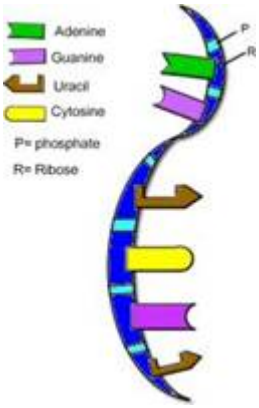
Buy from flipkart.com

Post transcriptional RNA Processing

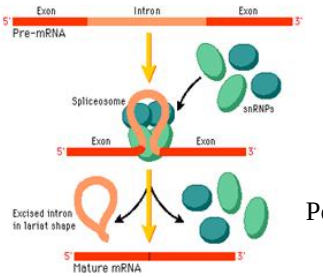
Created: Tuesday, 12 July 2011 05:45 | Published: Tuesday, 12 July 2011 05:45 | Written by Super User | Print

Transcriptional Process :



In a cell's nucleus DNA transcription occurs the RNA is synthesized and then transferred to the cell's cytoplasm where it is translated into a protein.

In prokaryotes, the RNA synthesized during DNA transcription is ready for translation into a protein. Eukaryotic RNA from DNA transcription is not immediately ready for translation.



Post-transcriptional is a process incell biology by which, ineukaryotic cells,primary transcript RNA is converted intomature RNA.

Processing includes base modification, sugar modification, pyrimidine ring rearrangements, formation of helices and tertiary conformations, additions to the 5?- and 3?-termini, specific exonucleolytic and endonucleolytic cleavages, complex cleavages with splicing and the formation of RNA–protein complexes.

The number, type and order of the processing events vary with the RNA species.

Main Modifications

1. 5' capping,
2. 3'polyadenylation,
3. RNA splicing

5' capping

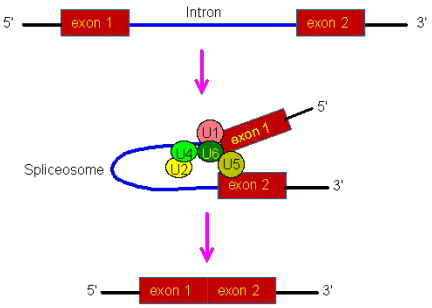
- The 5' cap is a specially alterednucleotide on the5' end ofprecursor messenger RNA and some other primary RNA transcripts as found ineukaryotes.

Polyadenylation

- The addition of a poly (A) tail to anRNA molecule.
- Begins as thetranscription of agene finishes.

RNA splicing :

It is the process by whichintrons, are removed from the pre-mRNA and the remainingexons connected to re-form a single continuous molecule



RNA Transcription components :

- The enzyme RNA polymerase
- A DNA template
- All four types of ribonucleoside triphosphates (ATP, GTP and UTP)
- Divalent metal ions Mg++ or Mn++ as a co-factor
- No primer is needed for RNA synthesis
- RNA transcription is a process that involves the following steps.
- Binding of RNA Polymerase to DNA Double Helix

The histone coat protecting the DNA double helix of the gene to be transcribed is removed, on a signal from the cytoplasm, exposing the polynucleotide sequences in this region of DNA. The RNA polymerase enzyme binds to a specific site, called promoter, in the DNA double helix. This site is located on the 5 side of the gene to be transcribed. It signals the beginning of RNA synthesis. The promoter also determines the DNA strand that is to be transcribed.

Exposure of RNA Bases :

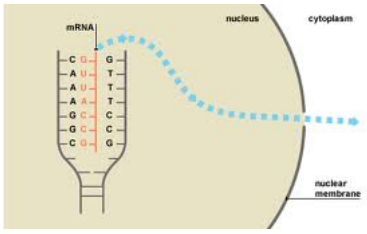
The RNA polymerase moves along the DNA and causes local unwinding and splitting of the DNA double helix into two chains in the region where the gene to be transcribed is located. This exposes the A, T, C and G bases that project into the karyoplasms from the phosphate deoxyribose sugar backbone. Only one strand, called sense strand, of DNA functions as a template, the other strand

is complementary.

Base Pairing :

The ribonucleoside triphosphates, namely, adenosine triphosphate (ATP), guanosine triphosphate (GTP), cytidine triphosphate (CTP) and uridine triphosphate (UTP), floating free in the nucleus, serve as the raw material for RNA synthesis.





They are formed by activation (phosphorylation) of ribonucleoside monophosphates, viz., adenosine monophosphate (AMP), guanosine monophosphate (GMP), cytidine monophosphate (CMP) and uridine monophosphate (UMP) as a result of their combining with ATP.

The enzyme phosphorylase catalyse this activation process.
The ribonucleotide triphosphates are joined to the bases of the DNA template chain one by one by hydrogen bonding according to the base pairing rule i.e., A U, U A, C G, G C. This base pairing is brought about by the RNA polymerase.

Formation of RNA Chain :

Each ribonucleoside monophosphate attached to the DNA template chain then combines with the ribonucleotide arrived earlier, making the RNA chain become longer.

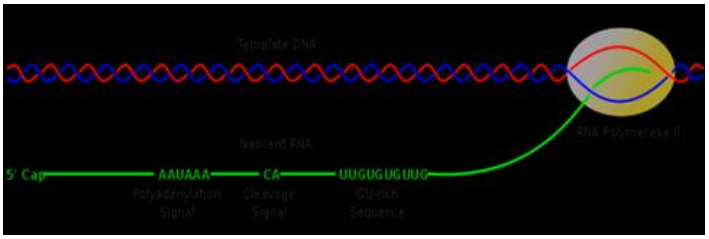
The process is catalysed by the enzyme RNA polymerase

The RNA chain, thus formed, contains nitrogenous bases that are complementary to those of the template DNA chain.

Processing of RNAs :

The forms of RNAs originally transcribed from DNA are called primary transcripts. These undergo extensive changes, termed processing or post-transcriptional modification of RNAs, before they can become functional in both prokaryotes and eukaryotes. In RNA processing,

- Larger RNA precursors are cut into smaller RNAs by a ribonuclease-P cleaving enzyme.
- Unwanted nucleotides are removed by enzymes called nucleases (splicing).
- Useful regions are rejoined by ligase enzyme.
- Certain nucleotides are added at the terminal ends enzymatically (terminal addition).
- The RNA molecule may fold on itself to assume proper shape (folding)
- Some nucleotides may be modified (nucleotide modification).



What is the difference between a DNA and the RNA?

Want to know more about RNA processing? Click here to schedule a live help with an eTutor!

About eAge Tutoring :

eAgeTutor.com is the premium online tutoring provider. Using materials developed by highly qualified educators and leading content developers, a team of top-notch software experts, and a group of passionate educators, eAgeTutor works to ensure the success and satisfaction of all of its students.

Contact us today to learn more about our guaranteed results and discuss how we can help make the dreams of the student in your life come true!

Reference Links :

- http://en.wikipedia.org/wiki/Nucleic_acid
- http://en.wikipedia.org/wiki/DNA_replication
- http://en.wikipedia.org/wiki/Base_pair
- http://en.wikipedia.org/wiki/Nucleic_acid_structure
- http://en.wikipedia.org/wiki/Post-transcriptional_modification
- http://www.youtube.com/watch?v=qO8FaVCklJk

Category:ROOT

Joomla SEF URLs by Artio