Effect Of Different Temperature & Different Concentration Through Diffusion Of The Membrane

Introduction

Biology may be a scientific study of life within which we examine the essential components to living things and their key habits to survival. to grasp this process, we first have a look at the organism's cell. The cell was discovered and derived because the basic unit of life by British scientist, scientist. From his study, he concocted the thought that everything an organism has to survive is found, processed, and utilized within the cell. He then realized that certain nutrients, proteins, and more must enter and depart from the cell through what we all know today because the cell's cell membrane. The cell's membrane acts as a barrier to its surrounding elements, although it does allow certain things inside. This function labels the membrane as being semi-permeable. A fluid mosaic model (Nicholson 1972) is what we use to visualize the cell membrane and its configuration.

The membrane's main composition has structures called phospholipids. Phospholipids are formed by both phosphate groups and lipids, forming a shape that resembles a head and tail. The "head," portion contains a phosphate group additionally because the lipid, glycerol. This portion is hydrophilic, meaning it corresponds well with water. The tail section of the phospholipid, however, is hydrophobic, meaning water doesn't work well with its carboxylic acid chains. Throughout the membrane there'll be several other components that help molecules get in and out of the cell, including ones that help the membrane keep its rigid structure. Steroids like cholesterol, enhance the form and fluidity of the membrane. Glycolipids and glycoproteins are connected to the membrane but stick outside of the cell. They function "cell detectors," in whose job is to acknowledge other cells in search of an overseas one that would potentially cause harm to the present cells. Lastly, the cell membrane holds specific proteins. Integral and peripheral proteins dispersed throughout the cell help deliver key nutrients. Integral proteins are imbedded within the membrane, while peripheral proteins lie on the side of it. Outside molecules that are often overlarge to diffuse across the membrane by themselves, are brought in by proteins called carrier and channel proteins. Channel proteins are a sort of integral protein that act as a passageway to water-soluble molecules. They push these molecules down their concentration gradient, or to a section of high to low solution. Carrier proteins often "carry" things like ions in and out of the cell. they are doing this by changing shape to the given protein they're transporting.

When transportation of proteins occurs, the cell completes several varieties of movement: osmosis, active and transport, and bulk transport. Osmosis may be a kind of transport because it doesn't require energy. This process only moves water and liquid solvents through the membrane. These solutions cannot diffuse easily across the membrane, because they contain polar, water molecules. The phosphate head is additionally polar; therefore, it'll reject the presence of the similarly charged molecule. transport varies from transport because it requires energy within the variety of ATP. Bulk transport may be a kind of transport because it takes on many processes that use energy. as an example, endocytosis relates to bringing things through the membrane and within the cell. this may be done 3 ways. Phagocytosis, pinocytosis, or receptor mediated endocytosis. In other words, the cell can either bring things in by eating large, outside molecules, drinking small molecules and extraneous outside fluid, or using the skin glycoprotein receptors to connect to the corresponding molecules and engulf them in. the identical way molecules enter the cell, they have to exit by a task called exocytosis. Exocytosis doesn't have specific ways for the within materials to exit. They simply gather together in vesicles because the vesicles fuse with the membrane. From there, the materials are dumped back outside of the cell or dampened by lysosomes. (Cooper GM. The Cell: A Molecular Approach.)

Conclusively, the cell membrane plays a giant role in cell survival. By being selectively permeable, it can regulate what's needed inside and out of the cell by the direct size, placement, and quantity of the molecule. Its active and transport facilitates the movement and delivery of every molecule for the advantage of the cell. However, the initial hypothesis for this experiment is to see if such factors like temperature and concentration enhance the method of diffusion.

Methods

The intended purpose of this experiment was to look at the variable as being the method of diffusion. More specifically, the factors that increase the speed of diffusion. within the first experiment, the variable that's being tested is that the solution concentration. First, you're given a stock concentration of KMNO4. With this, you want to add a 1 mL sample of it to a 4-mL water filled tube. Once that solution is settled, take a 1 mL sample from the primary tube and apply it to a second 4-mL water filled tube. From the second solution, take one last 1-mL sample and apply it to a 3rd 4-mLwater filled tube, so you've got three test tubes in total stuffed with the identical amount of water, but different concentration amounts of the KMNO4. you're doing this to dilute each sample in hopes of getting a more robust reading from the sample containing more KMNO4. From here, you'll add 2 mL's of every solution to a few dialysis tubes. The tubing is then secured on both ends with clamps and placed in their own beaker. A sample of H2O will have to be measured as a sway for the experiment before the measurement of the other substance. to live the concentration in each testing, you'll sample each solution in an exceedingly cuvette within five-minute increments of every other. ranging from twenty-five minutes, the spectrophotometer will read the solutions absorbance level during which you utilize to equate concentration (c = A/(eb). C is that the concentration, A is your absorbance level, E stands because the molar absorbance coefficient, and B is that the path length (Beer's Law). Our hypothesis suggests that the answer with more permanganate will have higher concentration, because diffusion works faster when it's a better concentration of solutes to move through the concentration gradient. Another factor we rationalized through our hypothesis, is that the upper the temperature our stock solution settles in, the faster diffusion would occur. to start this experiment, you begin by locating three beakers and stir plates. you'll set one to 25 ° Celsius, another to 37 ° Celsius, and also the last one to 50 ° Celsius, making the temperatures our variable. Once heated, take a sample of just the water, and measure its absorbance through the spectrophotometer for a sway to your experiment. As within the previous experiment, permanganate (KMNO4) are going to be given to feature to the heated water beakers. Add 2 mL of KMNO4 to the given dialysis tubes, and place each in one in every of the three different temperature settings. confirm that your bags are clamped tightly before placement. ranging from twenty-five minutes, use a timer to check your concentration every five minutes. the speed at which it diffuses is your variable.

Discussion

As we are covering membrane transport in class it is beneficial to see how this concept affiliates with real world scenarios, as it is with all topics taught. Class discussion then led to the intake of drugs why? Because drugs enter our body, more importantly our cells, just as any other protein or molecule. The reason then for consuming, injecting, or inhaling these drugs is to undergo the corresponding side effects. However, these effects would not have any impact on the human body until they are diffused through the cellular membrane. As mentioned before, molecules diverge through the cell through several transport mechanisms. (Active and passive transport, osmosis, or receptor mediated). Pharmacist, Jennifer Le of UCS school of pharmacy states that most drugs are acids or bases, as well as un-ionized and ionized forms in an aqueous environment. This gives them the ability to either pass through the membrane easily or with assistance.

For example, the drug marijuana is used and now legalized in several states. Often smoked and inhaled, the active drug in marijuana, THC, acts as an inhibitor to release dopamine. Dopamine releases a “natural high” to the body, giving off a relaxed vibe. THC however is a non-polar molecule in which it can easily diffuse across the lipid bilayer unlike a polar intoxication as alcohol. Drugs like THC use the receptor mediated process when diffusing, seen in the mouse party presentation. The drug attaches to these receptors and acts as anandamide to signal messages to surrounding neurons.

Although marijuana can be used medicinally, there are many other drugs that must be examined to see how they diffuse into the cell before being administered. The specific field of medicine I want to study is optometry. In certain scenarios relating to optometry, membrane transport to lens cells metabolize the overall health of the eye. Cataracts are an example of how membrane structure can affect the eye. In the middle of the lens, the increase in sphingomyelin and cholesterol to phospholipids ratio decreases the plasma membrane's refractive index. At this point the ability to focus light is deterred causing cataracts. (Gretchyn Bailey, Cataracts.) The drug, Avastin, is used to supplement eye diseases in accordance to vision loss. It requires an eye injection that attacks the growth of abnormal blood cells. It reciprocates the genetic shape of antibodies. By having this ability, it can diffuse into the membrane just as antibodies do. Therefore, everything that enters the body must travel into and through the plasma membrane first. The membrane is much more than a structure, it allows our cells to keep us alive and functioning, making the knowledge of it and its functions a necessity in the science world.

Bibliography

1. Bailey Gretchyn, All About Vision, August 03, 2017 http://www.allaboutvision.com/conditions/cataracts.htm
2. Bank Eric, Seattle Pi, “What Kinds of Molecules Can Pass through the Plasma Membrane through Simple Diffusion?” http://education.seattlepi.com/kinds-molecules-can-pass-through-plasma-membrane-through-simple-diffusion-4587.html
3. Boyd, Kierstan, American Academy of Ophthalmology, Mar. 01, 2017 https://www.aao.org/eye-health/drugs/what-happens-during-treatment-with-avastin
4. Cooper GM. The Cell: A Molecular Approach. 2nd edition. Sunderland (MA): Sinauer Associates; 2000. Endocytosis. Available from:

https://www.ncbi.nlm.nih.gov/books/NBK9831/
5. Frederique M.D. Tholozan, Roy A. Quinlan, Lens cells: More than meets the eye The International Journal of Biochemistry & Cell Biology 2007 http://www.sciencedirect.com/science/article/pii/S1357272507002130
6. NIDA. 'Marijuana.' National Institute on Drug Abuse, 30 Aug. 2017, https://www.drugabuse.gov/publications/research-reports/marijuana. Accessed 17 Sep. 2017.