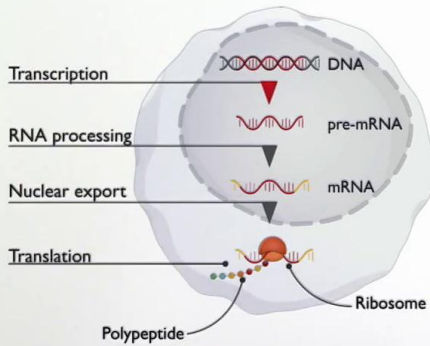
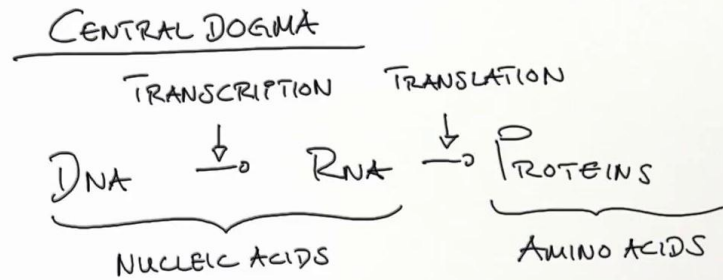


# NEUROSCIENCE RECONSTRUCTED

# Gene transcription



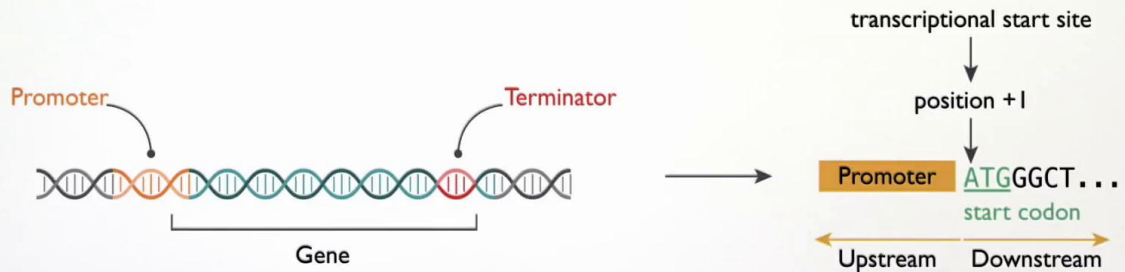
So what is gene transcription actually? Gene transcription is one of two fundamental processes of what is called the central dogma of molecular biology. So this central dogma stipulates that DNA goes to RNA, goes to proteins. So transcription refers to this first step here, which transcribes a copy of double stranded DNA into a single stranded RNA molecule. While translation refers to the second step here, and it is called translation because we switch languages between the language of nucleic acids to amino acids. So transcription is one of two fundamental processes that refers to what is known as the central dogma of molecular biology, which was coined by Francis Crick, one of the co discoverers of the structure of DNA. It postulates that DNA goes to RNA, goes to proteins. This first step is referred to as transcription. While the second step is referred to as translation because it literally translates from the language of nucleic acids to the language of amino acids.

Notes

Summary



# Gene transcription



So the essential steps of gene transcription are as follows. Obviously, we need to have a gene, and this gene has a beginning and an end. In molecular biology, we call these things promoter, which is the beginning of a gene, and the terminator or terminating sequence, which signals that this is the end of a gene. So if we zoom in to the promoter region, then we can see that a gene, we annotate a gene that starts at the very first position that is transcribed, and this is always a start codon, as we will hear later, that is called ATG. So this gets the name of position plus one or transcriptional start site or TSS. Everything that is downstream, everything that is below or after this transcriptional start site gets the annotation of downstream, while everything that is before gets annotated as being upstream of the transcriptional start site.

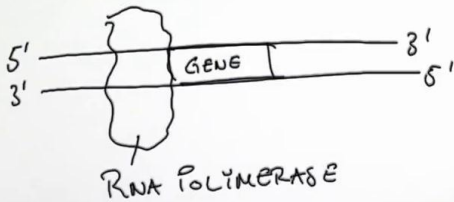
Notes

Summary

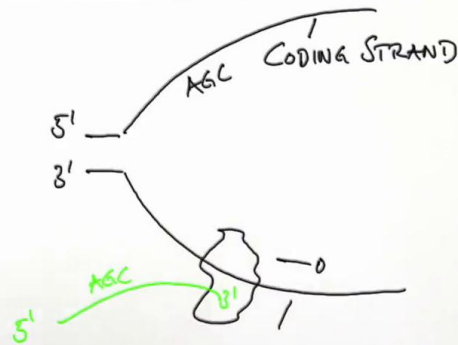


# Gene transcription

## 1) INITIATION



## 2) ELONGATION



So gene transcription takes place in three essential steps. First, we have the initiation. So what we can do here is to draw a double stranded DNA strand that has a certain directionality, five prime to three prime and three prime to five prime. We can imagine that somewhere in its middle, there is a gene. So the initiation of transcription is nothing more than the binding of a very big enzyme that is called RNA polymerase. This enzyme is called RNA polymerase because it produces a polymer of RNA starting from a DNA molecule. So once this step is accomplished, the mode of RNA polymerase switches from binding to an elongation mode, and hence the second step is called elongation. So what happens during elongation is that there are enzyme that come in that open up the DNA to grant access to this RNA polymerase, and the RNA polymerase then starts to copy information that is written on what is called the coding strand into a single stranded copy of an RNA molecule. So RNA polymerase moves along the lower strand and produces a single stranded copy of the coding strand on top. So this also has a certain direction, five prime to three prime, and it is a perfect copy of what is written on this upper strand here, which thereby gets the name of coding strand.

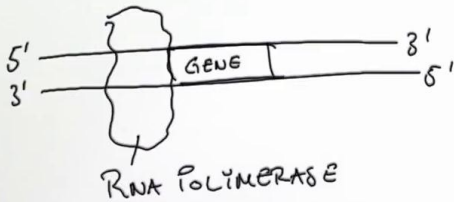
Notes

Summary

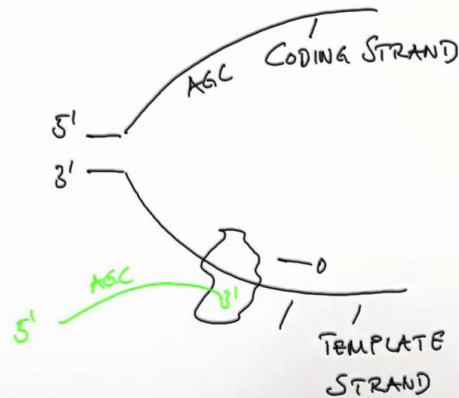


# Gene transcription

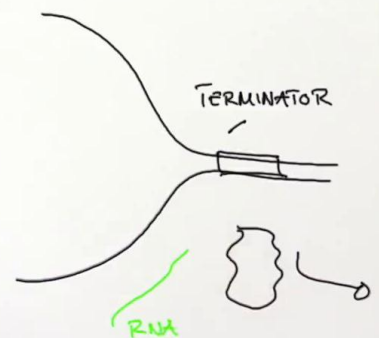
## 1) INITIATION



## 2) ELONGATION



## 3) TERMINATION



RNA polymerase moves along the bottom strand that serves as a scaffold or as a template, and hence this lower strand gets the name of template strand. Elongation continues. So RNA polymerase is going to continue to produce the single stranded molecule, which is an exact copy of the coding strand until it reaches what is called a termination site, and hence the last step is called termination. This termination is being brought about by a terminator sequence which signals to the RNA polymerase to dissociate, and by doing so, the finalised RNA molecule is also released. These were the basics of gene transcription.

Notes

Summary

