

Capturing RNA Sequence and Transcript Diversity, from Technology Innovation to Clinical Application

References:

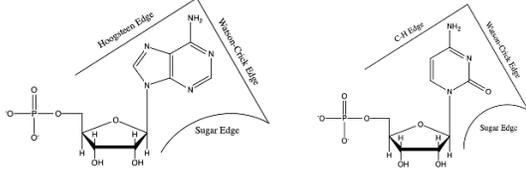
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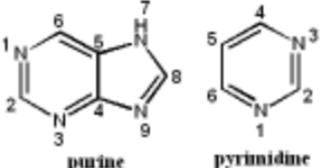
Glossary of Key Terms:

Are there key terms missing? Please let us know.

Contact Katie Bardsley (katie.bardsley@nih.gov) with “Glossary” in the subject or use #Glossary in the meeting chat to suggest a new term!

| Term | Definition |
|-------------------------|--|
| Artificial Intelligence | A broad concept that encompasses the idea of machines being able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages. |

| Term | Definition |
|--|--|
| Anticodon | Three nucleotides in tRNA that read and basepair with nucleotides in mRNA (during translation) |
| Antisense oligonucleotides | Single-strand DNA with sequences that is complementary to an RNA target |
| Base edge nomenclature and H-bond donor/acceptor |  |
| cDNA sequencing | The sequencing of complementary DNA (cDNA) copies of RNA molecules by reverse transcriptase. Technically a better name than RNA-seq for most RNA sequencing experiments. |
| Chem-modSeq | Includes any chemical method used to map RNA structure via modification followed by reverse transcription and cDNA sequencing (DMS, SHAPE, etc). |
| Direct RNA sequencing | The direct sequencing of RNA molecules rather than sequencing cDNA copies of those molecules. This is most commonly carried out using nanopore sequencing of RNA molecules. |
| DMS-MaPseq | Dimethyl sulfate mutational profiling with sequencing. Provides high signal to noise ratio and RNA secondary structure information. Accomplished by modifying two positions; N1 of adenosine and N3 of cytidine which blocks RT. |
| Machine Learning | An application (or subset) of Artificial Intelligence (AI) that provides machines (like computers) the ability to automatically learn and improve from experience, without being explicitly programmed. The intention of ML is to enable machines to learn by themselves using provided information (data) to make accurate predictions. |
| mRNA vaccine | Synthetic mRNA when introduced to cells is translated in a protein or fragment of a protein that triggers immune response so when an organism with those proteins invade the body, an immune response can be triggered |
| nanopore | Nanometer size pores generated by pore-forming proteins such as alpha hemolysin or synthetic material such as graphene |
| nanopore sequencing | Sequencing of DNA, RNA, or protein by passing single-molecule DNA/RNA/protein through protein nanopores; sequences are determined based on the disruption of the current across the pores as the molecules pass through |

| Term | Definition |
|--------------------------------------|--|
| Numbering of purines and pyrimidines |  <p>The image shows two chemical structures. On the left is a purine ring system, which consists of a fused imidazole and pyrimidine ring. The atoms are numbered 1 through 9. On the right is a pyrimidine ring system, which is a single six-membered ring with two nitrogen atoms. The atoms are numbered 1 through 6.</p> |
| Oligos (oligonucleotides) | Short single strand of synthetic DNA or RNA. |
| Oxidative stress | Excessive production of reactive oxygen species relative to antioxidant capacity of cells. |
| Phase-Separation | A liquid-liquid unmixing phenomenon resembling the formation of oil droplets. It is considered a mechanism of compartmentalization within cells, allowing rapid and dynamic isolation of specific activities from the surrounding cellular environment. |
| Reverse Transcription | The process where enzymes (reverse transcriptase) copy RNA to synthesize DNA molecules. |
| Ribonuclease | Enzyme that cleaves the phosphodiester bond in the sugar-phosphate backbone of RNA. |
| Ribonucleoside | A nitrogenous base with a sugar (ribose) moiety. |
| Ribonucleotide | A nitrogenous base with a sugar (ribose) and a phosphate group. |
| Ribosome | A structure with RNA and protein that acts as a site for protein synthesis, and responsible for translating mRNA sequence into amino acid(s). |
| RNA modification | Processes that alter the chemical composition of ribonucleic acid, RNA. These include enzymatic reactions that alter the nucleobase and sugar of RNA. |
| RNA sequencing | A term used interchangeably to describe the sequencing of RNA molecules directly or cDNA copies of RNA molecules. |
| RNA standards | Synthetic RNA with known sequences to act as controls in experiments |
| RNA structure probing | Includes chemical or physical methods to probe secondary and tertiary structures along with dynamics. |
| RNA therapeutics | Medicine that is based on RNA, including antisense oligonucleotides that target RNA, RNA aptamers that target proteins. |
| RNA-DNA hybrid | Double-strand molecule with a DNA and an RNA strand. |
| RNA-Seq | Sequencing of RNA, but today most of the methods require the conversion of RNA to DNA (cDNA) through reverse transcription, in most cases, one is actually sequencing the cDNA and not RNA, and therefore more properly called cDNA-Seq. |



| Term | Definition |
|-------------------------------|---|
| RNome | A complete set of all RNA. |
| SHAPE | Selective 2' hydroxyl acylation and primer extension. |
| SHAPE-MaP | Selective 2' hydroxyl acylation and primer extension and mutational profiling. |
| small interfering RNA (siRNA) | Short RNA that silences gene expression. |
| Splicing | Process where non-coding sequences (introns) are removed from pre-mRNA and the coding sequences (exons) are joined. |