Human Biology ATAR – Task 4: Science Inquiry

Introduction

This report will describe the journey of bread throughout the mouth, oesophagus, stomach, small intestine, large intestine, elimination and faeces and the material breakdown and use of bread in the body.

Heap of bread stock photo. (2018, July 10). [Bread]. iStock. https://www.istockphoto.com/photo/heap-of-bread-gm995038782-269379619

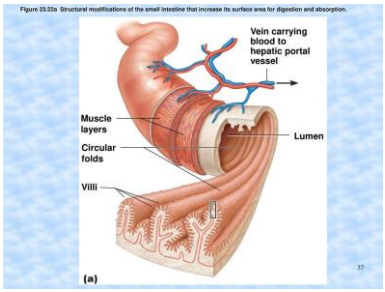
Mouth and Oesophagus

Teath are used for chewing, this reduces the size of the food particles wile mixing them with saliva. The saliva begins to break down the starch in the bread with an enzyme called amylase. Saliva also aids in the formation of the bolus of bread. The bolus of bread is then swallowed voluntarily down the pharynx. The bread is then slid into the oesophagus through the upper oesophageal sphincter. Once the bread is in the oesophagus, involuntary muscle contractions called peristalsis, a succession of wave-like muscle contractions, transports the bolus from the lower oesophageal sphincter to the stomach. (Jeffries, M. 2021)

Stomach

The lower oesophageal sphincter relaxes when the bolus approaches the stomach, allowing the chewed food to pass through. Peristalsis combines the bolus with gastric secretions comprising HCl, hormones, and digestive enzymes to generate chyme, a dense sludge. Many of the microorganisms that cling to the food are killed by the acid. HCl denatures or unfolds proteins to facilitate digestion, making them more accessible to digestive enzymes. Because the salivary amylase that started chemical digestion in your mouth became inactive in the presence of stomach acid, therefore digestion of the starch in your bread does not occur in the stomach.

Small Intestine



Slowly the pyloric sphincter that separates the stomach from the small intestine allowing the chyme to slide into the small intestine. “The breakdown process continues with enzymes from the pancreas and bile from the liver.” (Jeffries, M. 2021) The pancreas secretes bicarbonate to neutralise the acid, lipase to digest lipids, amylase to breakdown starches, and proteases to digest proteins when chyme is present in the upper region of the small intestine. The small intestine has folds covered in villi, which are tiny projections coated in much smaller microvilli. Specific nutrients have affinity for villi and microvilli. The minerals, electrolytes, and nutritional components in the

bread will be grabbed by a variety of villi. The nutrients are absorbed via the intestinal wall and into blood vessels, which transport them throughout the body.

Material breakdown and use.

Starches and sugars are ready for absorption once they have been digested into monosaccharides such as glucose, galactose, or fructose. They move through the small intestine lining, into the bloodstream through the portal vein, and to the liver. Proteins are generally broken down into single amino acids. They take the same route to the liver as monosaccharides. Most fats take a different path due to their lack of water solubility. Most of the dietary fat is triglycerides, which are digested into two free fatty acids and monoglycerides. However, these components are resynthesized into triglycerides within the intestinal cells. They bypass the portal vein entirely. Instead, they are bundled with cholesterol and coated with proteins to create chylomicrons, which are small particles. The chylomicrons are transported by lymphatic vessels to the lymphatic-circulatory junction, where they enter the bloodstream. Fats are absorbed into the portal vein in tiny amounts. These are smaller, more water-soluble fatty acids than long-chain fatty acids. The gut mucosa also absorbs vitamins, minerals, water, and many medications. (Weisenberger, M. J. S. 2020)

Large intestine

Once all the nurturance is taken from the bread, the indigestible parts are transported into the large intestine. The large intestine absorbs extra fluid to produce the solid waste know as feces. To move the waste, the colon uses the same involuntary muscular movement as the oesophagus. The large intestine is divided into three sections. (Weisenberger, M. J. S. 2020) The cecum is the first chamber. The colon follows, which is divided into three sections: ascending, transverse, and descending. Salts and fluids are absorbed from the indigestible meal in the first two regions. Normally, billions of bacteria in the colon aid in the fermentation and absorption of nutrients like fibre. While these tracts absorb, they also create mucus, which aids in the movement of excrement through the descending colon and into the rectum, the third section of the large intestine. Your faeces are stored here until they are ejected through the anus in your next bowel movement. (Weisenberger, M. J. S. 2020)

References

Heap of bread stock photo. (2018, July 10). [Bread]. iStock. https://www.istockphoto.com/photo/heap-of-bread-gm995038782-269379619

Jeffries, M. (2021, June 12). How the Digestive System Works. HowStuffWorks. https://health.howstuffworks.com/human-body/systems/digestive/digestive-system7.htm

Mendy, G. (2021, November 18). How Long Does It Take to Digest Bread? Busby's Bakery School | Recipes | Tutorials | Theory | Professional Services. https://www.busbysbakery.com/how-long-does-it-take-to-digest-bread/

structural modifications of the small intestine that increase the surface area for digestion and absorption. (n.d.). [Image]. Slide Player. https://slideplayer.com/slide/13326523/

Weisenberger, M. J. S. (2020, February 25). Food and Our Digestive Tract. Innerbody. https://www.innerbody.com/nutrition/food-and-our-digestive-tract