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## 1 | Notes

### 1.0.1 | Overview

- Organisms turn genes on and off which is called Gene Expression
  - This can be done in response to external and internal signals
    - These signals are based off of environmental factors
  - This is also be done in order to specialize cells
    - Certain cells need certain genes to preform their specific role

### Differential Gene Expression - Human Cells can express about 20% of it's protein coded genes at any given time - Most cells contain the same genome - Each cell type must use specific parts of this genome - This is called Differential gene expression - Exception would be cells of the immune system - Due to the importance of gene expression when it has issues it can affect the organism significantly - Process of Gene expression in a Eukaryotic cell - Chromatin (DNA unpacking) -> - RNA processing -> - Transport to cytoplasm -> - Translation -> - Protein processing -> - Transport to cellular destination-> - This process can often be equated to transcription for Prokaryote cells

### 1.0.2 | Regulation of Chromatin Structure

- The chromatin structure itself allows for the regulation of gene expression
    - This is partially due to the location of the promoter
  - Chemical modifications to the histone proteins can affect the structure
    - This in turn can affect gene expression
    - Histone proteins are the proteins in which the DNA is wrapped
    - There are many types of modifications that can take place
      - Histone acetylation can tend to promote transcriptions by opening up the chromatin
      - Additional methyl groups tend to close up the chromatin and decrease transcription
    - DNA methylation occurs in most plants and animals as well as fungi
    - Methylated DNA will stay methalated through cell divisions
      - This accounts for genomic imprinting
      - These epigenetic markers can be inherited
        - There is continually more evidence for the importance of epigentics in gene expression
- ### Regulation of Transcription

- Chromatin changes are not permanent and can be reversed
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