

# THE EFFECTS OF MAGNESIUM DEPRIVATION ON THE NATURAL FLORA OF THE GASTROINTESTINAL TRACT



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# TRIO

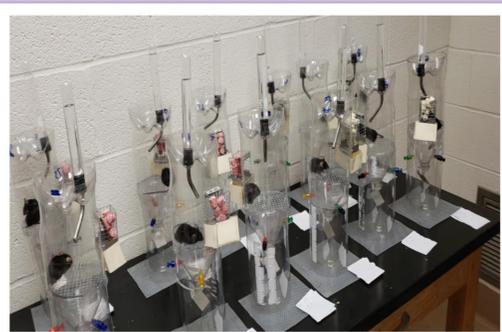
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## Abstract

More than 200,000 people a year suffer from Ulcerative Colitis in the United States alone.

Ulcerative Colitis (UC) is a chronic, inflammatory bowel disease (IBD) that affects the large intestine or colon causing irritation and swelling (inflammation). Eventually this can lead to sores in the lining of the intestines and significantly compromised health. Studies show that an increase in magnesium intake can lead to less severe symptoms of UC.

This research seeks to determine how the use of magnesium may help in the treatment of hypomagnesemia (low levels of magnesium) and in lowering colonic bacteria to healthier levels.



## Research Question

How does magnesium manipulation affect the gastrointestinal tract of a mouse and how it can induce ulcerative colitis?

## Limitation

This research began in the spring of 2019. The completion goal is December of 2019.

## Methodology

Multiple experiments are conducted on twelve mice. Six mice are given magnesium pellets and the other six are given magnesium free pellets. One group of mice drinks DSS (Dextran Sodium Sulfate) solution and the other group drinks water. DSS (Dextran Sodium Sulfate) induces colitis in the mice by affecting fatty acid chains in the colon. Mice are weighed everyday and solutions are made for them every three days. Fecal occult test are conducted to test for blood in their feces. Periodic urine and blood analyses are also conducted. Dissections are performed in order to remove their spleens and colon. Future experiments will involve more techniques which will be discussed later.

## Procedure

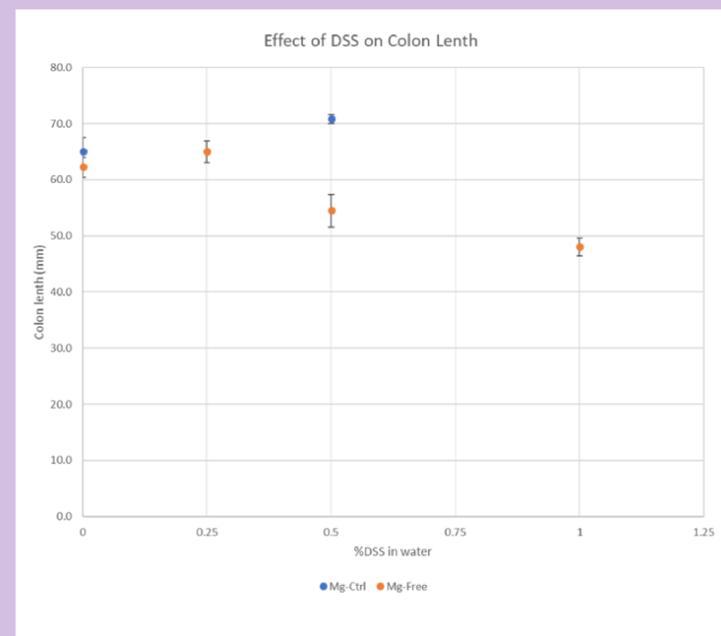
- ❑ Twelve mice are placed in cages with food given (Mg<sup>2+</sup> pellets/Mg<sup>2+</sup> free pellets) and water/ DSS. They are kept in cages for seven days then transferred to metabolic cages for a day, then dissected. The spleen and colon are then removed to be analyzed.
- ❑ Fecal Occult Blood test are performed to test for blood in their feces
- ❑ Urine and blood are taken for analysis and homogenization.

## Results

0.5% DSS shows a significant difference in colon length. DSS is known to shorten the colon and therefore in conclusion 0.5% works the best.

The absence of magnesium shows that the colon length is lower than the control group with an average of 70mm to 55mm. (0.5%)

There was an error with the 0% DSS and it was believed to be from accidental switching of mice from different groups.



## Conclusion

1. The absence of magnesium worsens the severity of colitis symptoms.
2. In DSS- induced colitis, magnesium restriction increases the amount of colonic bacteria and the spread of bacteria to the spleen.
3. The correct amount of DSS that was acceptable to use was 0.5%.



## Acknowledgments

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## References

Ostrow, J.D. "Tests for Fecal Occult Blood." 21 Jan. 2011, p. 1.

Ortega, Bernardo. "Effect of Dietary Magnesium Manipulation on the Gastrointestinal Microbiome of a Mouse Model of Ulcerative Colitis." pp. 1-19.