Fat Brain

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Objectives:

- To understand how information travels in the brain
- Gain an appreciation for what the brain is made of
- Visualize the lipids that make up a significant portion of the brain

Materials and Supplies Needed:

Item	Quantity	Notes (Vendor, price, purpose, etc.)
Packaged pig brain	1	Can buy from local butchers (about $20 a package)
Blender	1	Designated blender specific for this activity ~$20 – Walgreens, target, etc. Affix biohazard sticker.
Coffee filters	1 package	~$5 – various grocery stores
Disposable spoon	1	
Mason jars / clear mugs	2	
Water		
100% Ethanol	1 bottle	Alternatively, vodka with a high alcohol content can be used (but why waste them when you can drink them...)
Personal protective equipment (PPE)		Masks, gloves, lab coats, goggles etc.
Biohazard waste container	1	

Background Information / Activity Explanation:

The human brain can produce an amazing assortment of actions. Even though the brain only weights ~3 pounds (roughly 2% of our weight), each of us have over 86 billion neurons in our head. Information travels from one part of the brain to another (or between neurons) at a speed of about 100mph. How is this possible? The 'information' is electrical impulses that travel down axons. Just like the wires that bring us electricity, the more insulated they are, the faster they relay that information. The same is true in the brain. If you look at a picture of a cut brain, the white parts (called white matter) are made up of fat. The major pathways in the brain are wrapped in fat that serves as insulation. The fatter the brain, the faster information can travel! Some diseases affect the amount of fat that insulates the brain's wiring. This can have major consequences on a person's ability to think fast and function properly.

What is the brain made of? Water makes up ~77%, fat is the next largest component comprising 11%, protein with 8% and 4% is organic substances and carbohydrates.
Can we visualize how fat a brain is? Yes! By blending up a brain, adding different liquids and filtering out certain parts, we can isolate the fatty parts that make up 11% of our brain.

Procedures:

Use gloves and appropriate PPE at all times.

1. Put the brain in the blender and mix until it is a reddish, smooth liquid
2. Take ~1 spoonful of the liquid and place it in one of the jars
3. Add ½ cup of ethanol and mix in order to separate the fat molecules from the proteins.
4. Once stirred, pour the contents through a coffee filter into the other jar
5. To the filtrate, add in ~1 cup of water
6. The mixture will become very cloudy because of the fat swimming around. It will eventually rise to the top and separate from the water.

Dispose of all liquids in designated biohazard waste container.