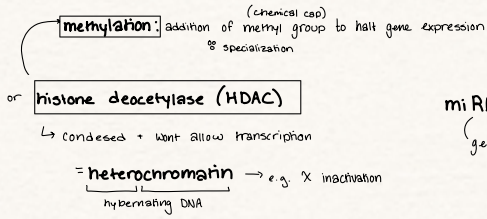
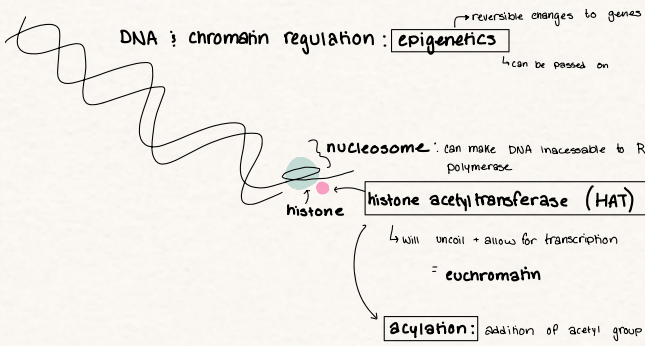


# gene regulation

## eukaryotic gene regulation



miRNA: transcriptional/post-gene silencing/prevents translation

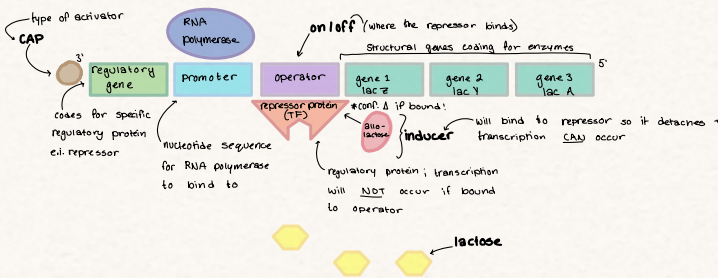
DNA → RNA → protein

type of small regulatory RNAs that bind to mRNA

## prokaryote gene regulation (E. coli)

inducible operon: turned **off** unless needed

### lac operon



no lactose = lac operon **off**

- RNA polymerase will **NOT** bind
- repressor **SHOULD** attach to operator

lactose present = lac operon **on**

- RNA polymerase transcribes
- glucose causes repressor to **conf Δ** - detach

↓ glucose, ↑ lactose

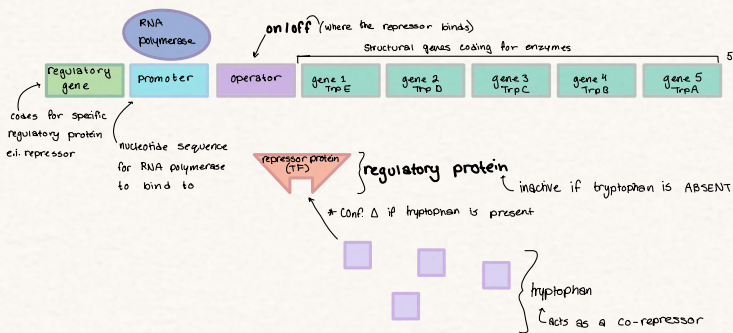
- Lots of transcription
- RNA polymerase will bind
- cap will **not** bind to CAP site
- ↓ glucose = ↑ cAMP

↑ glucose, ↓ lactose

- LESS transcription
- RNA polymerase will **not** bind
- CAMP will **not** bind to CAP activator
- ↑ glucose = ↓ cAMP

repressible operon: turned **on** unless not needed

### Tryptophan operon

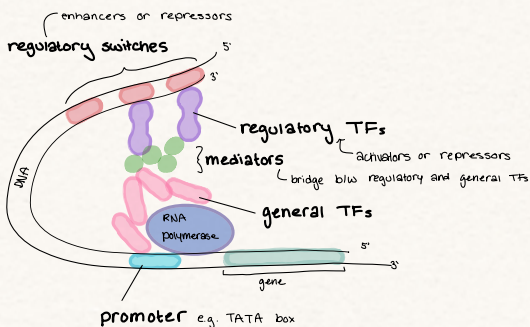


↑ tryptophan = operon **off**

- tryptophan binds to repressor
- repressor binds to operator
- NO transcription

↓ tryptophan = operon **on**

- RNA polymerase bound to promoter
- repressor is **inactive**



constitutive (housekeeping) gene = always on

inducible gene = can be turned on/off

regulatory gene = repressors or activator (TF)