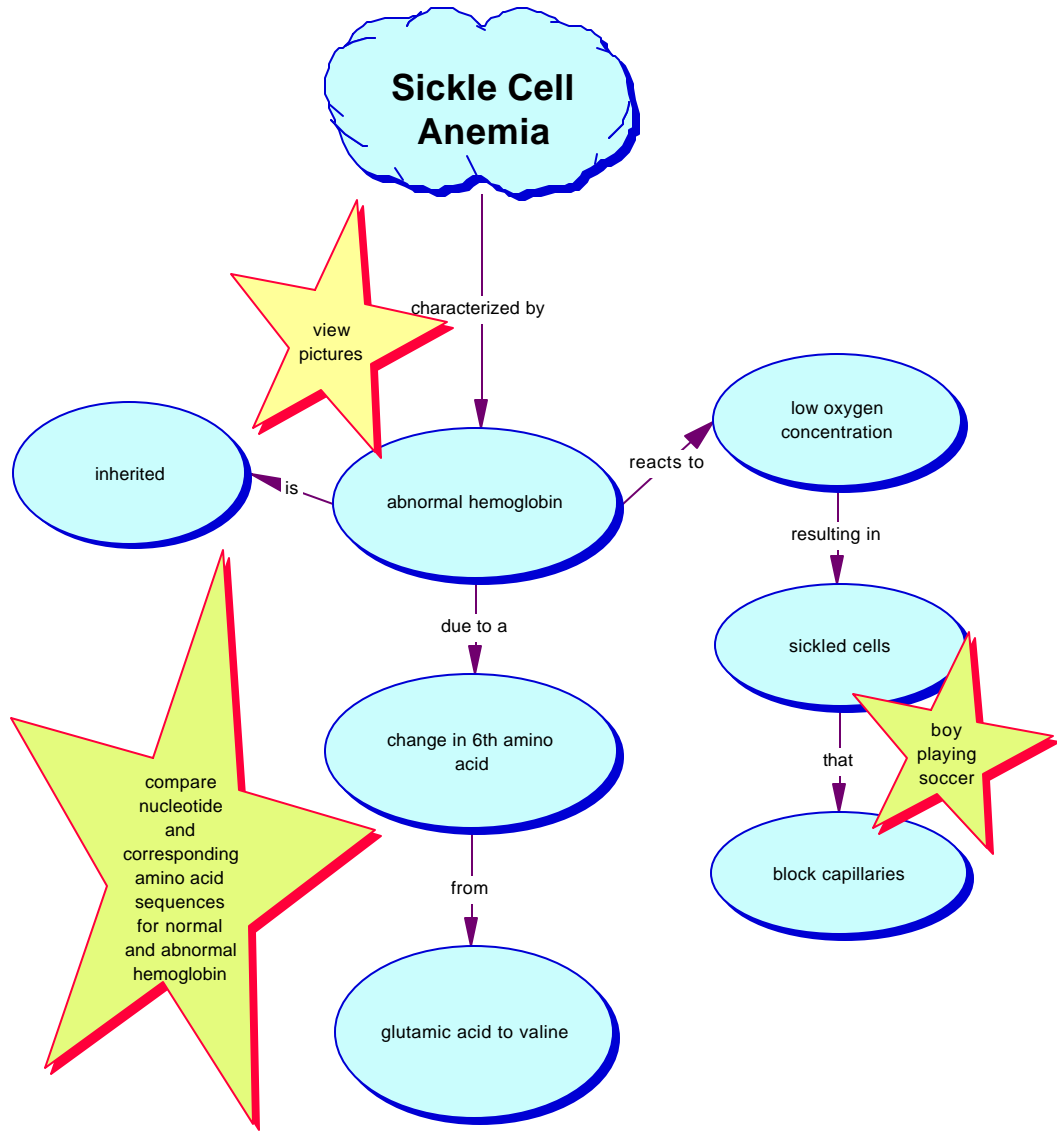


MODULE 4: EXPLORATION



Using Databases to find the normal and abnormal nucleotide and corresponding amino acid sequences for proteins.

OPTION 1

- 1) Go to Entrez at <http://www.ncbi.nlm.nih.gov/entrez/>
- 2) Click on “nucleotide” or “protein”(depending on the sequence you wish to find).
- 3) In the “search for” box type in the protein name that you wish to find.
- 4) Click on “Go”. Various types of requested sequences will appear.
- 5) Choose the desired accession number to attain the required sequence.

OPTION 2 (Directions provided by Angelique Bosse, teacher at Montgomery Blair High School)

- 1) Go to <http://workbench.sdsc.edu/>
- 2) Enter Biology Workbench 3.2 and enter user name and password, click OK.
- 3) Scroll down to “Protein tools” or Nucleic tools” (depending on the sequence you wish to find).
- 4) Select “Ndjinn-Multiple Database Search” and click “Run”.
- 5) In the text box type in the name of the protein you wish to find. Choose a database such as SWISSPROT by clicking in the white box.
- 6) Click on “Search” followed by “Show Records” to view the sequences of interest.

DNA for NORMAL Beta Chain Hemoglobin Protein

atggtgcacctgactcctgaggagaagtctgccgttactgccctgtggggcaag
gtgaacgtggatgaagttggtggtgaggccctgggcagg

ctgctggtggtctacccttgaccagaggttctttgagtcctttggggatctgtcc
actcctgatgctgttatgggcaaccctaaggtgaaggc

tcatggcaagaaagtgctcgggtgcctttagtgatggcctggctcacctggacaa
cctcaagggcacctttgccacactgagtgagctgcact

gtgacaagctgcacgtggatcctgagaacttcaggctcctgggcaacgtgctg
gtctgtgtgctggccatcactttggcaaagaattcacc

caccagtgcaggctgcctatcagaaagtgggtggctggtgtggctaatgccctg
gccacaagtatcactag

DNA for MUTATED Beta Chain Hemoglobin Protein

atggtgcacctgactcctgaggagaagtctgccgttactgccctgtggggcaa
ggtgaacgtggatgaagttggtggtgaggccctgggcaggc

tgctggtggtctacccttgaccagaggttctttgagtcctttggggatctgtcca
ctcctgatgctgttatgggcaaccctaaggtgaaggctc

atggcaagaaagtgctcgggtgcctttagtgatggcctggctcacctggacaa
ctcaagggcacctttgccacactgagtgagctgcactgtg

acaagctgcacgtggatcctgagaacttcaggctcctgggcaacgtgctggtc
tgtgtgctggccatcactttggcaaagaattcacc

ccagtgcaggctgcctatcagaaagtgggtggctggtgtggctaatgccctggc
ccacaagtatcactag

NORMAL Amino Acid sequence for Beta Chain Protein of Hemoglobin

MVHLTP**E**EKSAVTALWGKVVNDEVGGEALGRLLVVYP
WTQRFFESFGDLSTPDAVMGNPKVKA

HGKKVLGAFSDGLAHLNLDNLKGTFFATLSELHCDKLHVDP
ENFRLLGNLVLCVLAHFGKEFTPPVQA

AYQKVVAGVANALAHKYH

Mutated Amino Acid Sequence for Beta Chain Protein of Hemoglobin

MVHLTP**V**EKSAVTALWGKVVNDEVGGEALGRLLVVYP
WTQRFFESFGDLSTPDAVMGNPKVKA

HGKKVLGAFSDGLAHLNLDNLKGTFFATLSELHCDKLVDP
ENFRLLGNVLVLCVLAHFFGKEFTPPVQA

AYQKVVAGVANALAHKYH