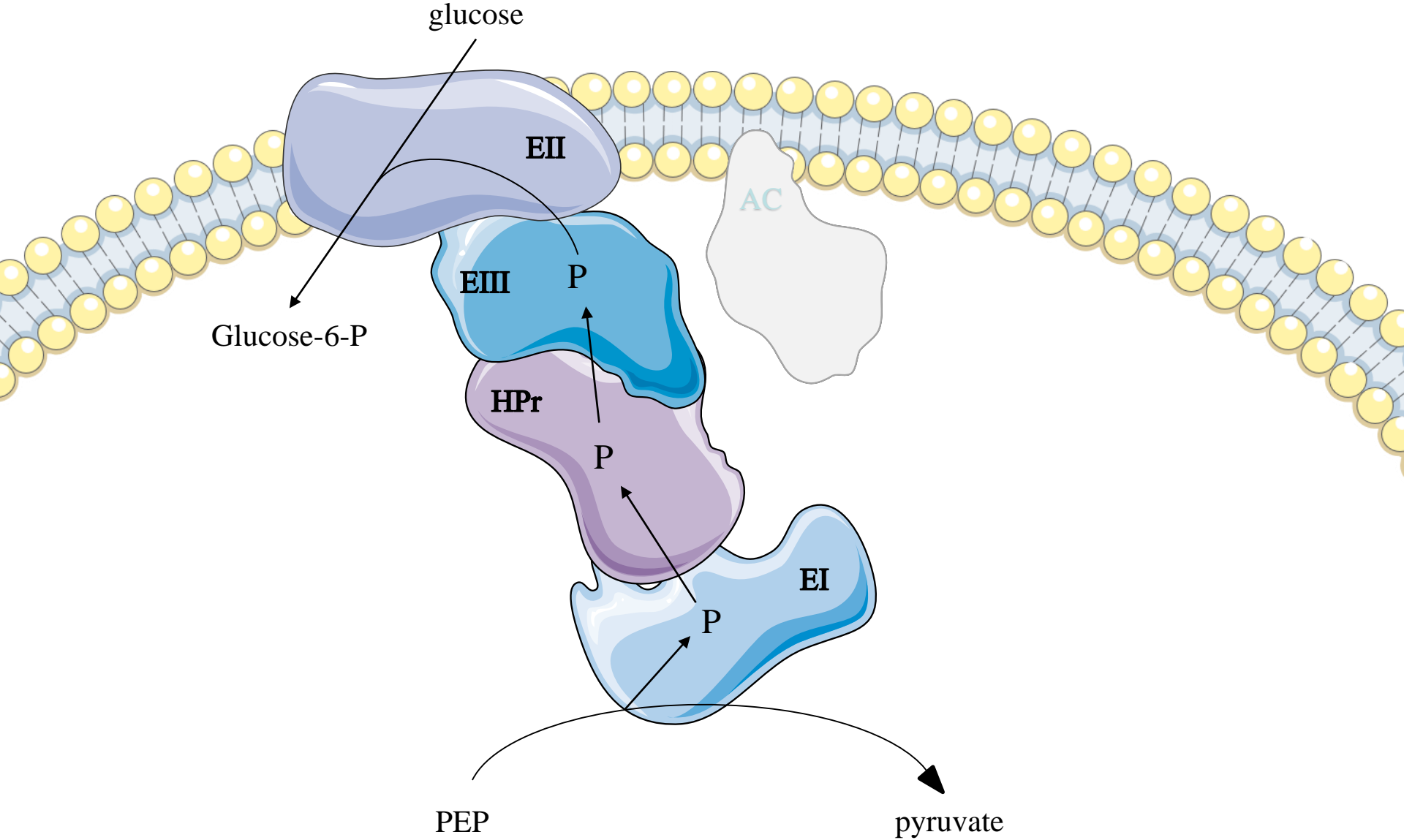
## With inducer (with lactose, no glucose):



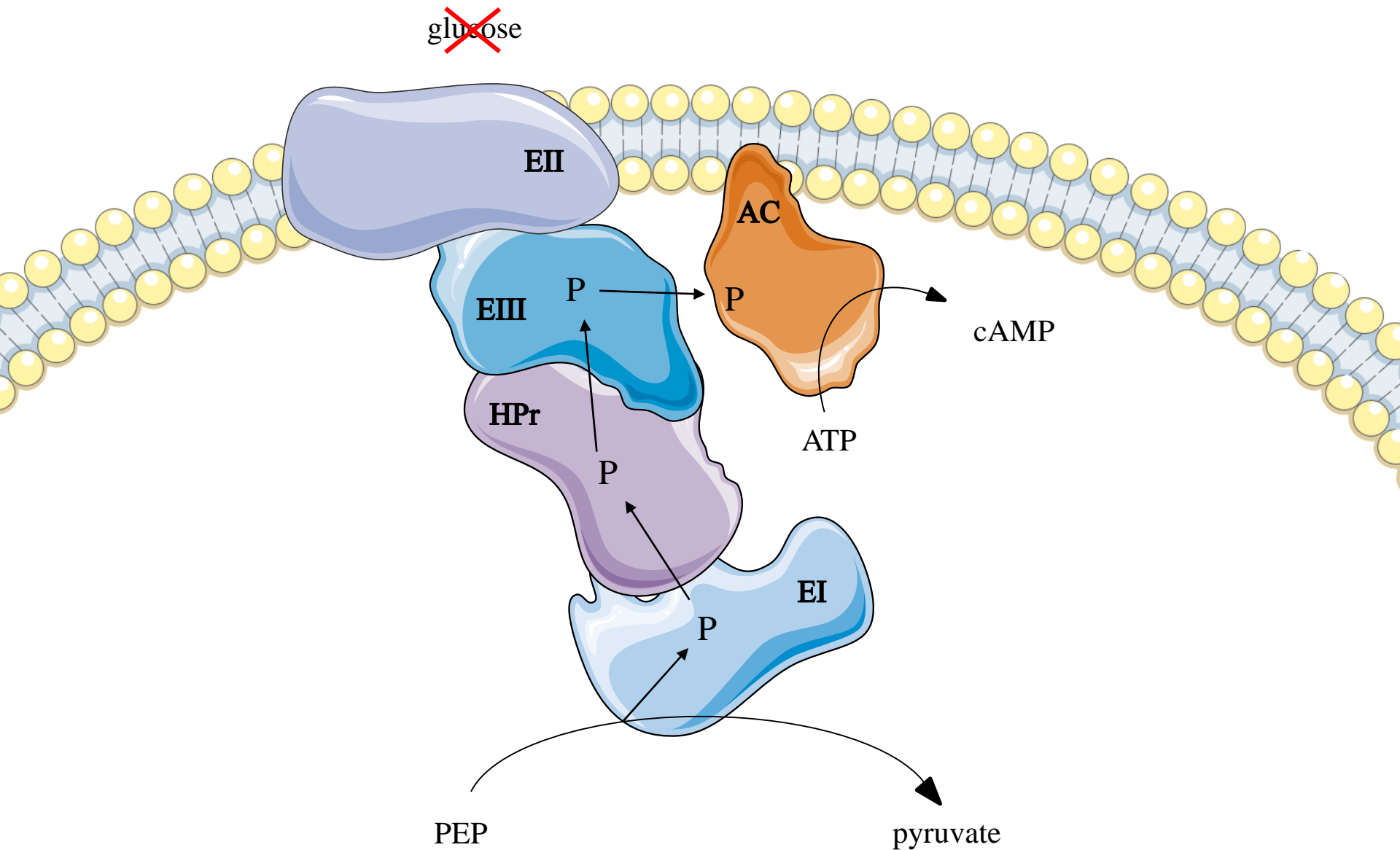
# Regulation of gene expression through cAMP



# Phosphotransferase system (PTS) – glc transport

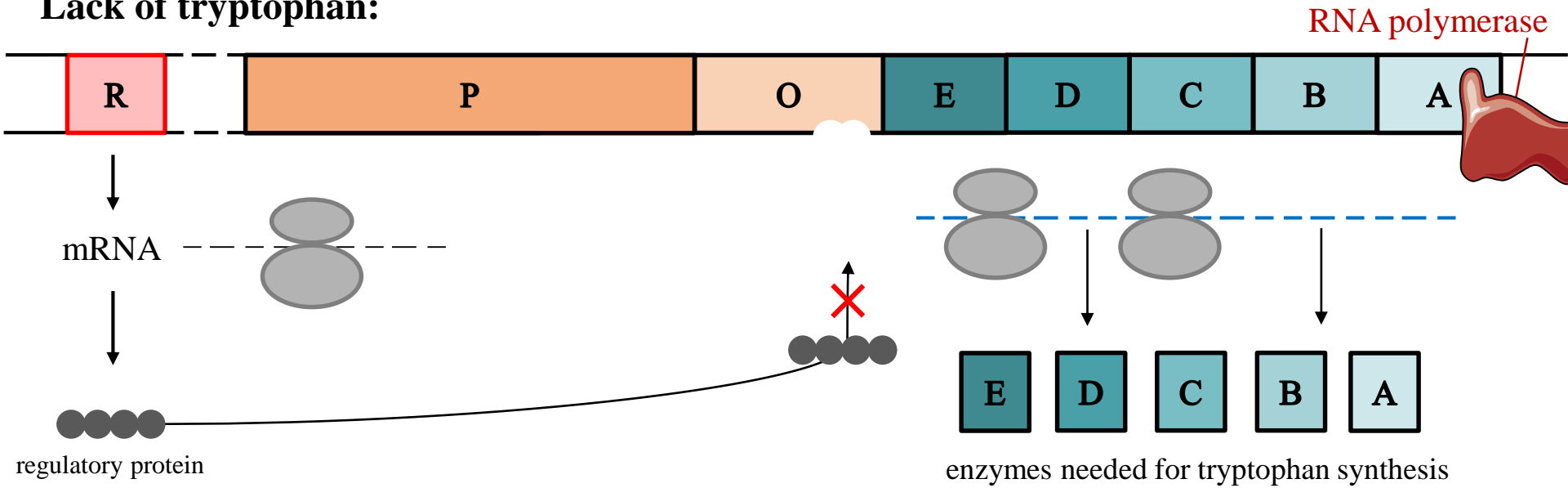


# Phosphotransferase system (PTS) – glc transport

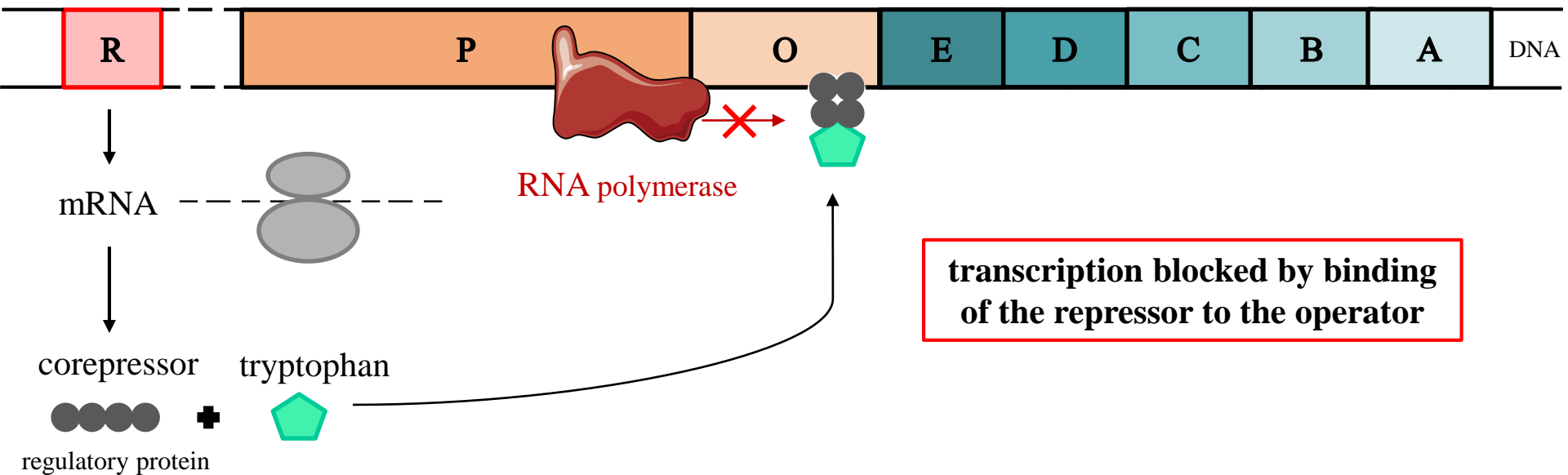




## Lack of tryptophan:



## With tryptophan:



# Signal

## 1. Hormones:

- Steroid – estrogens, testosterone
- Protein – STH

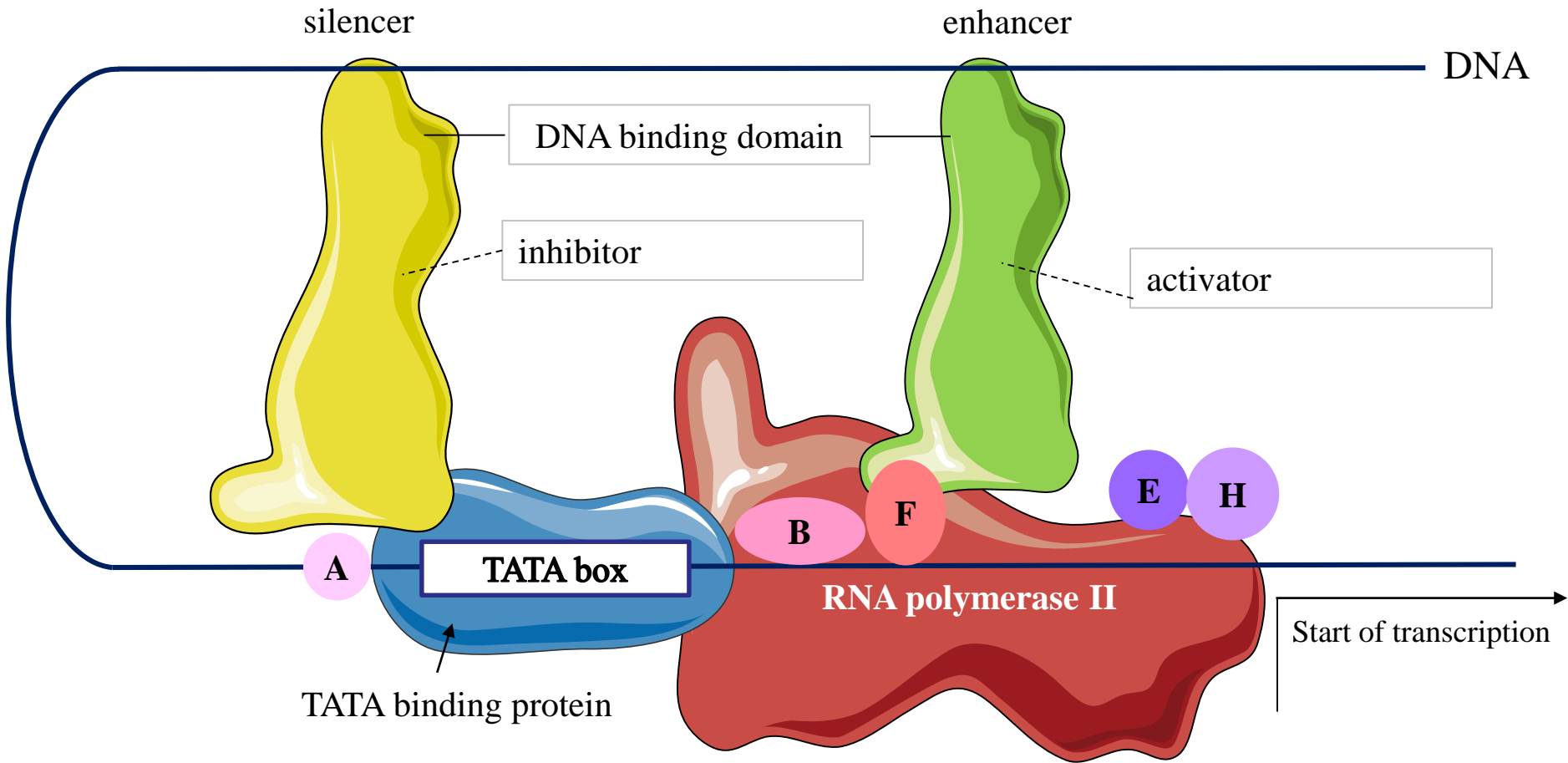
## 2. Circulating or secretory protein factors:

- Nerve growth hormone – differentiation of nerve cells
- Epidermal growth hormone – epithelium
- Erythropoietin – development of red blood cells

## 3. Signals from environment:

- Metabolic signals – urea
- Toxic substances – cytochrome P450

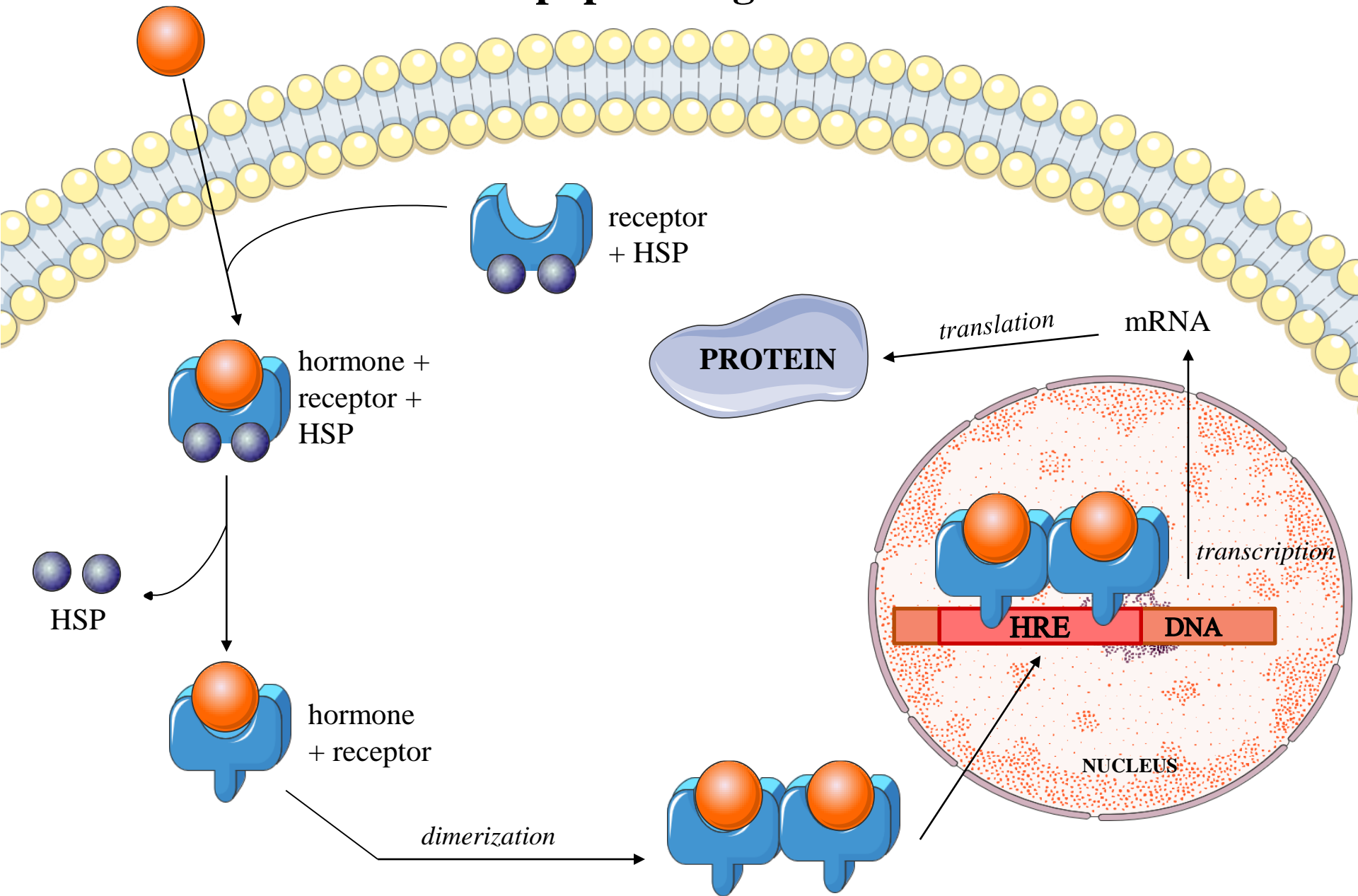
## 4. Cell-to-cell contact



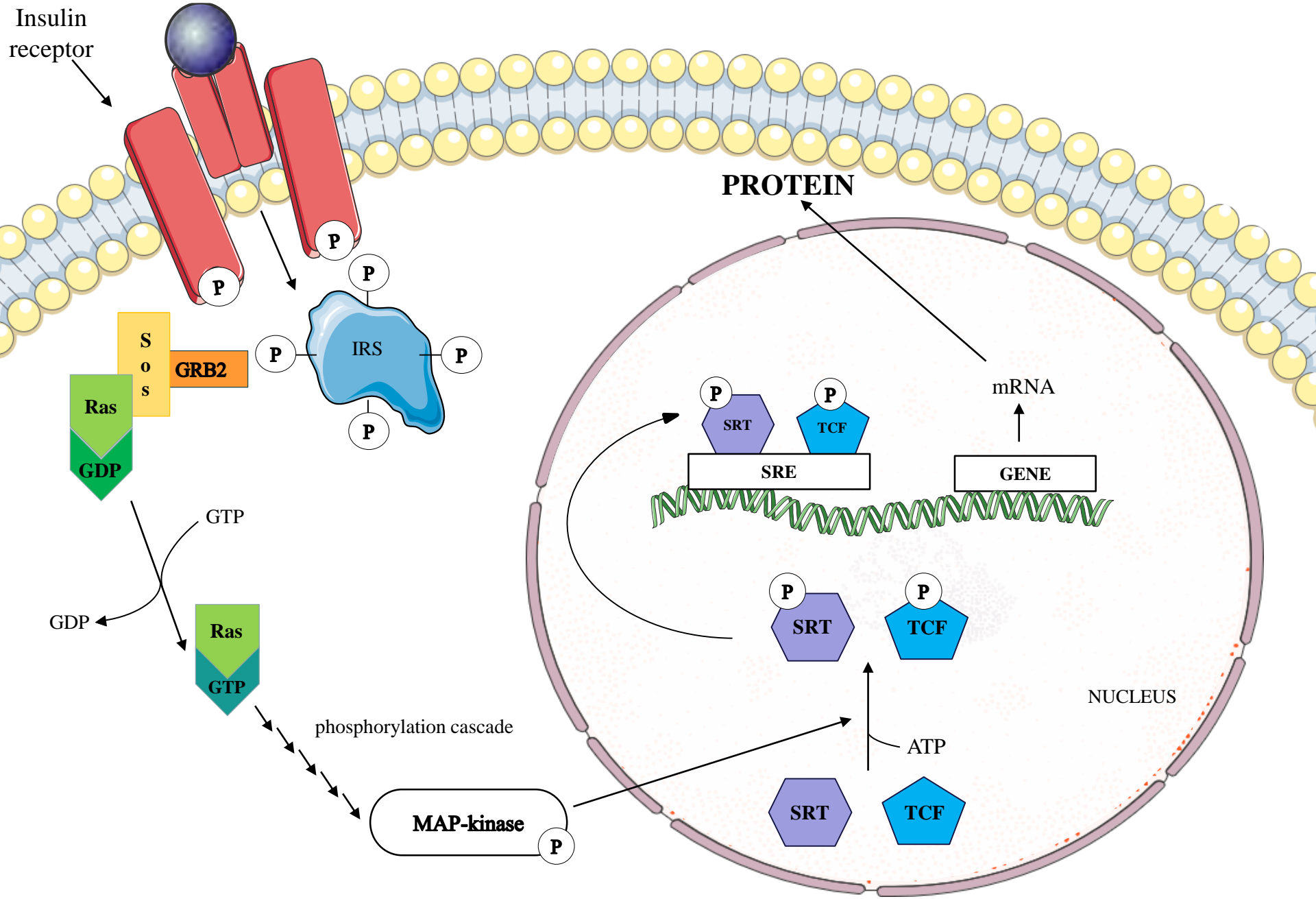
A, B, E, F, H:  
basal transcriptional factors

# Action of lipophilic signal molecules

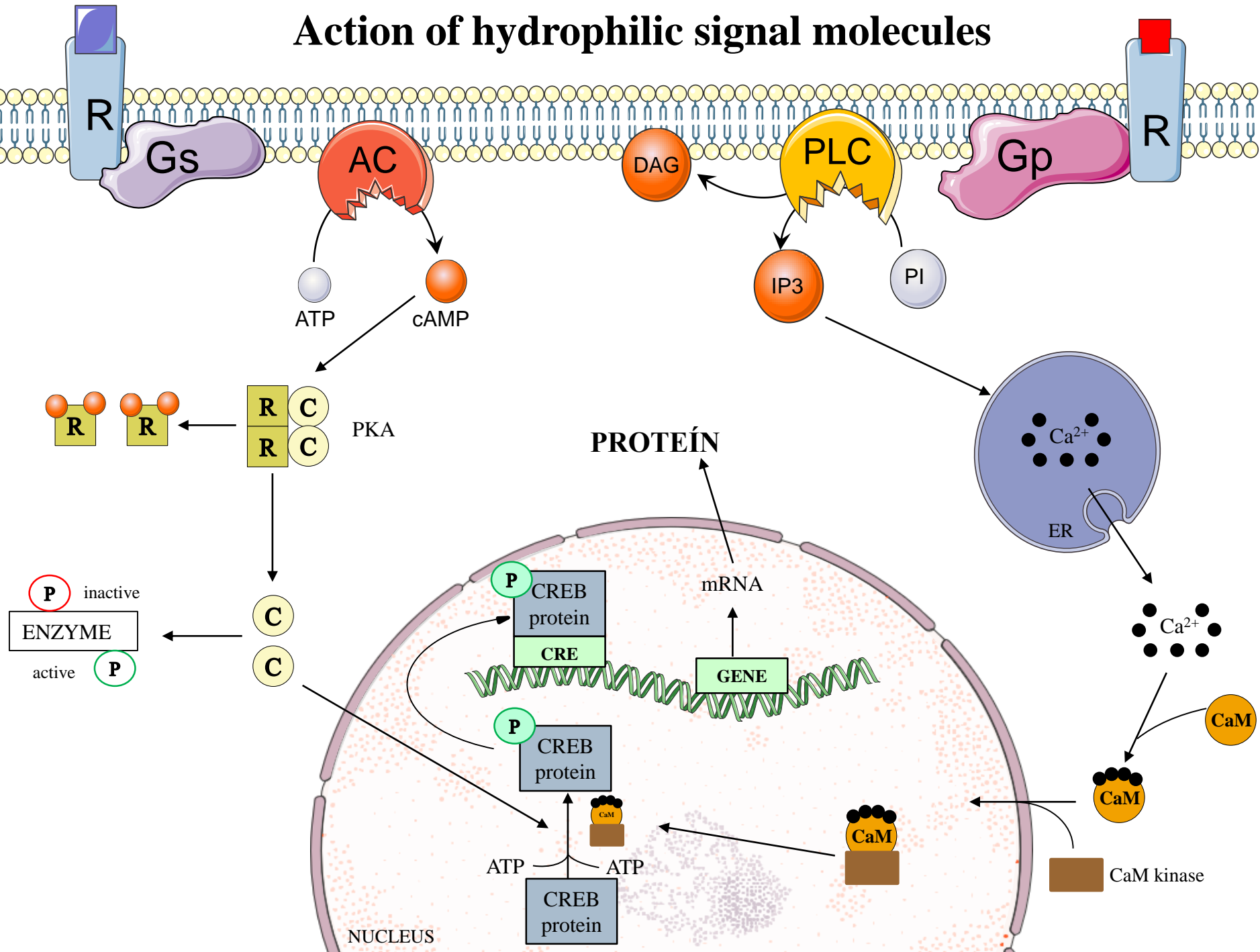
hormone (cortisol)



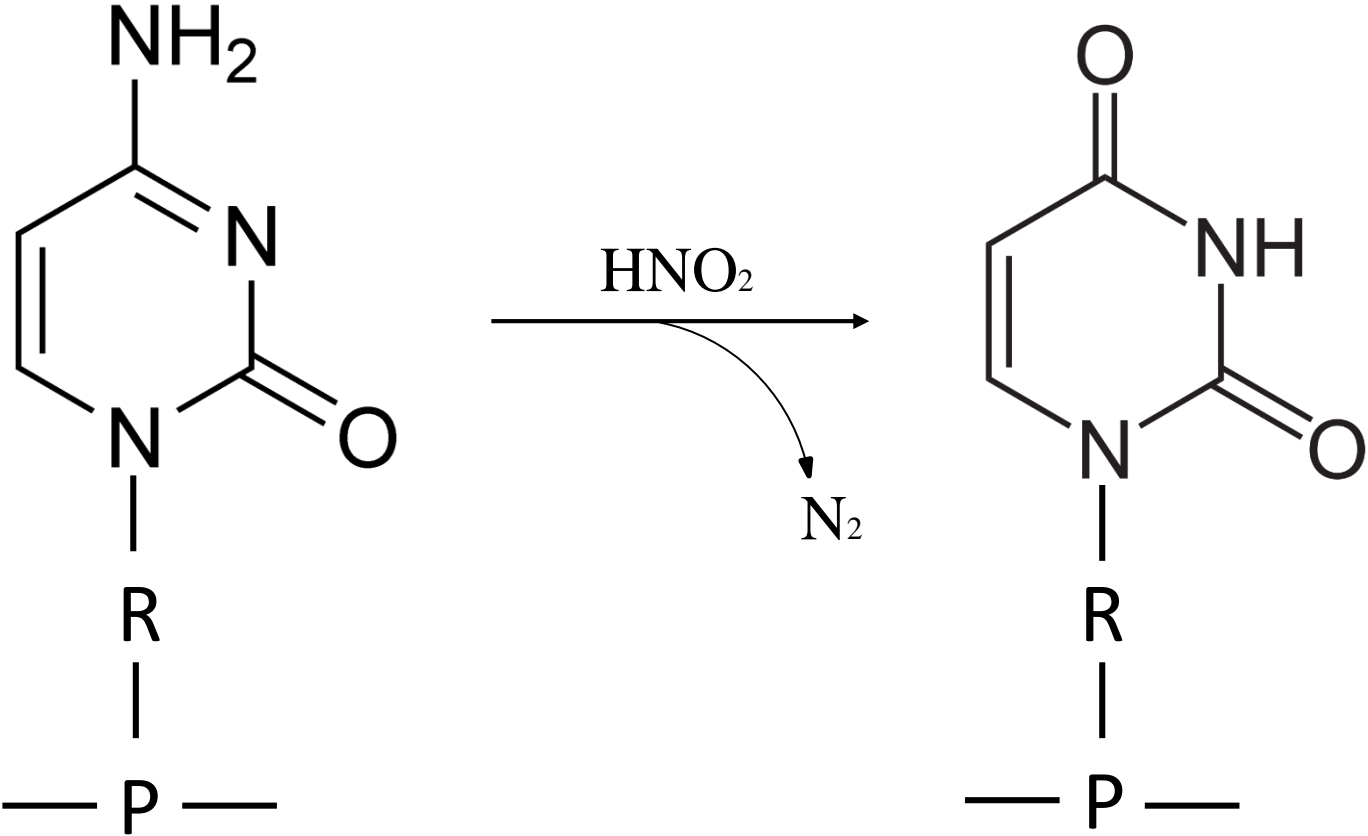
# Mechanism of insulin effect during activation of transcription factor

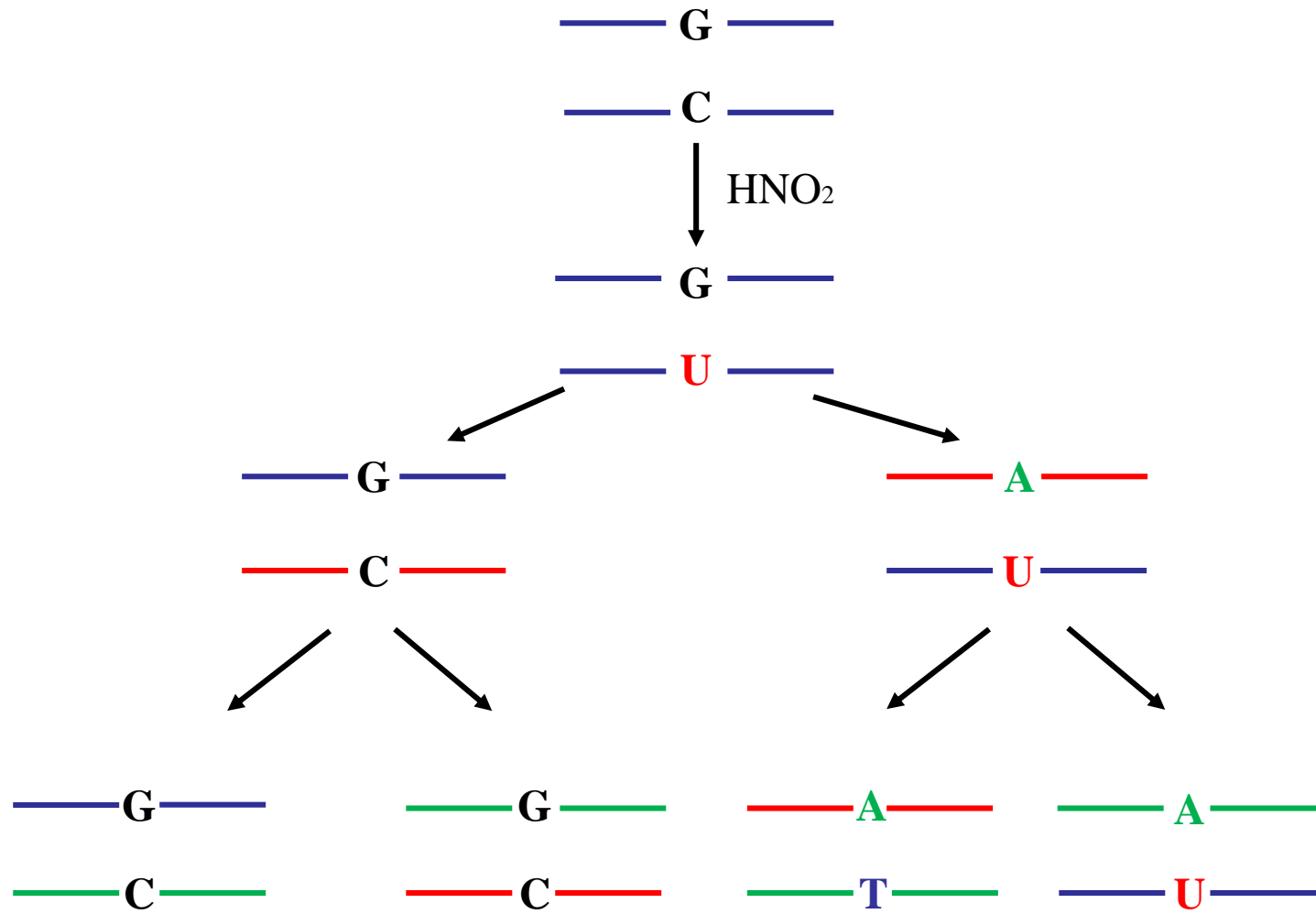


# Action of hydrophilic signal molecules

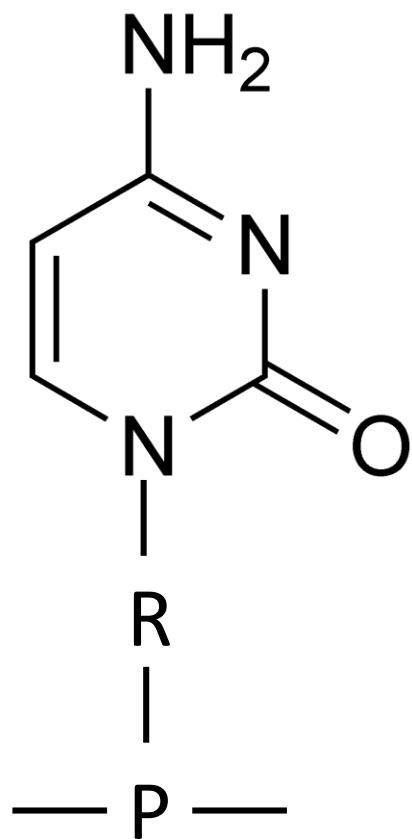


# DNA mutation

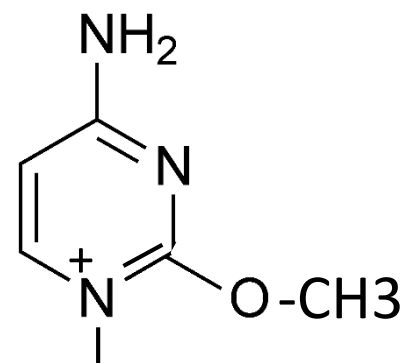
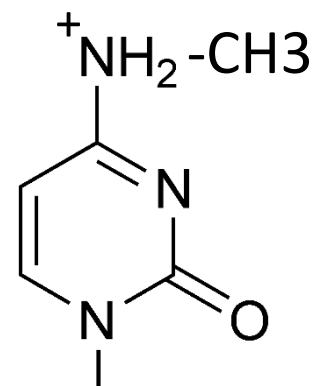
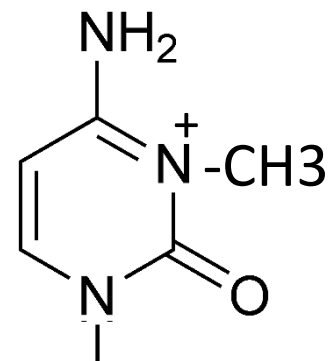
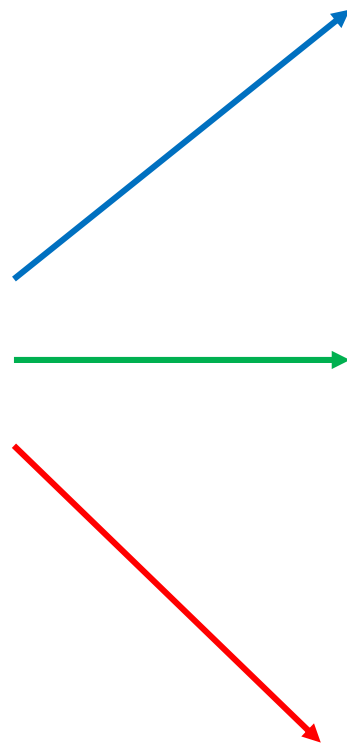
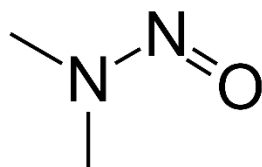


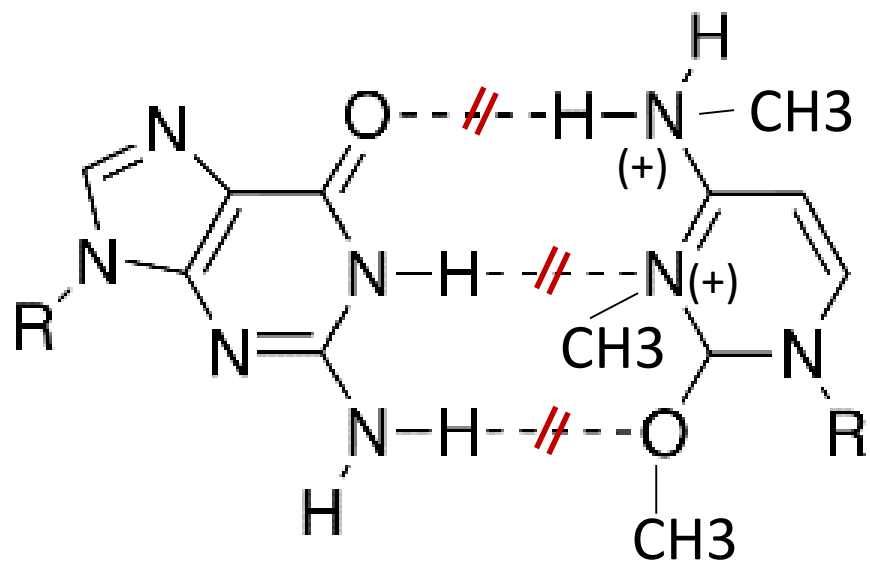
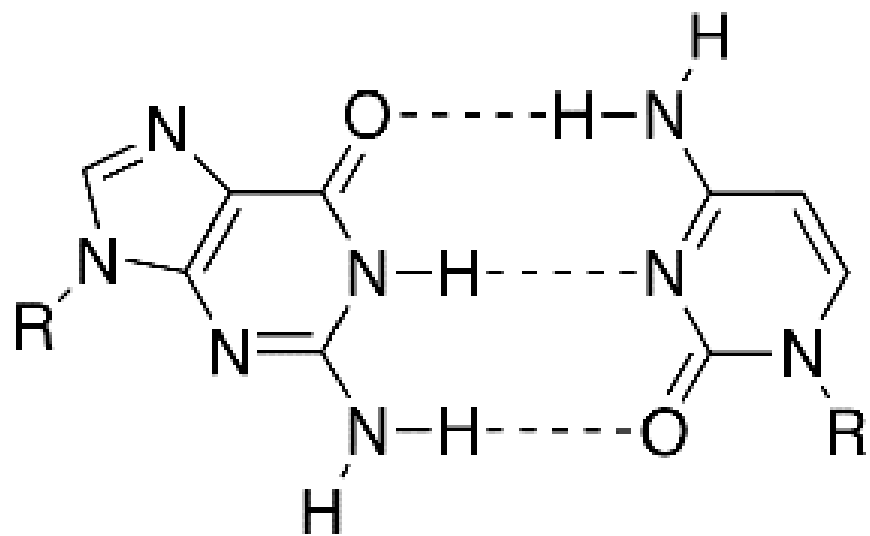


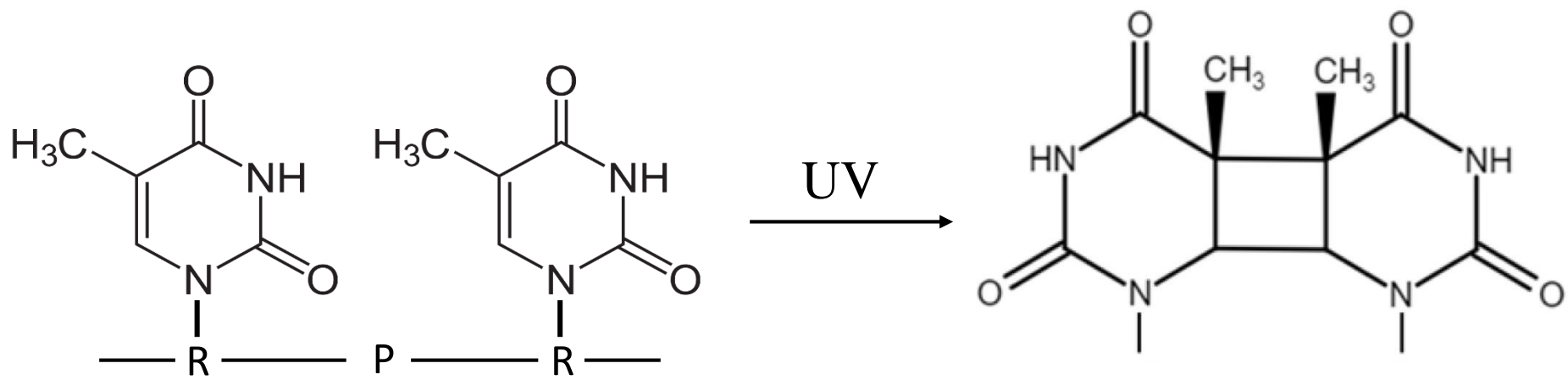




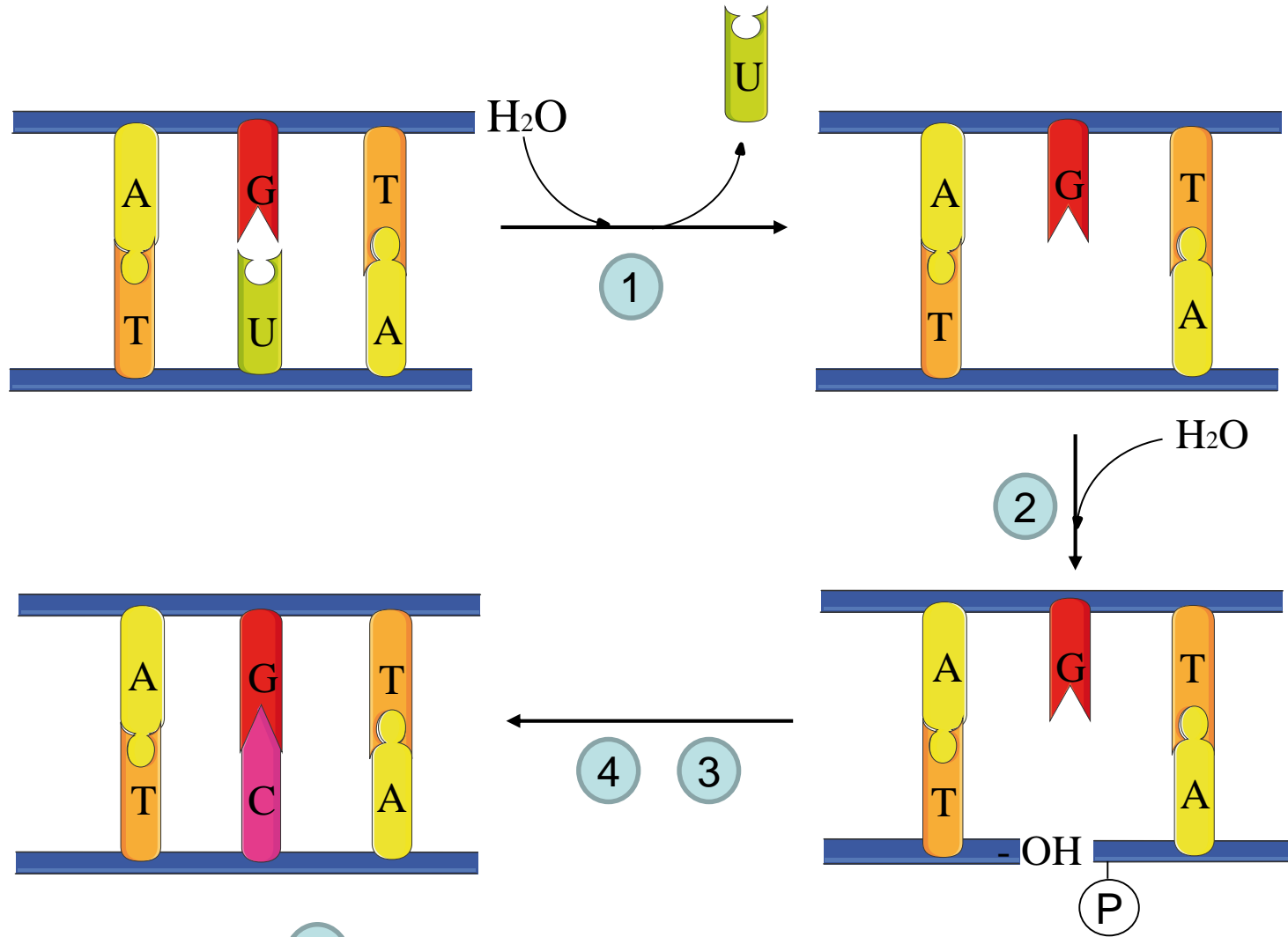
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# DNA reparations



1 DNA-Glycosylase

3 DNA-polymerase I

2 AP-endonuclease

4 DNA-ligase

