Resistant Starch & Type 2 Diabetes

PRESENTATION BY KELLY GRAPENTINE
DIETETICS

MENTORS: MATTHEW ROWLING & GAR YEE KOH
As an undergraduate researcher...

- Work with graduate and PhD Students

- Adds value to my experience at Iowa State University

- Increased my interest and understanding in research in the area of nutrition
Dietary resistant starch prevents urinary excretion of vitamin D metabolites and restores circulating 25-hydroxycholecalciferol concentrations in the Zucker diabetic fatty rat.

Gar Yee Koh, Kirsten Mancosky, Yi-Ting Loo, Kelly Grapentine, Emily Bowers, and Matthew J. Rowling

- How does resistant starch play a role in vitamin D status of rats with Type 2 Diabetes?
A little background information...

<table>
<thead>
<tr>
<th><strong>Resistant Starch</strong></th>
<th><strong>Vitamin D</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Fermentable dietary fiber</td>
<td>- Fat soluble vitamin</td>
</tr>
<tr>
<td>- Puts your gut microbes to work!</td>
<td>- Plays a role in our body’s ability to absorb other vitamins and minerals, particularly calcium</td>
</tr>
<tr>
<td>- The human body cannot digest this alone...the bacteria present in the intestines are needed to help break it down</td>
<td>- There may be an association between Vitamin D status and kidney (renal) health – diabetes is one specific population that is known to be a leading cause of kidney failure.</td>
</tr>
<tr>
<td>- Resistant Starch vs. Non-resistant starch (Control)</td>
<td></td>
</tr>
</tbody>
</table>
Working with Zucker rats

Lean control rat (non-diabetic)
Diabetic Fatty rat (Type 2 Diabetic rat)

Week 0, 8 weeks old
Left: Lean ZDF (Control)  
Right: ZDF fa/fa

Week 5, 13 weeks old

Lean ZDF  
ZDF fa/fa on CTR diet  
ZDF fa/fa on RS diet
Making food and tracking weight

- 6 weeks

- Control diet (made with cornstarch) and Resistant Starch diet (made with high-amylose maize – 35% resistant); Made fresh every week

- Rats could eat as much as they wanted. We would track how much they ate every time we would feed them.

- Record weight three times a week to track weight gain
**Left:** Control diet; **Right:** Resistant Starch diet
Samples collected

- Urine ➔ Excretion of protein, albumin, creatinine, Vitamin D

- Blood ➔ Serum Vitamin D, glucose levels

- Liver and Kidney samples ➔ RNA/DNA, gene expression
Results
Results
A step to future research...

- This study is a stepping stone to future research

- Currently, Gar Yee Koh is working on a study that looks at different concentrations of resistant starch. **Could there be a threshold or critical point of resistant starch to be effective?**

- Translate research to humans
  - Prebiotics – found in legumes, potatoes, asparagus, and many other vegetables and fruits
  - Use resistant starch in baking mixes
THANK YOU
Dr. Matthew Rowling and Gar Yee Koh
for being leaders in this research.
Questions??