This post is part of the GRN series. Check out the intro.

This is a very quick and dirty introduction to what biologists call **the central dogma:**

DNA ==> RNA ==> Protein

DNA is what genes are made of. When the cell wants to use a gene, it first **transcribes** a copy of the DNA into RNA. That's **transcription**. The **RNA** then gets moved and changed. Eventually, it gets used as instructions to make **proteins**. This is called **translation**. Proteins do most jobs for the cell, controlling cell shape/motion, pH, salt/ion flow, energy production, modifying other proteins, and more. Some proteins bind to DNA and activate or repress transcription, and those proteins are called **transcription factors**. These **transcription factors** often anchor stably at the same 4- to 12-basepair sequence of DNA. For example, my favorite transcription factor, FOXN1, often binds DNA at occurrences of GACGC. These sequences, like GACGC, are called **transcription factor binding motifs.**

Other important info

- Some RNAs can already do stuff without ever being used to make protein. These RNA's are sometimes called long non-coding RNAs. If they are tiny, they might operate differently, and so they go by other names, such as "microRNAs". They are harder to measure than regular RNAs.
- Each gene can have multiple **isoforms**, because the RNA transcript gets **spliced** (chopped up and mashed back together with pieces missing). Different isoforms can work differently.
- **Enhancers** are pieces of DNA that are not genes, but they help control the activity of nearby genes, often by serving as a landing pad for transcription factors. (Thus, they often contain transcription factor binding motifs.) There are tens of thousands of genes in the human genome, but there are hundreds of thousands of enhancers. Sometimes, the same gene will be active in two similar cell types, but it will be controlled by different enhancers.
- The way that DNA is packaged (**"chromatin state"**) is very important for the control of transcription. As a proxy for gene activity, people often measure whether a gene or an enhancer is accessible to DNA chopping enzymes or whether it is packaged with certain "active marks". These assays measure **chromatin state.**