Week 14

CHE 4342 – Topics in Human Biochemistry

Hello and welcome to the weekly resources for CHE 4342!

This week is Week 14 of classes, and typically in this week of the semester, your professors are covering these topics below. If you do not see the topics your particular section of class is learning this week, please take a look at other weekly resources listed on our website for additional topics throughout the semester.

We also invite you to take a look at the group tutoring chart on our website to see if this course has a group tutoring session offered this semester.

If you have any questions about these study guides, group tutoring sessions, private 30-minute tutoring appointments, the Baylor Tutoring YouTube channel or any tutoring services we offer, please visit our website www.baylor.edu/tutoring or call our drop-in center during open business hours, M-Th 9am-8pm on class days, at 254-710-4135.

***Keywords**:* N-terminal Signal Sequence, Signal Recognition Particle (SRP), Direct repair, Base Excision Repair (BER), Non-homologous end joining, Homologous Recombination, Nucleotide Excision Repair (NER)

Topic of the Week: Regulation and Repair

Highlight #1: Secretory Pathways

N-terminal Signal Sequence – Directs ER proteins to the ER after translation. This is what directs come biosomes to the ER and some to the cytosol.

Signal Recognition Particle (SRP) – binds the signal sequence and the receptor on the ER membrane

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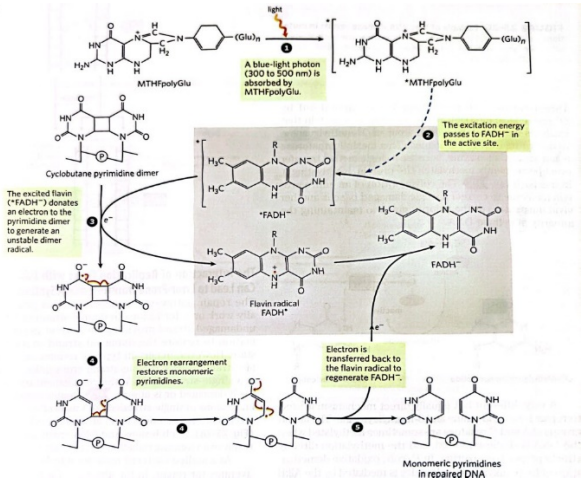
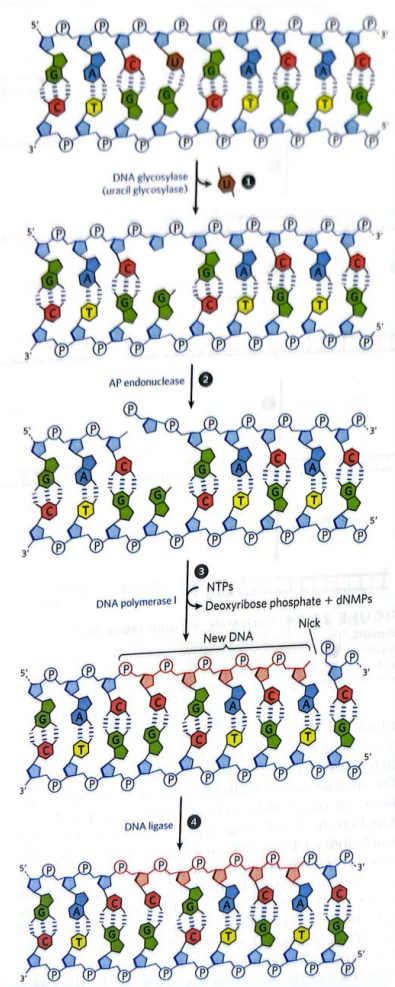
Highlight #3: DNA Repair

Direct repair – Used to repair dimers in the DNA and does not require the removal of a base. This type of repair utilizes DNA photolyases to separate the joined bases.

All images are from Lehninger Principles of Biochemistry, by David L. Nelson and Michael M. Cox, the 8th edition



Base Excision Repair (BER) – This in both prokaryotes and eukaryotes and happens in 3 steps. First Glycosylases cut the base form the sugar which leaves a hole called the AP (Apurinic or Apyrimidinic) site. Then AP nucleases cleave the remaining sugar. Finally nick translation (prokaryotes only) closes the whole. Instead of nick translation, in eukaryotes, DNA pol B and DNA ligase fill in short patches.



Non-Homologous end joining – Used to repair double-strand breaks but sacrifices nucleotides.

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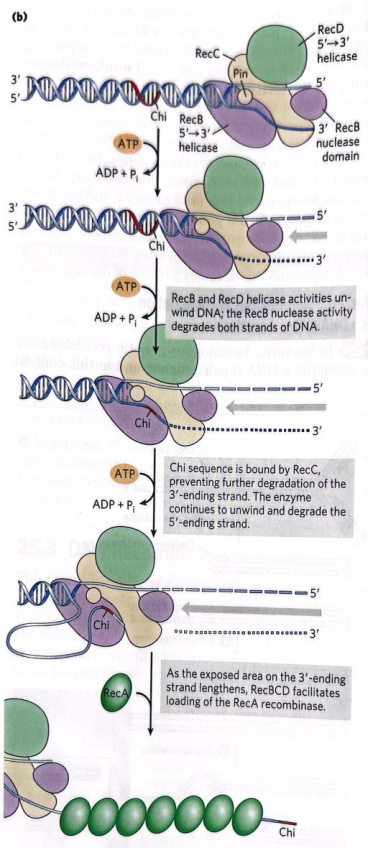
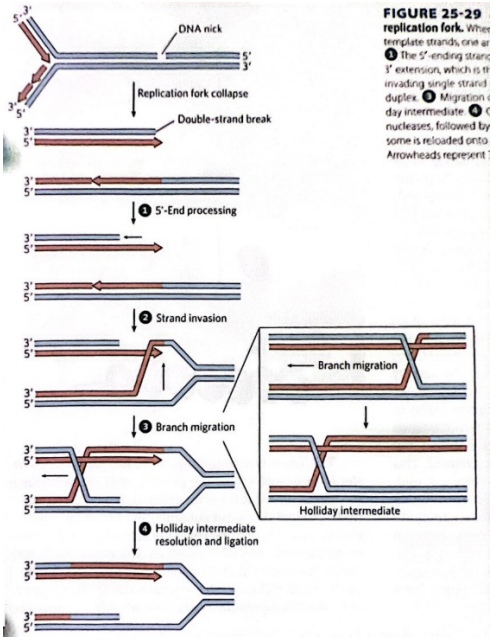
The Ku complex recognizes the breaks, and the RecBCD protein complex fixes them by cutting out nucleotides to make the ends fit back together.



Homology Recombination – Saves a broken strand by using a homologous sequence to repair it. Employs the RecB pathway.



Nucleotide Excision Repair – First A2B sensor finds the error. Then exonuclease (UvrC) cuts

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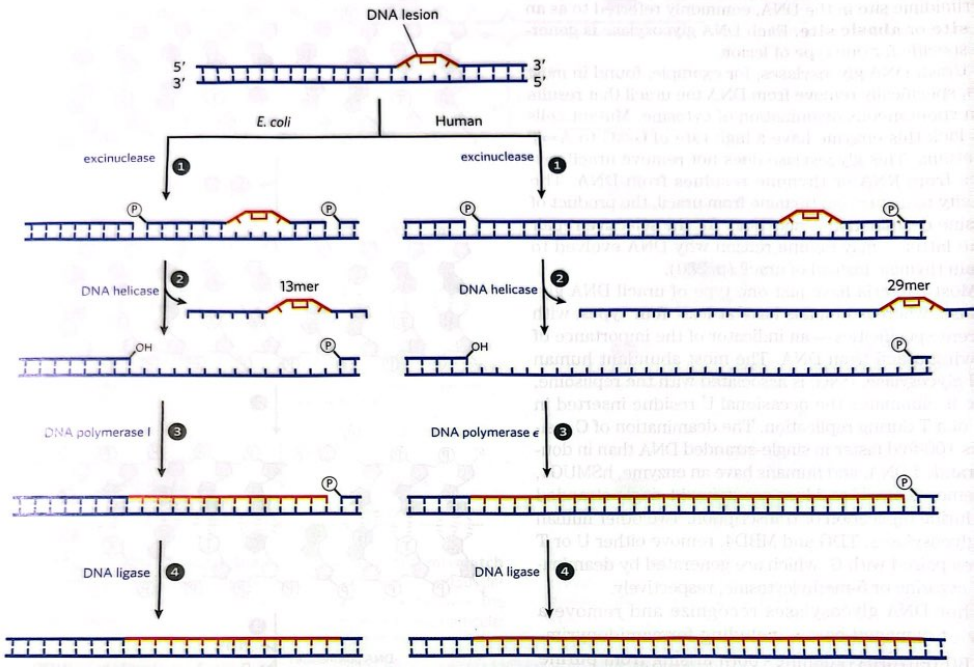
out an entire region of the DNA. Finaly nick translation is used to close the gap. Errors in this translation can manifest as Xeroderma Pigmentosa which is characterized by many freckles on the skin.



Check Your Learning:

1) If thymine dimers were created by UV radiation what would be the best method of repair?

    a. Direct Repair

    b. Base Excision Repair

    c. Homologous recombination

    d. None of the above

2) If a person had dense freckles on their face, which process(s) would most likely be nonfunctional?

    a. Direct Repair

    b. Nucleotide Excision Repair

    c. Non-Homologous end joining

    d. All of the above

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Things You May Struggle With:

- Understanding the different types of repairs. While they all do very similar things the route they go about it is very different. Studying these often will help to keep them straight in your head.
- Remembering that the signal sequence is what directs proteins to where they need to go.

Thanks for checking out these weekly resources!
Don't forget to check out our website for group tutoring times, video tutorials, and lots of other resources: www.baylor.edu/tutoring ! Answers to check your learning questions are below!

Answers to Check Your Learning:

1) A
2) B

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