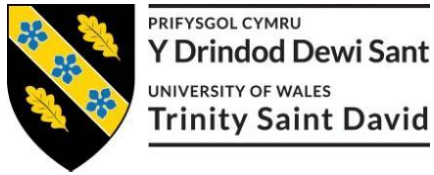


1



LEVEL 4

SEMESTER 2

MODULE CODE: SHSS4068

MODULE TITLE: THE SCIENCE OF NUTRITION

ASSESSMENT TYPE: ESSAY

ASSESSMENT/COMPONENT: 1

COMPONENT WEIGHTING: 100 %

WORD COUNT: 3000

MODULE TUTOR: David Gardner

SUBMISSION DETAILS: by 3.00 pm through turnitin

- Complete all 3 essays to be submitted through Turnitin UK via moodle.
- Each essay to be no more than 1000 words, excluding figures, tables and references.

By 28th February 2020

Describe the hormonal and enzyme regulation of the digestion process.

or

Describe the digestive process with particular reference to gut flora and bioavailability.

By 27th March 2020

Describe the mechanisms of cell signalling.

or

Describe the processes of gene expression.

By 1st May 2020

Describe the roles and importance of vitamins or minerals during energy catabolism.

or

With reference to a specific vitamin or mineral discuss the implications of deficiency and toxicity.

Assessment Criteria

Details relating to the specific requirements levels grading for the essays are provided in the generic level descriptor provided on moodle.

Specific details and an example session will be provided during lectures.

School of Sport, Health & Outdoor Education

Assessment Feedback Sheet

Student No./Name: Karen Oldham

Module Code: SHSS4068

Module: The Science of Nutrition

Personal Evaluation – to support your academic progress please complete the section below BEFORE submitting your work.									
What do you consider to be the best aspects of this work?	Completing it								
Which aspects do you consider could have been improved in this piece of work?	Time, more research								
What have you found most satisfying whilst undertaking this submission?	Researching								
ASSESSMENT CRITERIA	Learning	GRADE							
		Poor 0-25%	Unsatisfactory 26-39%	Satisfactory 40 – 49%	Good 50 – 59%	Very Good 60 – 69%	Excellent 70 – 85%	Exceptional 86– 100%	%
Theoretical explanation	1								70%

Assignment Checklist

xPlease complete the **Personal Evaluation** section of the Assessment Feedback sheet, add your name and details, and paste the whole of this assignment document into the front of your assignment

xSubmission is a **single .pdf file, clearly labelled** with your name and module code

xFont style - Times New Roman, size -12 for text and 14 for headings

xInk colour – black only

xLine spacing – 1.5 line spacing and 2cm- 2.5cm page margins

xQuotations more than three lines to be indented 1 line spacing

xOne line space between paragraphs, paragraphs must be left aligned

xPagination (your assignment should have **page numbers**)

xAll tables and figures are internally referenced and have a title

x**Word count** checked and written at end of text (before references and any appendix)

xAssignment is within 10% of the word limit (excluding references and any appendices)

x**All** references in the text are included in the reference list

x**Correct referencing as described in UWTSD Harvard Referencing Handbook on the Library website** <https://www.uwtsd.ac.uk/media/uwtsd-website/content-assets/documents/library-and-learning-resources/infoskills/harvard-eng.PDF>

6

xCorrect spelling and punctuation, using **UK English**

xGrammar and syntax correct- double check anything that has a green line under it

xI have read my assignment out loud to myself and it makes sense and is easy to read

xSomebody else has read my work and it makes sense to him or her!

xI have checked and I have not plagiarised

Failure to follow these guidelines will

Describe the hormonal and enzyme regulation of the digestion process

The human body requires food to sustain life, this gives us our energy. The food such as carbohydrates, proteins and fats cannot be digested by humans in its natural form. The food allows the cells in our body to receive nutrients. Human body is ingestion and digestion beginning in the mouth through the Alimentary canal stretching through the body leading to the stomach, and beyond to the rectum. The body goes through a mechanical and chemical process breaking it into molecules so it can be absorbed through the large and small intestine, then through the blood stream. The chemical enzymes which are present in secretions and the hormones coordinate the digestion process. Not all food can be digested and absorbed so this is eliminated through the rectum called defecation.

The Digestive System

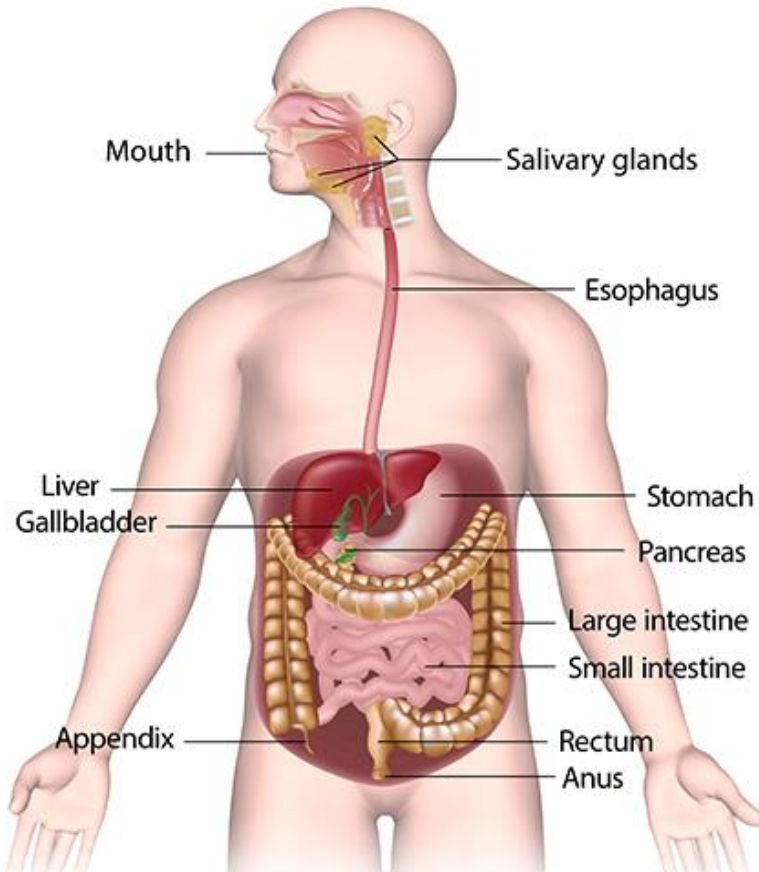
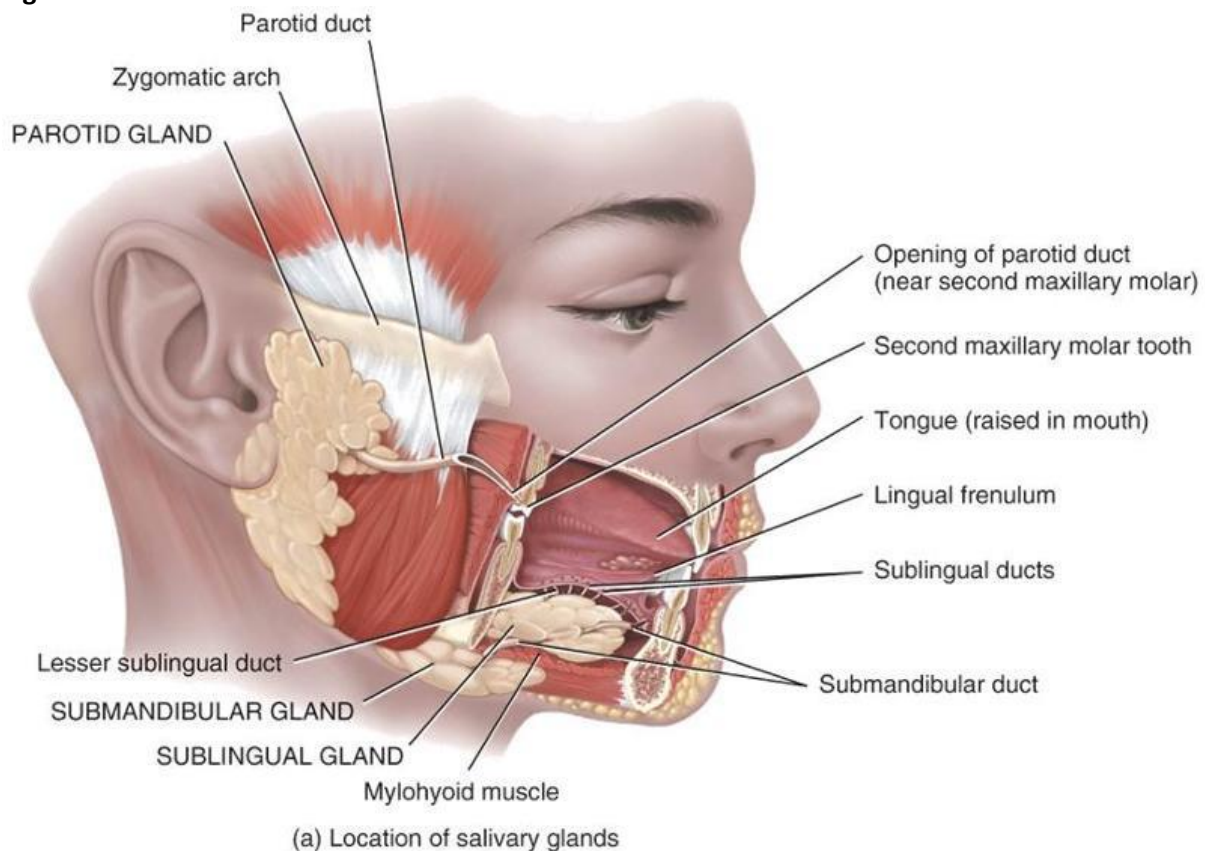


Figure 1

What is the digestive system (NIDDK, 2017)

[The first stage in the digestion process **Figure 1** happens in the mouth **cephalic** phase. The smell, taste and sight of food will secrete saliva that can be up to 1.5 litres a day. This is from the salivary Parotid gland this is an enzyme called lipase that breaks down starches along with submandibular and sublingual glands that secrete mucus. **Figure 2** demonstrate the primary salivary glands in the mouth parotid; Submandibular & sublingual glands these start off the process of digestion.

Figure 2



(Marieb & Smith, 2015)

According to Sturgeon (2018), Salivary Amylase plays a minor role in the long-term breakdown of carbohydrates. As the carbohydrates go in the mouth, it is important as *ultimately results in the construction of Glucose which is fundamental of cellular energy* ($\text{glucose} + \text{O}_2 \rightarrow \text{ATP} + \text{CO}_2 + \text{H}_2\text{O}$). By this happening it will start the process of the parasympathetic, which is the autonomic nervous system (ANS) working to digest food. These all produce a chemical reaction with the food in the oral cavity the mouth, the teeth can break down food into lumps of bolus which happens when food is chewed. Mucin, water and amylase will allow for the food area to soften, making it easier to move down the pharynx through to the stomach in a process called peristalsis. This drives the food(bolus) through to the esophagus where walls that have secreted mucus prevents the Epithelial cells from being damaged. The bolus goes through to the stomach via the cardiac sphincter preventing food going back into the esophagus.

The next stage is the **gastric** phase where acids and enzymes break down the food. Once the food is in the stomach the hormone is activated and Gastrin fluid (Fry ,2009)

is released which consists of mucus which protects the stomach lining. Hydrochloric acid (HCl) is released also which erases bacteria and ignites chemical breakdown, Pepsinogen an inactive enzyme changes and becomes active once the (HCl) is released becoming Pepsin. This comes from the chief cells, which are in the gastric pits in the endocrine cells. (Cheng, WenWen, Peng, Xiao Dong Chen, 2020) say that 10-30% of dietary triglyceride hydrolysis is done by the enzyme lipase which is also secreted by chief cells. The liver produces the bile which aids the digestion and fractures the lipids.

Explained by (Sturgeon, 2018) the flow of HCl enables the pH of the gastric juice at around 3.5 and 1.5. The parietal cells must be sheltered by the active acid. Hydrogen Ions (H^+) and Chloride Ions (Cl^-) are deposited singly into the stomach. (Sturgeon, 2018). When the food (bolus) and secretions are combined they constitute a fluid called chyme. (Seeley, Stephens, Tate, 2008)

The last phase of the process is **intestinal**. (Ross and Wilson 2018) Into the small intestine made up of the duodenum, Jejunum and ileum. Acid chyme proceeds and combined with pancreatic juice, bile and intestinal juice. Within the Pancreatic juice the following are incorporated

- Water
- Mineral salts
- Enzymes.
 1. Amylase
 2. Lipase
 3. Nucleus that digest the nucleic acids
 4. Inactive enzymes: Trypsinogen and Chymotrypsin.

The digestive enzyme **amylase** action is to decompose carbohydrates into smaller molecules. Chewing food, the carbohydrates this is converted into Maltose (disaccharide) two glucose molecules. Pancreatic amylase concludes the process of breakdown of carbohydrates, which then can be absorbed into the blood stream. Proteins are broken down by the enzyme **Protease** (Pepsin; trypsin and chymotrypsin) into units. By assembly into polypeptides or single amino acids that can be absorbed into the circulation. Dietary fats are broken down by enzymes **gastric lipase** made by the cells in the stomach. It digests the larger fats in your food that are converted into fatty acids and glycerol. Efficient compact molecules are used by the cells, blood and lymph vessels transfer these to all parts of the body. (Marie, J. 2018).

Production of HCl amino acids, fatty acids the walls of the duodenum secrete two hormones in the blood. Secretin and cholecystokinin (CCK), secretin encourages the pancreas and liver ducts to release water and bicarbonate (HCO_3^-) to make the solution a pH 8 (alkaline). Digestive enzymes are increased by CCK which helps the removal of the bile. (Kimble, E.

2015). When nutrients are absorbed the end of digestion happens by defecation of solid and liquid waste through the rectum.

Hours have gone by as the digestive system has performed its difficult process which breaks down food in a chemical reaction that sustains life. Which concludes with our food broken down into simple sugars; fatty acids; glycerol and amino acids. The enzymes and hormones provide healthy bodies through nutrient absorption; achievement of the digestive process and making free radicals inactive. cellular function such as Adenosine triphosphate (ATP) which is crucial and is the main energy in cells especially in the transport of protein and lipids. Without the enzymes working with in the Liver, the digestive system would not be able to remove toxins. So really our enzymes and hormones do an amazing job of allowing us to have a healthy body.

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Assessed: 29th February 2020.

Word count 979