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ARTICLE

Health

Intermittent Fasting and Autophagy

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I love to read books and articles. During the summer holidays, I signed up for the summer reading challenge at the library. One day I came across an interesting article about intermittent fasting and autophagy that was published in the New York Times. I have started doing literature review on this topic and decided that this might be my next science fair project. The focus of the project includes the function and effects of intermittent fasting on the human body and a hypothetical study to understand whether the fasting period helps to prevent disorders and diseases.

Introduction

Intermittent fasting is an eating pattern that involves alternating periods of fasting and eating, focusing on when you eat rather than what you eat. One of the commonly used methods is 16:8 method, which is the simplest and most popular type of intermittent fasting. This method involves an 8 hour window for three meals and a 16 hour fasting period (Leonard, 2023). During the fasting period, it is allowed to drink water, coffee, and tea without added sugar and cream. The fasting period helps to maintain a healthy body. When the body is in the fasting state, insulin levels decrease, leading the body to switch its energy source from glucose to stored fats, resulting in weight loss, improved insulin sensitivity, and reduced inflammation. Additionally, fasting can stimulate autophagy which plays a critical role in energy metabolism.

Autophagy is a natural cellular process that occurs in the body to remove and recycle damaged or dysfunctional components within a cell. It allows cells to break down and recycle stored fats and sugars during times of nutrient deprivation, such as fasting or exercise. Furthermore, autophagy plays an essential role in the regulation of glucose levels by helping to maintain proper insulin production and sensitivity, especially in the pancreas where it helps to remove damaged or dysfunctional beta cells responsible for insulin production (Antoni et al., 2017). Impaired autophagy in the pancreas can lead to impaired insulin production and glucose intolerance. Figure 1 shows benefits of time-restricted eating in rodent and drosophila. The studies in mice showed several health benefits from reduced blood cholesterol, fat, inflammation to reduced microbial imbalance (dysbiosis) and increased energy expenditure, motor control and endurance. Time-restricted eating in drosophila helped in improved sleep and cardiac function.

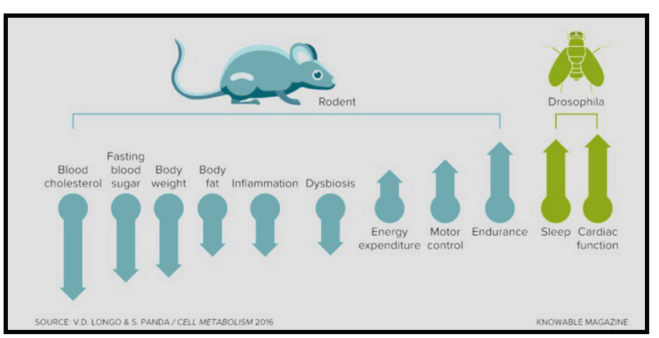

Figure 1: Benefits of time-restricted eating in Rodent and Drosophila.

Purpose

The aim of this study is to investigate the effects of intermittent fasting on autophagy and glucose levels, particularly in relation to the role of autophagy in regulating insulin production and sensitivity in the pancreas. By understanding how intermittent fasting affects autophagy and glucose metabolism, this study may provide insight into potential therapeutic interventions for metabolic disorders such as diabetes.

Hypothesis

The hypothesis of the study is that intermittent fasting enhances autophagy which improves the body's metabolism by reducing inflammation and improving insulin sensitivity.

METHODS

The study involved 30 healthy participants, who were randomly assigned to either an intermittent fasting group or a control group. The intermittent fasting group fasted for 16 hours each day, while the control group was instructed to maintain their usual diet and activity level throughout the study. Blood samples were taken at the beginning and the end of the 4-week trial to measure and compare the levels of autophagy, inflammation, and insulin sensitivity.

Participants in the intermittent fasting group consumed their calories within an 8-hour window each day, with the remaining 16 hours being a fasting period. During this fasting period, participants were allowed to drink water, tea, or coffee without added sugar or cream, while the control group were permitted to have unrestricted access to food. Autophagy levels, inflammation, and insulin sensitivity were measured and compared using blood samples taken at the start and conclusion of the 4-week trial.

RESULTS

The results showed that intermittent fasting increased autophagy in healthy individuals. Participants in the intermittent fasting group had significantly lower levels of inflammation markers compared to the control group, but there was no significant difference in insulin sensitivity between the two groups.

DISCUSSION

Intermittent fasting increases autophagy in a variety of ways (Kroemer & Levine, 2008). Fasting causes a metabolic shift in the body, which triggers a stress response and activates autophagy (Mattson et al., 2017). It leads to a reduction in insulin and glucose levels in the blood, which can stimulate the activity of certain proteins involved in autophagy. Moreover, the reduction of the body's stored energy during fasting can activate the production of molecules known as ketones, which stimulates autophagy.

CONCLUSION

The hypothetical study shows that intermittent fasting promotes autophagy, leading to improved metabolic health. So, I believe that intermittent fasting can be an effective method for promoting weight loss and improving metabolic health in adults. The mechanism behind this method is related to the timing of food intake and its effect on metabolism. However, further research is required to confirm these findings and determine the optimal fasting protocol for different populations. It is interesting that many famous people have used 16:8 intermittent fasting method. One among them is Elon Musk. He shared on Twitter that he lost 20 pounds in a year through periodic fasting. Based on the findings, intermittent fasting could be a valuable dietary intervention for individuals looking to achieve healthy weight loss and improve their body's metabolism.

FUTURE SCOPE

In the future, I would like to do detailed research on the effect of intermittent fasting on people with diabetes.

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ABOUT THE AUTHOR FARAH GABALA

Farah Gabala is a curious 13-year-old girl with a passion for books and knowledge. Her world revolves around the enchanting world of books and movies. She also has a passion for the scientific world, where she explores diverse topics. History is also one of her passions. She loves the tales of bygone eras, and they captivate her imagination. Farah's spirit and love for discovering new things paint her as a young intellect on a journey full of discovery and enlightenment.