Impact of the introduction of black raspberries in a standard diet and a western-style diet on colitis and colorectal cancer risk in mice

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Colorectal Cancer (CAC)

2nd leading cause of cancer death

- 1.4 Million people suffer from inflammatory bowel disease (IBD).
- IBD is the primary risk of CAC.
- CAC is predicted to be responsible for 51,000 deaths in 2019.

Key Statistics for Colorectal Cancer, The American Cancer Society
Inflammatory Bowel Disease

• Patients diagnosed with colitis and Crohn’s Disease with prolonged colitis are at high risk.
• Overall health cost of more than $1.7 billion.
• Treatment include anti-inflammatory drugs.
• Intervention studies to reduce colonic inflammation could reduce the progression of CRC including diet.
Total Western Diet for Rodents

- Based on energy density macro and micro nutrient of the 50\textsuperscript{th} percentile intakes reported in NHANES.

- Past studies showed a 2.8-fold increase in tumor outcome in mice fed the TWD.

- Reduce inflammation by supplementation of different foods such as black raspberries

OBJECTIVE

The goal of this study was to compare the efficacy of dietary intervention with whole, freeze-dried black raspberries on colitis and colon tumorigenesis in mice consuming either a standard diet or a Western type diet that emulates typical U.S. nutrient intakes.
Study design

<table>
<thead>
<tr>
<th>Group</th>
<th>Diet</th>
<th>Treatment</th>
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</thead>
<tbody>
<tr>
<td>G1</td>
<td>AIN93G</td>
<td></td>
</tr>
<tr>
<td>G2</td>
<td>AIN93G</td>
<td>+5% BRB</td>
</tr>
<tr>
<td>G3</td>
<td>AIN93G</td>
<td>+10% BRB</td>
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<tr>
<td>G4</td>
<td>TWD</td>
<td></td>
</tr>
<tr>
<td>G5</td>
<td>TWD</td>
<td>+5% BRB</td>
</tr>
<tr>
<td>G6</td>
<td>TWD</td>
<td>+10% BRB</td>
</tr>
</tbody>
</table>

Endpoints (all groups)
- HP/IHC (6 mice)
- Mucosa (8 mice)
- Fecal microbiome (10 cages)

Endpoints (G1, G4)
- Mucosa (8 mice)
- Fecal microbiome (8 cages)

Endpoints (all groups)
- MRI (12 mice)
- HP/IHC (6 mice)
- Mucosa (8 mice)
- Fecal microbiome (8 cages)
- Tumor assessment (24 mice)
Early results – colitis symptoms

Colitis

Recovery

Disease activity index (DAI)

AIN | TWD

AIN | TWD

CON | 5%BRB | 10%BRB

Statistical analysis pending curation of remaining data
Ongoing Data Analysis

- Body weight gain
- Food intake
- Organ weights
- Tumor outcome
- Microbiome analysis
- Inflammatory Biomarkers
- Gene expression
Future work

Fecal transfer from BRB-fed mice

Is the protection by BRB against colitis conferred to recipient mice when the microbiome is transferred?
ACKNOWLEDGEMENTS

- USTAR Applied Nutrition Research, Utah State University
- USDA NIFA AFRI grant no. 2018-67017-27516 and 2014-67017-21755
- Special Thanks to:
  - Abby Benninghoff  Michaela Brubaker
  - Korry Hintze  Elizabeth Park
  - Kerry Rood  Abbey Horrocks
  - Heloisa Rutigliano  Sam Vassar
  - Aaron Olsen  Eliza Owens
  - Canyon Neal
  - Sumira Phatak