

**PRACTICAL MANUAL**

**HUMAN ANATOMY AND PHYSIOLOGY II PHM 10902**

**Bachelor of Pharmacy with Honours [B.Pharm (Hons)]**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**LIST OF PRACTICALS**

**HUMAN ANATOMY AND PHYSIOLOGY 11 PHM 10902**

**SEMESTER 2, YEAR 1**

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| **Practical 1** | **Digestive system** |
| **Objective** | To provide students with the knowledge and skills required to learn about different parts of digestive system |
| **Hard- and software** | * Please bring you own laptop (may use computer at the computer lab). * Internet * Anatomy models (optional) |
| **Procedure (s)** | 1. Visit the website, https://drive.unisza.edu.my/s/k6ziEQ7Lh1Bc8cT 2. Review the sections entitled “THE DIGESTIVE SYSTEM” in the textbook, Tortora GJ, Derrickson BH. (2012) Principles of Anatomy and Physiology. 13 ed. Hoboken, N.J.: Wiley. 3. Make notes as indicated below: 4. Organs of the digestive system 5. Structures of the mouth (oral cavity) 6. The three major salivary glands—parotid, sublingual, and submandibular 7. External and internal anatomy of the stomach 8. Relation of the pancreas to the liver, gallbladder, and duodenum 9. Histology of the liver 10. Anatomy of the small intestine 11. Histology of the small intestine 12. Anatomy of the large intestine 13. Histology of the large intestine 14. Find other learning material related to anatomy and physiology of different parts of digestive system: 15. Salivary gland 16. Stomach 17. Liver 18. Pancreas 19. Small intestine 20. Large intestine 21. Optional: Use the anatomy models to identify:   *Oral cavity and pharynx*  ❏ Oral cavity  ❏ Hard palate  ❏ Soft palate  ❏ Uvula  ❏ Tongue  ❏ Oropharynx  ❏ Laryngopharynx  *Gut tube proper*  ❏ Esophagus  ❏ Stomach  ❏ Greater curvature  ❏ Lesser curvature  ❏ Gastric rugae  ❏ Pyloric sphincter  ❏ Duodenum  ❏ Jejunum  ❏ Ileum  ❏ Circular folds  ❏ Cecum  ❏ Vermiform appendix  ❏ Ascending colon  ❏ Transverse colon  ❏ Descending colon  ❏ Sigmoid colon  ❏ Semilunar folds  ❏ Taenia coli  ❏ Omental or fatty appendices  ❏ Rectum  *Glandular organs*  ❏ Liver  ❏ Gall bladder  ❏ Pancreas   1. You may discuss your finding in groups |
| **Report** | Study questions: (Answer ALL questions)   1. Which components of the digestive system are GI tract organs, and which are accessory digestive organs? 2. Which organs of the digestive system come in contact with food, and what are some of their digestive functions? 3. Which kinds of food molecules undergo chemical digestion, and which do not? 4. What structures form the mouth? 5. How are the major salivary glands distinguished on the basis of location? 6. How is the secretion of saliva regulated? 7. Compare the epithelium of the esophagus with that of the stomach. How is each adapted to the function of the organ? 8. What is the importance of rugae, surface mucous cells, mucous neck cells, chief cells, parietal cells, and G cells in the stomach? 9. What is the role of pepsin? Why is it secreted in an inactive form? 10. What are the functions of gastric lipase and lingual lipase in the stomach? 11. Describe the duct system connecting the pancreas to the duodenum. 12. What are pancreatic acini? How do their functions differ from those of the pancreatic islets (islets of Langerhans)? 13. What are the digestive functions of the components of pancreatic juice? 14. Draw and label a diagram of the cell zones of a hepatic acinus. 15. Describe the pathways of blood flow into, through, and out of the liver. 16. How are the liver and gallbladder connected to the duodenum? 17. Once bile has been formed by the liver, how is it collected and transported to the gallbladder for storage? 18. Describe the major functions of the liver and gallbladder 19. List the regions of the small intestine and describe their functions. 20. In what ways are the mucosa and submucosa of the small intestine adapted for digestion and absorption? 21. Describe the types of movement that occur in the small intestine. 22. Explain the functions of pancreatic amylase, aminopeptidase, gastric lipase, and deoxyribonuclease. 23. What is the difference between digestion and absorption? How are the end products of carbohydrate, protein, and lipid digestion absorbed? 24. By what routes do absorbed nutrients reach the liver? 25. Describe the absorption of electrolytes, vitamins, and water by the small intestine. 26. What are the major regions of the large intestine? 27. How does the muscularis of the large intestine differ from that of the rest of the gastrointestinal tract? What are haustra? 28. Describe the mechanical movements that occur in the large intestine. 29. What is defecation and how does it occur? 30. What activities occur in the large intestine to change its contents into feces?  * Write your answers in the laboratory report. |
| **References** | 1. Tortora GJ, Derrickson BH. (2012) Principles of Anatomy and Physiology. 13 ed. Hoboken, N.J.: Wiley. |
| **Notes** | Further reading:   1. Hall JE. (2011) Guyton and Hall Textbook of Medical Physiology. 13 ed. Philadelphia Saunders/Elsevier. 2. Costanzo LS. (2014) Physiology. 15 ed. Philadelphia Saunders/Elsevier.   Examples of references:   1. https://www.youtube.com/watch?v=Og5xAdC8EUI 2. Gastrointestinal system physiology   https://www.khanacademy.org/test-prep/nclex-rn/rn-gastrointestinal-system |

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| **Practical Report 1: Digestive system** | |
| **Introduction** | |
| Write a paragraph describing the basic principles of function in digestive system. What do you expect to learn from this experiment? Briefly describe the methods you will use to study human digestive system in this lab exercise. | |
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| **Results** | |
| 1. As a review activity, label the figures below:   |  | | --- | |  |  |  | | --- | |  |  |  | | --- | |  |  |  | | --- | |  |  |  | | --- | |  |  |  | | --- | |  |  |  | | --- | |  |  |  | | --- | |  |  |  | | --- | |  |  |  | | --- | |  |  |  | | --- | |  |  |  | | --- | |  | | |
| 2. List your findings on other learning material related to anatomy and physiology of different parts of digestive system (eg. textbook, articles, internet).   1. Salivary gland 2. Stomach 3. Liver 4. Pancreas 5. Small intestine 6. Large intestine | |
| **Study questions** | |
| 1. Which components of the digestive system are GI tract organs, and which are accessory digestive organs? 2. Which organs of the digestive system come in contact with food, and what are some of their digestive functions? 3. Which kinds of food molecules undergo chemical digestion, and which do not? 4. What structures form the mouth? 5. How are the major salivary glands distinguished on the basis of location? 6. How is the secretion of saliva regulated? 7. Compare the epithelium of the esophagus with that of the stomach. How is each adapted to the function of the organ? 8. What is the importance of rugae, surface mucous cells, mucous neck cells, chief cells, parietal cells, and G cells in the stomach? 9. What is the role of pepsin? Why is it secreted in an inactive form? 10. What are the functions of gastric lipase and lingual lipase in the stomach? 11. Describe the duct system connecting the pancreas to the duodenum. 12. What are pancreatic acini? How do their functions differ from those of the pancreatic islets (islets of Langerhans)? 13. What are the digestive functions of the components of pancreatic juice? 14. Draw and label a diagram of the cell zones of a hepatic acinus. 15. Describe the pathways of blood flow into, through, and out of the liver. 16. How are the liver and gallbladder connected to the duodenum? 17. Once bile has been formed by the liver, how is it collected and transported to the gallbladder for storage? 18. Describe the major functions of the liver and gallbladder 19. List the regions of the small intestine and describe their functions. 20. In what ways are the mucosa and submucosa of the small intestine adapted for digestion and absorption? 21. Describe the types of movement that occur in the small intestine. 22. Explain the functions of pancreatic amylase, aminopeptidase, gastric lipase, and deoxyribonuclease. 23. What is the difference between digestion and absorption? How are the end products of carbohydrate, protein, and lipid digestion absorbed? 24. By what routes do absorbed nutrients reach the liver? 25. Describe the absorption of electrolytes, vitamins, and water by the small intestine. 26. What are the major regions of the large intestine? 27. How does the muscularis of the large intestine differ from that of the rest of the gastrointestinal tract? What are haustra? 28. Describe the mechanical movements that occur in the large intestine. 29. What is defecation and how does it occur? 30. What activities occur in the large intestine to change its contents into feces? | |
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| **References** | List your reference (s) |
| **Notes** | To what extent were you satisfied with the practice session?   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Very Dissatisfied** | 1 | 2 | 3 | 4 | 5 | **Very Satisfied** | |  |  |  |  |  |  |  | | What is/are improvement (s) that you can suggest for this experiment? | | | | | | | |

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| **Practical 2** | **Endocrine system** |
| **Objective** | To provide students with the knowledge and skills required to learn about different endocrine glands and hormone-secreting cells that constitute the endocrine system |
| **Hard- and software** | * Please bring you own laptop (may use computer at the computer lab). * Internet * Anatomy models (optional) |
| **Procedure (s)** | 1. Visit the website, https://drive.unisza.edu.my/s/k6ziEQ7Lh1Bc8cT 2. Review the sections entitled “THE ENDOCRINE SYSTEM” in the textbook, Tortora GJ, Derrickson BH. (2012) Principles of Anatomy and Physiology. 13 ed. Hoboken, N.J.: Wiley. 3. Make notes as indicated below: 4. Endocrine glands 5. Mechanisms of hormone action 6. Hypothalamus and pituitary gland 7. Thyroid gland 8. Parathyroid glands 9. Adrenal glands 10. Pancreatic islets 11. Ovaries and testes 12. Pineal gland and thymus 13. Other endocrine tissues and organs, eicosanoids, and growth factors 14. Find other learning material related to anatomy and physiology of different parts of endocrine system: 15. Hypothalamus and pituitary gland 16. Thyroid gland 17. Parathyroid glands 18. Adrenal glands 19. Pancreatic islets 20. Ovaries and testes 21. Pineal gland and thymus 22. Other endocrine tissues and organs, eicosanoids, and growth factors 23. Optional: Use the anatomy models to identify:   *Hypothalamus and pituitary gland*  ❏ Hypothalamus  ❏ Anterior pituitary  ❏ Posterior pituitary  *Thyroid gland*  *Parathyroid glands*  ❏ Left superior parathyroid gland  ❏ Right superior parathyroid gland  ❏ Left inferior parathyroid gland  ❏ Right inferior parathyroid gland  *Adrenal glands*  ❏ Right adrenal gland  ❏ Left adrenal gland  ❏ Adrenal cortex  ❏ Adrenal medulla  *Pancreatic islets*  ❏ Pancreas  *Ovaries and testes*  *Pineal gland and thymus*   1. You may discuss your finding in groups |
| **Report** | Study questions: (Answer ALL questions)   1. List three organs or tissues that are not exclusively classified as endocrine glands but contain cells that secrete hormones. 2. Describe the two general mechanisms of hormone action. 3. What factors determine the responsiveness of a target cell to a hormone? 4. What are the differences among permissive effects, synergistic effects, and antagonistic effects of hormones? 5. In what respect is the pituitary gland actually two glands? 6. How do hypothalamic releasing and inhibiting hormones influence secretions of the anterior pituitary? 7. Describe the structure and importance of the hypothalamohypophyseal tract. 8. Explain how blood levels of T3/T4, TSH, and TRH would change in a laboratory animal that has undergone a thyroidectomy (complete removal of its thyroid gland). 9. How are the thyroid hormones synthesized, stored, and secreted? 10. How is the secretion of T3 and T4 regulated? 11. What are the physiological effects of the thyroid hormones? 12. How is secretion of parathyroid hormone regulated? 13. In what ways are the actions of PTH and calcitriol similar? How are they different? 14. How do the adrenal cortex and adrenal medulla compare with regard to location and histology? 15. How is secretion of adrenal cortex hormones regulated? 16. How is the adrenal medulla related to the autonomic nervous system? 17. How are blood levels of glucagon and insulin controlled? 18. What are the effects on secretion of insulin and glucagon of exercise versus eating a carbohydrate- and protein rich meal? 19. Why are the ovaries and testes classified as endocrine glands as well as reproductive organs? 20. What is the relationship between melatonin and sleep? 21. Which thymic hormones play a role in immunity? 22. What hormones are secreted by the gastrointestinal tract, placenta, kidneys, skin, adipose tissue, and heart? 23. What are some functions of prostaglandins, leukotrienes, and growth factors?  * Write your answers in the laboratory report. |
| **References** | 1. Tortora GJ, Derrickson BH. (2012) Principles of Anatomy and Physiology. 13 ed. Hoboken, N.J.: Wiley. |
| **Notes** | Further reading:   1. Hall JE. (2011) Guyton and Hall Textbook of Medical Physiology. 13 ed. Philadelphia Saunders/Elsevier. 2. Costanzo LS. (2014) Physiology. 15 ed. Philadelphia Saunders/Elsevier.   Examples of references:   1. Advanced endocrine system physiology https://www.khanacademy.org/science/health-and-medicine/advanced-endocrine-system |

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| **Practical Report 2: Endocrine system** | |
| **Introduction** | |
| Write a paragraph describing the functions of hormones in the endocrine system. What do you expect to learn from this experiment? Briefly describe the methods you will use to study human endocrine system in this lab exercise. | |
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| **Results** | |
| 1. As a review activity, label the figures below:   |  | | --- | |  | | |
| 2. List your findings on other learning material related to anatomy and physiology of different parts of endocrine system (eg. textbook, articles, internet).   1. Hypothalamus and pituitary gland 2. Thyroid gland 3. Parathyroid glands 4. Adrenal glands 5. Pancreatic islets 6. Ovaries and testes 7. Pineal gland and thymus 8. Other endocrine tissues and organs, eicosanoids, and growth factors | |
| **Study questions** | |
| 1. List three organs or tissues that are not exclusively classified as endocrine glands but contain cells that secrete hormones. 2. Describe the two general mechanisms of hormone action. 3. What factors determine the responsiveness of a target cell to a hormone? 4. What are the differences among permissive effects, synergistic effects, and antagonistic effects of hormones? 5. In what respect is the pituitary gland actually two glands? 6. How do hypothalamic releasing and inhibiting hormones influence secretions of the anterior pituitary? 7. Describe the structure and importance of the hypothalamohypophyseal tract. 8. Explain how blood levels of T3/T4, TSH, and TRH would change in a laboratory animal that has undergone a thyroidectomy (complete removal of its thyroid gland). 9. How are the thyroid hormones synthesized, stored, and secreted? 10. How is the secretion of T3 and T4 regulated? 11. What are the physiological effects of the thyroid hormones? 12. How is secretion of parathyroid hormone regulated? 13. In what ways are the actions of PTH and calcitriol similar? How are they different? 14. How do the adrenal cortex and adrenal medulla compare with regard to location and histology? 15. How is secretion of adrenal cortex hormones regulated? 16. How is the adrenal medulla related to the autonomic nervous system? 17. How are blood levels of glucagon and insulin controlled? 18. What are the effects on secretion of insulin and glucagon of exercise versus eating a carbohydrate- and protein rich meal? 19. Why are the ovaries and testes classified as endocrine glands as well as reproductive organs? 20. What is the relationship between melatonin and sleep? 21. Which thymic hormones play a role in immunity? 22. What hormones are secreted by the gastrointestinal tract, placenta, kidneys, skin, adipose tissue, and heart? 23. What are some functions of prostaglandins, leukotrienes, and growth factors? | |
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| **References** | List your reference (s) |
| **Notes** | To what extent were you satisfied with the practice session?   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Very Dissatisfied** | 1 | 2 | 3 | 4 | 5 | **Very Satisfied** | |  |  |  |  |  |  |  | | What is/are improvement (s) that you can suggest for this experiment? | | | | | | | |