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**Unit 5 Review**

Key Concepts: Overarching principles you should now understand.

Essential Questions: You should be able to answer these questions easily in your head.

Key Terms: You should know these definitions if given the term; you should know these terms if given the definition.

Other study tools:

* Powerpoint
* Notes
* Conclusions questions
* Career journals
* Links online
* Quiz

**Key Concepts**

1. There are many types of fat or lipid molecules and each has different physical properties and functions in the body.
2. Cholesterol is a lipid and is necessary for the proper functioning of cells and for maintaining a healthy body.
3. Cholesterol is transported in the blood by protein complexes called high density lipoprotein (HDL) and low density lipoprotein (LDL); the measurement of these complexes may indicate a person’s risk for heart disease.
4. DNA from numerous sources including blood and saliva can be amplified and analyzed.
5. The Polymerase Chain Reaction (PCR) exponentially increases the number of DNA molecules.
6. Restriction Fragment Length Polymorphism allows for genetic diseases and disorders to be diagnosed by analysis of DNA samples without DNA sequencing.
7. DNA gel electrophoresis separates DNA fragments based on size and is used in Restriction Fragment Length Polymorphism analysis.

**Essential Questions**

1. Are all fats the same?
2. What is the difference between saturated and unsaturated fats?
3. Why unsaturated fats are considered healthier than saturated ones?
4. What is cholesterol?
5. Why are so many foods advertised as non-fat and cholesterol-free?
6. What are LDL and HDL?
7. Why are there so many drugs available to lower cholesterol or LDL?
8. How are LDL, HDL, and cholesterol related to heart disease?
9. How do crime scene investigators get enough DNA evidence from a single drop of blood?
10. What is PCR?
11. How is DNA analyzed without sequencing it?
12. What does PCR do and how does it work?
13. Can genetic diseases or disorders be diagnosed using a small blood or saliva sample from a patient?
14. Why are DNA tests on television programs and movies shown as patterns of stripes or bands on film or in gels?
15. What is gel electrophoresis and how are the results interpreted?

**Key Terms**

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| **Cholesterol** | A lipid that forms an essential component of animal cell membranes and acts as a precursor molecule for the synthesis of other biologically important steroids. |
| **Fatty Acid** | A long carbon chain with the end carbon double bonded to oxygen and to a hydroxyl (OH) to form a carboxylic acid. Fatty acids vary in length and in the number and location of double bonds; three fatty acids linked to a glycerol molecule form fat. |
| **HDL (High Density Lipoprotein)** | A cholesterol-carrying particle in the blood, made up of cholesterol and other lipids surrounded by a single layer of phospholipids in which proteins are embedded. An HDL particle carries less cholesterol than a related lipoprotein, LDL, and may be correlated with a decreased risk of blood vessel blockage. |
| **LDL (Low Density Lipoprotein)** | A cholesterol-carrying particle in the blood, made up of cholesterol and other lipids surrounded by a single layer of phospholipids in which proteins are embedded. An LDL particle carries more cholesterol than a related lipoprotein, HDL, and high LDL levels in the blood correlate with a tendency to develop blocked blood vessels and heart disease. |
| **Monounsaturated Fatty Acid** | A fatty acid whose molecular structure includes only one double carbon bond. |
| **Polyunsaturated Fat** | A kind of fat often found in plant products that contains numerous double bonds between the carbons in the hydrocarbon tails of the fatty acids. |
| **Saturated Fat** | A kind of fat, often found in meat and other animal products, which cannot incorporate any additional hydrogen atoms. |
| **Saturated Fatty Acid** | A fatty acid in which all carbons in the hydrocarbon tail are connected by single bonds, thus maximizing the number of hydrogen atoms that can attach to the carbon skeleton. |
| **Tri-glyceride** | Three fatty acids linked to one glycerol molecule. |
| **Unsaturated Fatty Acid** | A fatty acid possessing one or more double bonds between the carbons in the hydrocarbon tail. Such bonding reduces the number of hydrogen atoms attached to the carbon skeleton. |
| **Agarose** | A polysaccharide obtained from seaweed that is used as the supporting medium in gel electrophoresis. |
| **Allele** | Alternative versions of a gene that produce distinguishable phenotypic effects. |
| **Amplification** | A usually massive replication of genetic material and especially of a gene or DNA sequence. |
| **Electrophoresis** | The movement of suspended particles through a fluid or gel under the action of an electromotive force applied to electrodes in contact with the suspension. |
| **Exponential** | Rapidly becoming greater in size. In mathematics used to describe a mathematical entity such as a curve, function, equation, or series that contains, is expressed as, or involves numbers or quantities raised to an exponent. |
| **Familial Hypercholesterolemia** | A metabolic disorder that is caused by defective or absent receptors for LDLs on cell surfaces, that is marked by an increase in blood plasma LDLs and by an accumulation of LDLs in the body resulting in an increased risk of heart attack and coronary heart disease, and that is inherited as an autosomal dominant trait. |
| **Heterozygous** | Having two different alleles for a given gene. |
| **Homozygous** | Having two identical alleles for a given gene. |
| **Linear** | Relating to a straight line or capable of being represented by a straight line. |
| **Mutation** | A rare change in the DNA of a gene, ultimately creating genetic diversity. |
| **Restriction Endonuclease** | A degradative enzyme that recognizes specific nucleotide sequences and cuts up DNA. |
| **PCR**  **(Polymerase Chain Reaction)** | A laboratory technique for amplifying DNA *in vitro* by incubating with special primers, DNA polymerase molecules, and nucleotides. |
| **Phenotype** | The physical and physiological traits of an organism that are determined by its genetic makeup. |
| **Polymerase** | Any of several enzymes that catalyze the formation of DNA. |
| **Polymorphism** | The coexistence of two or more distinct forms in the same population. |

**You should be able to:**

* Discuss the facts of cholesterol
* Know the major functions of cholesterol
* Compare and contrast saturated and unsaturated fats
* Know their molecular structure
* Compare and contrast LDL and HDL
* Understand the role of food in cholesterol
* Understand cholesterol uptake and manufacture by the liver
* Know the causes of high cholesterol and ways to combat/prevent it
* What is PCR? What machine runs PCR?
* Explain: What does it do, what does stand for, what are the three steps, describe each
* Describe DNA electrophoresis, what are the steps, why is it done?
* What is FH? What is familial hypercholesterolemia?
* What is a restriction enzyme?
* Describe RFLPs. What are they? How does the process work?
* What results do you get from a gel? How can they be used?