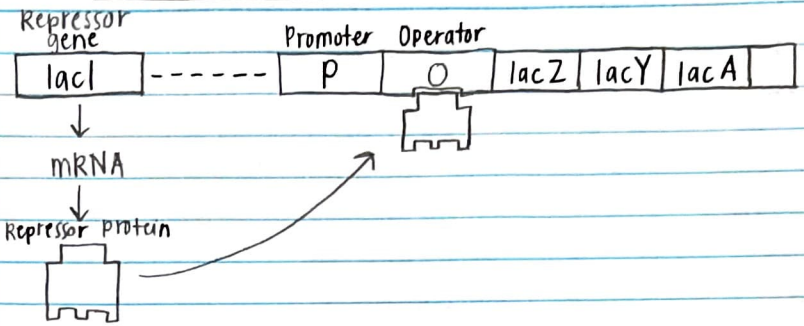
Kayleigh Thompson

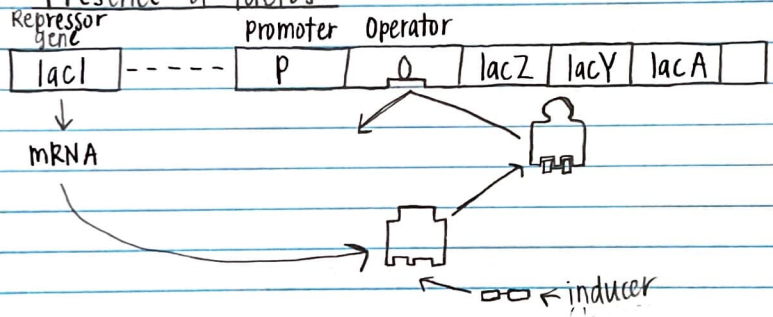
Absence of lactose

1.



When lactose is absent, the repressor gene lacI produces the repressor protein which then binds to the operator. Due to the repressor binding, there is no gene expression and RNA polymerase cannot begin transcription because the repressor is in the way.

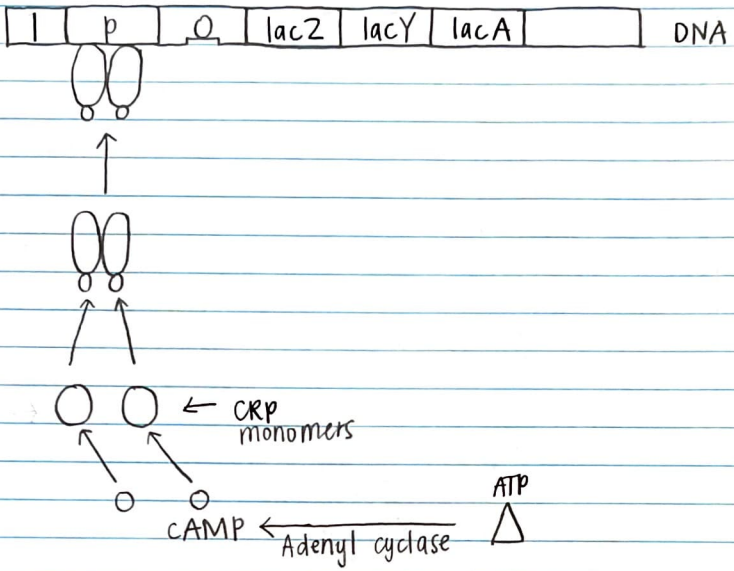
2. Presence of lactose



When lactose is present, molecules get converted to allolactose which is the inducer that binds to the repressor. When the inducer binds to the repressor, it causes it to change shape and the repressor can no longer bind to the operator. Without the repressor attached to the operator, it does not block the RNA polymerase and transcription will occur. lacZ, lacY, & lacA genes can be expressed. Transcription will occur at low levels.

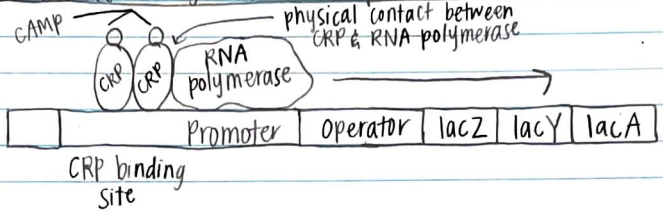
Absence of Glucose

3.



When glucose is absent, adenyl cyclase is highly available which allows for cAMP to be produced. The cAMP then attaches to the CRP monomers, which allow for it to bind to DNA. Having this bind to DNA promotes expression of lac structural genes. RNA polymerase by itself does not bind very well to the lac operon promoter so with the CRP monomers, it allows more transcription to occur. Without cAMP, the CRP monomers cannot bind to DNA.

4. Absence of glucose AND presence of lactose



With the absence of glucose & presence of lactose it allows for transcription to run as effiient as possible. The repressor protein does not bind to the operator or get in the way of RNA polymerase. cAMPs will also attach to the CRP monomers and allow for it to bind to the DNA. With the presence of lactose, the transcription would occur, just slower and could take more than one transcript, but with glucose also being absent and the CRPs binding as well, it makes the transcription occur at higher levels because the CRP helps RNA polymerase attach to the promoter.

- This regulation takes place in transcription