Transformations in Synthetic Biology

Brought to you by the UCSF iGEM Team
What is DNA?

DNA stands for **Deoxyribonucleic Acid**

It’s what makes you... you!
DNA is housed in the nucleus ("brain") of the cell. It contains all of the information the cell needs.
How does the DNA tell the cell what to do?

It does this through the **Central Dogma**!
What is the Central Dogma?

It is an explanation of the flow of genetic information in an organism.

DNA from the nucleus is made into information, or proteins, that can be used in the organism.
There are two processes that make up the Central Dogma: **Transcription** and **Translation**

DNA $\rightarrow$ RNA  
RNA $\rightarrow$ Protein
is a process in the nucleus in which the DNA is coded into RNA (ribonucleic acid), that can tell the protein makers (ribosomes) what to make.

Transcription

DNA $\rightarrow$ RNA

Protein Factory (ribosome)
There are two processes that make up the Central Dogma: **Transcription** and **Translation**

- **DNA ➔ RNA**
- **RNA ➔ Protein**
is a process in which the ribosome (protein factory) turns the RNA into proteins for the cells to use.

Translation
RNA → Protein
Scientists use the Central Dogma to study and change organisms through transformation.
What is *transformation*?

Did you think of...

It’s neither!
We’re thinking of bacterial transformation!
What is bacterial transformation?
How do you transform cells to glow green?

Not transformed bacteria
We know that some jellyfish naturally glow **green**...
...And we also know that we can take DNA from other organisms to put into bacteria!
So... We can use a jellyfish gene to make bacteria glow!

Jellyfish have something called “GFP”, or green fluorescent protein, that makes them glow green.
The Steps of Bacterial Transformation

First, we isolate the DNA.

Then we mix the DNA with bacteria.

The bacteria will take in the DNA and then…

SUCCESS!
Transformed bacteria!

Ask us to see bacteria with **GFP (green)** or **RFP (red)**!
But, we aren’t just limited to making bacteria glow different colors.

- Create drugs such as insulin
- Break down plastics or oils
- And more!

The possibilities are endless!
Thanks for watching!