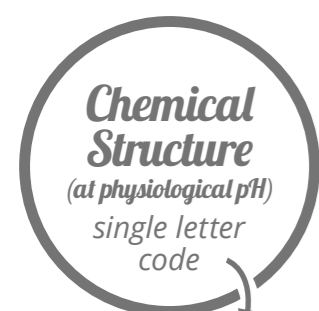


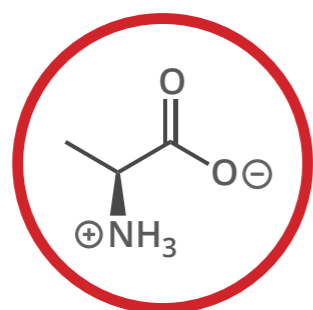
# A GUIDE TO THE TWENTY COMMON AMINO ACIDS

AMINO ACIDS ARE THE BUILDING BLOCKS OF PROTEINS IN LIVING ORGANISMS. THERE ARE OVER 500 AMINO ACIDS FOUND IN NATURE - HOWEVER, THE HUMAN GENETIC CODE ONLY DIRECTLY ENCODES 20. 'ESSENTIAL' AMINO ACIDS MUST BE OBTAINED FROM THE DIET, WHILST NON-ESSENTIAL AMINO ACIDS CAN BE SYNTHESISED IN THE BODY.

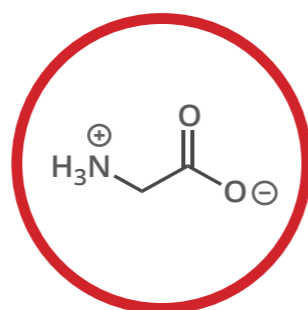
**Chart Key:** ● ALIPHATIC ● AROMATIC ● ACIDIC ● BASIC ● HYDROXYLIC ● SULFUR-CONTAINING ● AMIDIC ○ NON-ESSENTIAL ○ ESSENTIAL



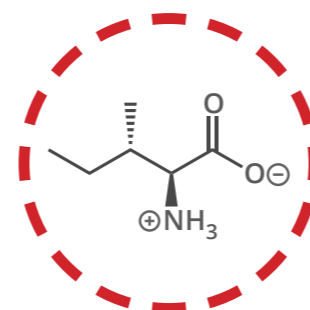
**NAME** **A**  
three letter code  
DNA codons



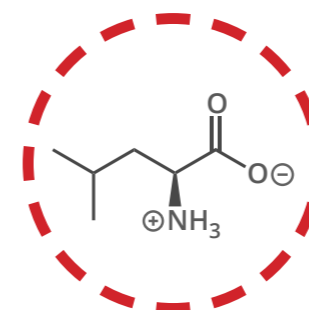
**ALANINE** **A**  
*Ala*  
GCT, GCC, GCA, GCG



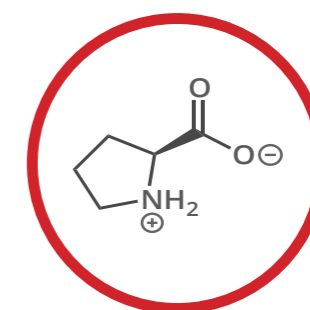
**GLYCINE** **G**  
*Gly*  
GGT, GGC, GGA, GGG



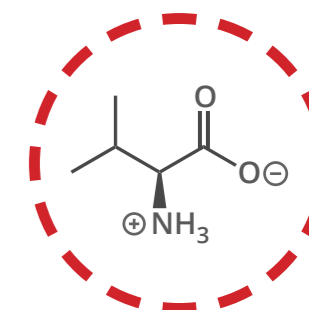
**ISOLEUCINE** **I**  
*Ile*  
ATT, ATC, ATA



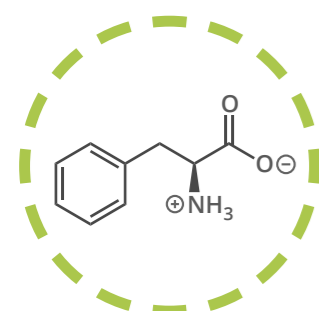
**LEUCINE** **L**  
*Leu*  
CTT, CTC, CTA, CTG, TTA, TTG



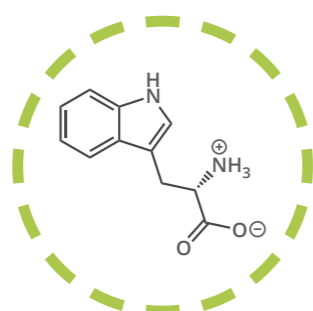
**PROLINE** **P**  
*Pro*  
CCT, CCC, CCA, CCG



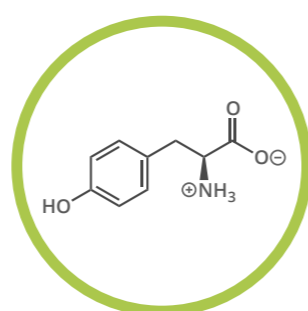
**VALINE** **V**  
*Val*  
GTT, GTC, GTA, GTG



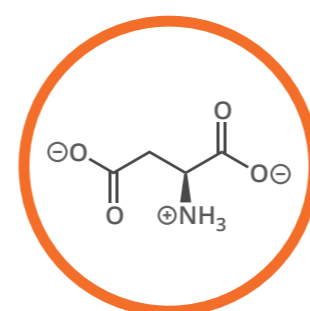
**PHENYLALANINE** **F**  
*Phe*  
TTT, TTC



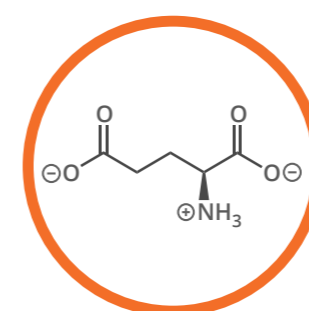
**TRYPTOPHAN** **W**  
*Trp*  
TGG



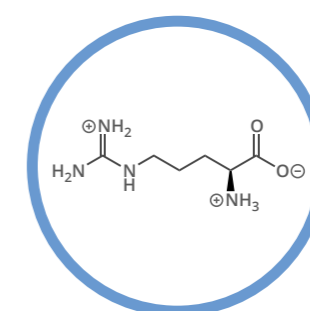
**TYROSINE** **Y**  
*Tyr*  
TAT, TAC



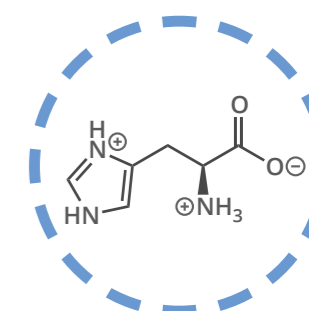
**ASPARTIC ACID** **D**  
*Asp*  
GAT, GAC



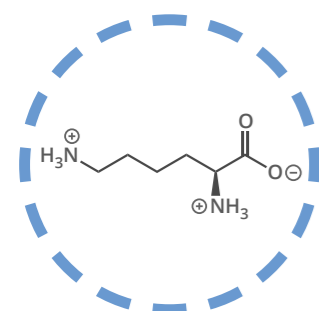
**GLUTAMIC ACID** **E**  
*Glu*  
GAA, GAG



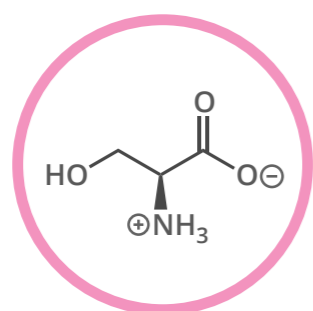
**ARGININE** **R**  
*Arg*  
CGT, CGC, CGA, CGG, AGA, AGG



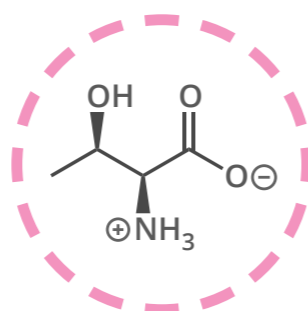
**HISTIDINE** **H**  
*His*  
CAT, CAC



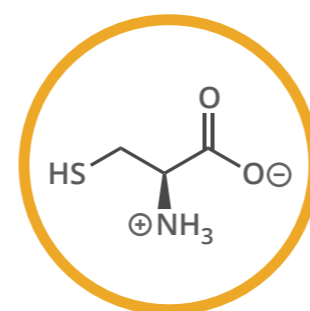
**LYSINE** **K**  
*Lys*  
AAA, AAG



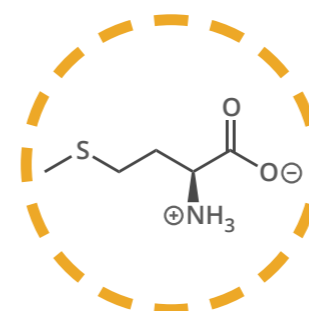
**SERINE** **S**  
*Ser*  
TCT, TCC, TCA, TCG, AGT, AGC



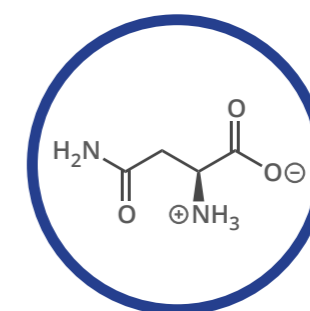
**THREONINE** **T**  
*Thr*  
ACT, ACC, ACA, ACG



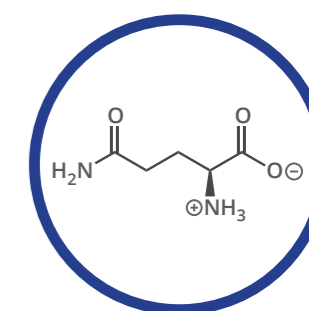
**CYSTEINE** **C**  
*Cys*  
TGT, TGC



**METHIONINE** **M**  
*Met*  
ATG



**ASPARAGINE** **N**  
*Asn*  
AAT, AAC



**GLUTAMINE** **Q**  
*Gln*  
CAA, CAG

**Note:** This chart only shows those amino acids for which the human genetic code directly codes for. Selenocysteine is often referred to as the 21st amino acid, but is encoded in a special manner. In some cases, distinguishing between asparagine/aspartic acid and glutamine/glutamic acid is difficult. In these cases, the codes asx (B) and glx (Z) are respectively used.