

Genetic Code

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Genetic Code

- A **triplet** sequence of nucleotides on the mRNA is the codon for each amino acid.
- **64** (4^3) different codon
- **Nirenberg** got Nobel price in 1968 for this
- **31 tRNA** carrying **20 amino acids** which translate **61 codons**

<i>First nucleotide 5' end</i>	<i>Second nucleotide</i>				<i>Third nucleotide 3' end</i>
	U	C	A	G	
U	Phe	Ser	Tyr	Cys	U
	Phe	Ser	Tyr	Cys	C
	Leu	Ser	Stop	Stop	A
	Leu	Ser	Stop	Trp	G
C	Leu	Pro	His	Arg	U
	Leu	Pro	His	Arg	C
	Leu	Pro	Gln	Arg	A
	Leu	Pro	Gln	Arg	G
A	Ile	Thr	Asn	Ser	U
	Ile	Thr	Asn	Ser	C
	Ile	Thr	Lys	Arg	A
	Met	Thr	Lys	Arg	G
G	Val	Ala	Asp	Gly	U
	Val	Ala	Asp	Gly	C
	Val	Ala	Glu	Gly	A
	Val	Ala	Glu	Gly	G

Features of Genetic Code

- **Triplet Codons**
 - Codons are on mRNA
- **Non-overlapping**
 - The codons are read **one after another in a continuous manner**
 - Starting point is important
- **Non-punctuated**
 - There is no punctuation between codon they are **continuous**

- **Degenerate**
 - 61 codons and 20 amino acids
 - So **one amino acid has more than one codon**
 - If amino acid has more than one codon, **first two bases** in the codon will be the same, only third one is different, this reduces the effect of mutation.
- **Unambiguous**
 - One codon stands **only for one amino acid**
- **Universal**
 - Same in **all species**

- **Wobbling phenomenon**

- The reduced stringency between the third base of the codon and the complementary nucleotide in the anticodon is called wobbling
- The pairing of codon and anticodon can wobble at the third letter
- GGU, GGC, GGA for glycine can pair with CCI of glycine tRNA
- Reduce possibility of mutation effect

- **Terminator codons**

- Three codons do not code for any amino acids

- **Nonsense** codons

- **Punctuator** codon

- End of protein synthesis

- **UAA, UAG, UGA**

- UGA some time code for seleno-cysteine (21st amino acid)

- **Initiator codon**

- **AUG** in most cases. Also code for methionine

- **GUG** in some case

- **Mitochondria**

- Only 22 tRNA

- **UGA** (standard **stop** codon) is read as **Trp**

- **AGA** and **AGG** (standard codons for **Arg**) are read as **stop** codons

Thank You