

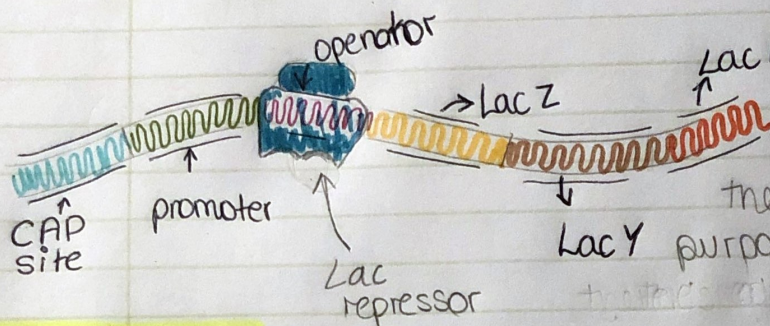
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5-) In terms of where in the process of gene expression the lac operon regulation take place, it is before or during transcription. The absence or presence of lactose or glucose directly affects whether RNA polymerase can transcribe the gene, which will eventually be translated into the necessary proteins

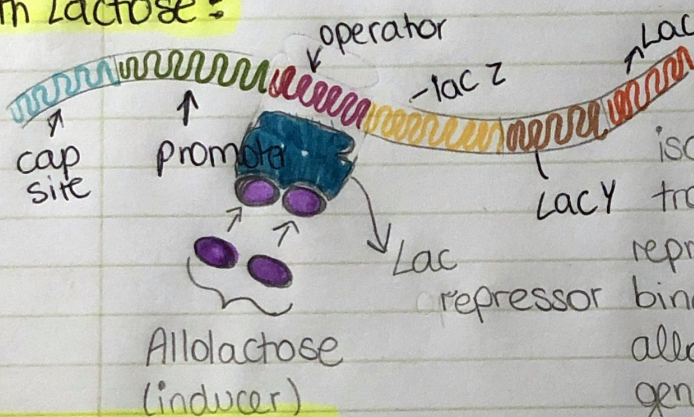
Lac Operon:

1-) In the absence of lactose: → No transcription



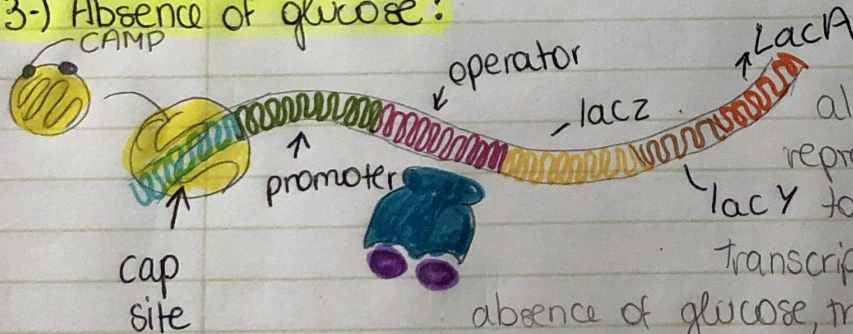
The lac repressor senses lactose indirectly through allolactose. When there is no lactose present, the cell will not transcribe the operon for lactose for efficiency purposes. No lactose - no transcription

2) With Lactose:



The presence of lactose also means an isomer of lactose (allolactose) is also present. This isomer acts as an inducer for transcription by binding to the repressor and prevents it from binding to the operator. This allows transcription of the lactose genes.

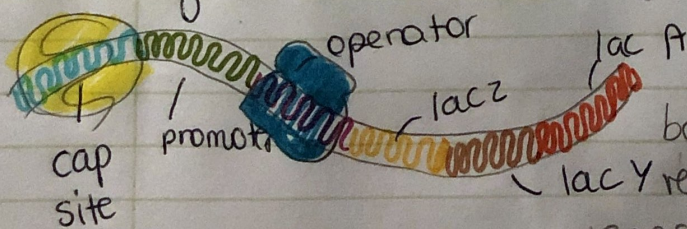
3-) Absence of glucose:



In the absence of glucose, the allolactose isomers bind to the repressor, and prevents it from binding to the operator. Therefore allowing transcription to take place. However, in the absence of glucose, there is a higher number of cAMP, which binds to the cap site and further induce transcription

4-) Absence of glucose and lactose

High glucose = low cAMP low glu = high cAMP



In the absence of glucose AND lactose both transcriptions are inhibited. The lac repressor binds to the operator, which represses transcription of lactose genes. The absence of glucose, the number of cAMP is higher, and they bind to the cap site and induce transcription, but unable to do it due to the repressor