**Case study: Cells**

**Question 1**

Brian means that the genes in the mitochondria have changed their DNA sequence, resulting in a cell that differs from the normal mitochondria. He focuses on the mitochondria because it is the part of the cell that contains the DNA known as mtDNA.

**Question 2**

The mitochondria have the main function of producing energy used in processes such as homeostasis, growth and movement. The mitochondria achieve that through its major function of oxidative phosphorylation. The function allows the organelle to produce ATP by using energy produced after food's oxidation.

**Question 3**

The mitochondria membrane is composed of phospholipids. They include phosphatidylinositol (PI), phosphatidic acid (PA), phosphatidylethanolamine (PE), phosphatidylserine (PS), and phosphatidylcholine (PC). Other membranes, such as the plasma membrane, cardiolipin and phosphatidylglycerol, are exclusive to the mitochondria. The composition of the eukaryotic cell membrane is phospholipids, glycolipids and cholesterol. The difference between the mitochondrial and eukaryotic membranes is in the composition and the fact that the former has a double-layer membrane. In contrast, the latter has a single-layer membrane (Bround et al., 2020).

Cell membranes are also known as plasma membranes and are found in the cells of organisms. They separate the internal parts of the cell from its external environment. The following are a few of the functions of cell membranes:

They act as a physical barrier separating the cytoplasm from the extracellular materials. That protects cell components. The plasma also provides the structural support that holds the cell components together. The membrane also determines what enters the cell through selective permeability. Only specific molecules can pass through the plasma to the inside of the cell. For example, ions such as sodium cannot pass the cell membrane, thus allowing the cell to control the rate of what goes into it.

**Question 4**

Based on the function of the mitochondria, there is a direct relationship between how a defect in the same could impact the optical nerve and thus cause the condition discussed in the case study. The optic nerve and the retina use large amounts of energy and thus require the mitochondria to function well to help provide such energy. When the mitochondria are inefficient, the energy levels are low, affecting the optic nerves and retina causing visual issues.

**References**

Kenneth, S. S. (2020). Anatomy & physiology: The unity of form and function. McGraw Hill.

Bround, M. J., Bers, D. M., & Molkentin, J. D. (2020). A 20/20 view of ANT function in mitochondrial biology and necrotic cell death. Journal of Molecular and cellular cardiology, 144, A3-A13. <https://doi.org/10.1016/j.yjmcc.2020.05.012>