Title: Lipid test

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Subject Area(s): Anatomy and Physiology

Grade(s): 10-12

Description of Lesson: Students will test different substances for lipid content by using Sudan III stain.

Length of Lesson: 1 block period (87 min.)

Student Objectives: Students will be able to identify known and unknown substances as lipids or lipid containing based on positive or negative Sudan staining test. Students will be able to understand the difference between oils (unsaturated) and fats (saturated) at room temperature. Students will understand that lipids provide roughly twice as many calories per gram as carbohydrates or proteins. Students will understand the main source of lipids in the diet is triglycerides and understand the general organic structure of fatty acid chains (saturated and unsaturated).

Materials: Distilled water, Sudan III stain, test tubes, beakers, paper towels, goggles, test tube racks, test tube stoppers, common fatty foods and oils, and unknown substances, toothpicks, laptops with internet connection

Procedure: Label each test tube by number. Place 5 mL of distilled water in each test tube. Add 10 drops of known or unknown substances to each food except for tube 1. Use a toothpick to transfer a small amount of Sudan stain to each test tube. Stopper each tube and shake well to mix up the contents of each tube. Observe any changes after 3 minutes. Scientific Explanation: Sudan IV stain is a dye that is soluble in lipids and insoluble in water. A positive test is indicated by a scarlet color in the layer of a mixture containing the oil. It does not chemically alter lipid molecules, so any color change is a physical change.

Assessment: Students will record any color change noted with each tube. Students will identify the control test tube. Students will identify which substances contained lipids based on results. Students will hypothesize about which types of fats are "healthier" and research online the structure of mono- and poly- unsaturated and saturated fats. Students will also research online the components of a lipid panel lab test at the doctor's office by answering questions about triglycerides, cholesterol, HDL, LDL, and chol/HDLC ratio. Students will summarize findings by drawing conclusions about what foods/oils contribute to better lipid panel tests over time. Students will also rate the stored energy differences between lipids, proteins, and carbohydrates in calories. Helpful websites that can be used include:

www.labtestsonline.org

www.americanheart.org
Kansas Standards Addressed:

STANDARD 1, Benchmark 1: The student will demonstrate the abilities necessary to do scientific inquiry.
STANDARD 3, Benchmark 5: The student will develop an understanding of matter, energy, and organization in living systems

Missouri Science Standards (GLE’s):

Strand 7.1
Concept B: Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations
Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical