



**CALIFORNIA STATE SCIENCE FAIR  
2005 PROJECT SUMMARY**

<b>Name(s)</b> <b>James A. Fraser</b>	<b>Project Number</b> <b>J0405</b>
<b>Project Title</b> <b>Digestion Is the Question: Part 2</b>	
<b>Objectives/Goals</b> I recreated the digestive system and enzymes. My project is a continuation of last year which I have done 288 more tests. I wanted to see if starch would combine with glucose and exit the semi-permeable membrane of a sausage casing representing an intestine. I tested for fat to see if it could break down without bodily fluids. If it does this proves that glucose, starch, and fat are able to break down in your intestines, exit the membrane and give nutrients to your cells. I tested foods with no additives, and foods with additives to see if any of the adding#s affected the output of the nutrients. I chewed the foods and tested for the three nutrients to see if salivary enzymes affected the output. I hypothesized that the starch and glucose would be able to exit the membrane because of past results. I didn't believe the fat would be able to break down because it takes a lot of energy and needs bodily juices and acids which were not in my tests.	
<b>Abstract</b>	
<b>Methods/Materials</b> Materials: Cornstarch, white bread, any type of soft pasta, yellow corn, potato, Cheerios, grinder to crush foods, glucose, starch, and fat test strips, apple juice with natural sugars, 48 sausage casings, pudding, potato chips, honey nut cheerios, chef boyardee, french toast, peanuts, popcorn, beef and pork hot dogs. Procedures: Collect all materials. Fill sausage casing with ¼ cup of the food mixture, ¼ cup of the apple juice, and ¼ cup of distilled water, tie the end tight. Fill the jar with distilled water and place the sausage casing on the bottom of the jar. Every fifteen minutes for an hour check the water for glucose, fat, and starch.	
<b>Results</b> My tests showed a big difference in the output of starch, glucose, and fat with non additive foods and additive foods. The tests proved the additives get in the way and block the membrane. Tests also showed the chewed foods broke down faster than the unchewed foods. This proves salivary enzymes play a huge part in your digestion. My tests proved that creating a meal with whole foods without additives is healthier than one with additive foods.	
<b>Conclusions/Discussion</b> My hypothesis was incorrect. The fat was digested like the glucose and starch. This proves that fat molecules are too big to exit the membrane until they are broken down. The glucose molecules were not as big as the other molecules and did not have to break down as much as the other molecules; they were already small enough to leave the membrane and the exit was faster.	
<b>Summary Statement</b> The breakdown and exit of glucose, starch, and fat molecules through the semi-permeable membrane of your intestines.	
<b>Help Received</b> My parents for purchasing my materials.	