Effects of Diet on Learning Abilities in Old Rats

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Introduction

• Diet regulation is one of the prime markers of health behavior and overall well-being
• Past literature discovered a strong association between high sugar intake and low cognitive abilities in aging adults (Ye et al., 2011)
• Previously, rats that ingested high sugar water found to experience greater oxidative stress than control group (Beilharz, Maniam, & Morris, 2014)
• In the past, adhering to a high fat diet resulted in slower learning abilities in the aging adults (Attuquayefo et al., 2016)

Hypothesis

• Old rats on a nutritionally balanced standard diet would perform better on cognitive learning tasks than rats on either a high-sucrose or high-fat diets
• There would be a difference in learning abilities between high-sucrose and high-fat diets

Methods

Subjects: 15-month-old male Sprague-Dawley rats
• Standard diet (4% sucrose, 1.5% saturated fat)
• High-sucrose (35% sucrose)
• High-fat (37% saturated fat)

Procedure: T-maze (Salamone et al., 1994; Bardgett et al., 2009)
• Diets ad-libitum for 21 days
• Limited amount of food starting testing day
• Habituation: In groups of two for ten minutes
• Learning: Randomly assigned to baited arm
  • First, un-baited arm is blocked
  • Next, the baited arm is blocked
• Discrimination I: Access to both arms
  • Removed after consuming the reward or reaching the end of the non-baited arm (10 trials per day until >90% correct)

Methods Continued...

• Discrimination I: Access to both arms
  • Removed after consuming the reward or reaching the end of the non-baited arm (10 trials per day until >90% correct)
• Discrimination II: Discrimination after baited and unbaited arms switched

Results

• Rats on nutritionally balanced standard diet (M=2.625) learned significantly faster than the rats on the high-sucrose (M=5.50) and high-fat diet (M=6.056)
• No significant difference in learning abilities between specialized diets or types of learning

Conclusion

• Hypothesis that the rats on nutritionally balanced diet would show a greater learning capacity than experimental groups supported
• Hypothesis that there would be a difference in learning abilities between high-sucrose and high-fat diets not supported
• Neural rewiring, cell atrophy, or network alteration due to different diets possible (Attuquayefo et al., 2016)
• High-fat diets could lead to atherosclerosis (Beilharz, Maniam, & Morris, 2014).
• Recommend larger sample size and better external factors control in the future

References


