Semester Credits: 3  Lecture Hours: 3

Histology DNH 115

Prerequisites:
Admission into dental hygiene program.

Course Description:
Presents a study of the microscopic and macroscopic anatomy and physiology of the head, neck and oral tissues. Includes embryologic development and histologic components of the head, neck, teeth, and periodontium.

Course Outcomes

At the completion of this course, the student should be able to:

1. Relate the histological components/structures of tissues of the oral cavity to gross anatomical structures.
2. Develop insight into the structures of the head and neck relating to surface anatomy and to the underlying supporting tissues.
3. Relate embryologic development of the head and neck to normal and abnormal intra and extra-oral clinical findings.
4. Develop a detailed knowledge of the individual micro and macroscopic characteristics and functions of intra-and extra-oral structures of the head and neck.
5. Develop a working knowledge of anatomical terminology for both identification and functional purposes. Expect questions in pre-clinic lab.
6. Begin to apply knowledge of oral-facial histology and anatomy to pre-clinic level client services.
7. Apply and integrate knowledge acquired in this course with other dental hygiene science and clinical courses taught in the curriculum.
Histology DNH 115

Required Materials:

Colored pencils

Textbook:


DNH 115 HISTOLOGY

Topical Description:

UNIT 1: COURSE INTRODUCTION, EMBRYOLOGY – WEEKS 1-3

A: Prenatal Development Periods
B: Development from Zygote to Germ Disc
C: Understanding the Physiologic Processes
D: Embryonic Germ Layers and Body Tissues
E: The Significance of the Primitive Streak, Neural Crest and Mesodermal Somites
F: Ectomesenchyme and Neural Crest Cells
G: Timeframe and Developmental Sequence of the Face, Palate & Tongue
H: Structures Derived from the Frontonasal Process
I: Branchial Arches and their Derivative Structures
J: Developmental Disturbances

UNIT 2: CELLS & TISSUES – WEEKS 4-6

A. The Cell
B. Cell Division
C. Extracellular Materials
D. Intercellular Junctions
E. Basic Tissue
F. Epithelium
G. Basement Membrane
H. Connective Tissue
I. Specialized Connective Tissue
J. Muscle
K. Nerve Tissue

UNIT 3: ORAL MUCOSA, SALIVARY GLANDS & TONSILS – WEEKS 7-9

A. Oral Mucosa
B. Regional Differences in Oral Mucosa
C. Pigmentation of Oral Mucosa
D. Aging and the Skin
E. Turnover Time, Repair, and Aging of the Oral Mucosa
F. Histology of Salivary Glands
G. Secretory Cells and Acini
H. Ductal System
I. Major Salivary Glands
J. Minor Salivary Glands
K. Development of Salivary Glands

UNIT 4: GINGIVA & PERIODONTIUM – WEEKS 10-14

A. Periontoium
B. Components of the Periodontium
C. Gingival Tissue
D. Dentogingival Junctional Tissue
E. Enamel
F. Cementum
G. Periodontal Ligament
H. Alveolar Bone

UNIT 5: TOOTH DEVELOPMENT – WEEKS 15-16

A. Tooth Development
B. Root Development
C. Periodontal Ligament Development
D. Alveolar Bone Development
E. Apposition of Enamel Matrix
F. Maturation of Enamel Matrix
G. Microscopic Features of Mature Enamel
H. Dentin-Pulp Complex
I. Future Concerns with Dentin-Pulp Complex
DNH 115 HISTOLOGY

Unit Objectives:

Unit 1: Embryology

1. Accurately define and use terminology that appears in italics (slide presentation) or in bold (text).
2. Describe the time span for each prenatal developmental period, and discuss events that occur in each period.
3. Trace development from zygote to germ disc to embryo, identifying layers and structures derived from each layer.
4. Identify the physiologic processes that take place to transform the blastula to an embryo, and the embryo to a mature human.
5. Identify the three embryonic layers and the body tissues and structures derived from each layer.
6. Discuss the significance of the primitive streak, the neural plate/crest, and the neural tube.
7. Describe the development of neural crest cells and ectomesenchyme/mesenchymal tissue, and identify structures of the head & neck derived from mesenchyme.
8. Discuss the significance of mesodermal somites.
9. Describe the location and significance of the stomodeum and buccopharyngeal membrane.
10. Describe the timeframe and developmental sequence of the face, palate, and tongue.
11. Identify the structures derived from the frontal/frontonasal processes and Branchial/Pharyngeal arches.
12. Relate developmental disturbances that may occur in the head and neck region to the appropriate prenatal development period.
13. Identify causes of developmental disturbances and the various facial and oral anomalies that may result.
14. Relate knowledge of the histology of basic tissues to embryonic development (unit II).
15. Apply knowledge of embryology to future units of instruction and clinical practice.
Unit 2: Cell, Basic Tissues, Bone and Cartilage Development

Upon completion of this unit, you should be able to:
1. Define histology.
2. State the rationale for studying general and oral histology.
3. Review the functions and characteristics of cells.
4. Identify cellular components and state the functions of those components:
   a. plasma membrane
   b. nucleus and nucleolus
   c. cytoplasm
   d. organelles:
      a. mitochondria
      b. endoplasmic reticulum
      c. golgi complex
      d. lysosomes
      e. filaments and tubules
5. Differentiate between pinocytosis and phagocytosis.
6. Differentiate between types of cell junctions.
7. Relate knowledge from embryology to the derivation of the four types of tissues.
8. Describe the common components of all tissues: cells, extracellular matrix/intercellular substance, tissue fluid.
9. Identify the four classifications of tissues and give an example of each.
10. Describe the characteristics and functions of epithelial tissues.
11. Identify epithelial tissues by number of cell layers and by cell shape.
12. Differentiate between epithelial lining tissues and glandular tissues.
13. Recognize the significance of epithelial tissue to the structures of the oral cavity.
14. Identify oral structures derived from epithelial tissue.
15. Describe the relationship between connective tissue and epithelial tissue in the oral cavity.
16. Name the layers of the basement membrane and the type of tissue derivation of each.
17. Classify the types of connective tissue and describe the functions of the various types.
18. Discuss the significance of connective tissue ground substance.
19. Identify the connective tissue fiber types and the characteristics of each.
20. Recognize the significance of connective tissue fibers to the oral cavity.
21. Differentiate between fixed and transient connective tissue cells.
22. Identify the function of each of the cell types found in connective tissues.
23. Relate the functions of connective tissue cells to health and disease in the oral cavity.
24. Recall the function of nervous tissue.
25. Recall the classifications and divisions of the nervous system and the function of each.
26. Differentiate between afferent and efferent nerves.
27. Recognize the significance of the twelve cranial nerves to the oral cavity and the practice of dental hygiene.
28. Describe the nerve conduction process in the central and peripheral nervous systems.
29. Identify the three types of muscle tissue.
30. Recall the process of muscle contraction.
31. Recognize the significance of the muscles of facial expression and the muscles of mastication to the oral cavity and the practice of dental hygiene.

Unit III: Oral Mucosa and Salivary Glands

1. Identify the most common form of epithelial tissue found in the oral cavity.
2. Differentiate between lining mucosa, masticatory mucosa, and specialized mucosa.
3. Identify the non-keratinized, ortho-keratinized, and parakeratinized epithelial tissues found in the oral cavity.
4. Relate the function of non-keratinized, ortho-keratinized, and parakeratinized tissues to location in the oral cavity.
5. Recognize, draw and label the cell layers present in non-keratinized and ortho- and para-keratinized oral epithelium.
6. Identify the role of each of the cell layers in ortho- and para-keratinized and non-keratinized epithelium.
7. Identify the functions and layers of the lamina propria.
8. Identify the function of the submucosa.
9. Apply knowledge of the basement membrane and the relationship of the basement membrane to the epithelium and connective tissues of the oral cavity.
10. Describe rete ridges/pegs and connective tissue papilla and discuss the relevance of these structures to the oral mucosa.
11. Recognize pigmentation of the oral mucosa as normal, and describe the histologic basis for pigmentation.
12. Compare tissue renewal rates for the various areas of the oral cavity.
13. Identify the steps in the tissue repair process.
14. Describe the role of epithelial and connective tissue cells in the repair process.
15. Describe the significance of granulation tissue.
16. Describe age-related histologic changes in oral mucosa.
17. Utilize preclinic lab sessions to identify various regions of oral mucosa and compare structure and function.
18. Locate and name the major salivary glands and the duct openings for each.
19. Differentiate between holocrine and merocrine glands.
20. Differentiate between exocrine and endocrine glands.
21. Locate and name the minor salivary glands and the duct openings for each.
22. Identify the types of secretions produced by the major and minor salivary glands.
23. Differentiate between serous and mucous acini in terms of cell shape, shape and location of the nucleus, and secretory products.
24. Identify the organic and inorganic components of salivary gland secretions.
25. Relate the functions of saliva to:
   - role in plaque accumulation
   - mineralization, demineralization, and remineralization of teeth
   - supragingival calculus formation
   - digestion
26. Describe the salivary glands histologically by tissue type, cell type, cell arrangement, ducts and duct systems, and relationship to surrounding connective tissue.
27. Identify the function and location of myeloepithelial cells.
28. Identify the function and location of intercalated, striated, and excretory ducts.
29. Describe the function and location of the connective tissue which surrounds and supports the salivary glands.
30. Identify the embryonic origin and developmental timeframe for the major salivary glands.
31. Identify causes of xerostomia.
32. Recognize the impact of xerostomia on the hard and soft tissues of the oral cavity.
33. Discuss the role of saliva substitutes.

Unit IV: Gingiva and Periodontium

1. Identify the structures of the periodontium in writing and on diagrams.
2. Identify the embryonic origin of the tissues of the periodontium.
3. Discuss the interrelationships of the structures of the periodontium.
4. Apply knowledge of head and neck anatomy to recognizing the clinical landmarks of the gingiva.
5. Describe the clinical features of the gingiva in health.
6. Apply knowledge of the clinical features of gingival health to examining a partner’s gingiva in preclinical laboratory sessions.
7. Relate histologic structure to clinical characteristics of the gingiva.
8. Identify the three aspects of gingival epithelium.
9. Relate the significance of keratinized and non-keratinized tissue to oral and sulcular epithelium.
10. Describe the purposes of gingival sulcus fluid.
11. Describe the characteristics of the junctional epithelium.
12. Identify the locations of the internal and external basal lamina on a diagram. State the function of each.
13. Recognize the significance of cellular turnover to the health of the gingiva.
14. Draw and label the connective tissues fibers of the gingiva and state the purpose of each fiber group.
15. Relate the significance of the fibroblast to the formation and integrity of the connective tissue fibers of the gingiva.
16. Identify the cellular elements present in gingival connective tissue and describe the function of each.
17. Discuss the significance of the reduced enamel epithelium.
18. Describe the major function of cementum.
19. Describe Sharpey’s fibers in terms of location, insertion, and function.
20. Draw and label the principle fiber groups of the periodontal ligament.
21. Identify the cells found in the pdl and describe the role of each.
22. Describe the role of the pdl.
23. Identify the landmarks of alveolar bone on a diagram, model, and radiographs.
24. Describe the radiographic appearance of the avb in health.
25. Identify the role of the dental sac.
26. Appreciate the role of the dental hygienist in recognizing...
periodontal health and identifying disease states as manifested by clinical and histological changes in the gingival tissues.

**Learner Objectives Unit V: Tooth Development and Eruption**

1. Recall the embryonic derivation of the structures of the teeth.
2. Relate your understanding of mesenchyme to the development of the teeth and supporting structures.
3. Discuss the process of induction and relate this to tooth development.
4. Identify the embryonic timeframe for tooth development.
5. Differentiate between the vestibular lamina and the primary dental lamina.
6. Identify the structures formed by the vestibular and the primary dental lamina.
7. Identify the three odontogenic stages.
8. Describe the stages of crown development in sequence (bud, cap, bell, amelogenesis, dentinogenesis).
9. Describe the stages of root development (dentinogenesis and cementogenesis).
10. Identify the teeth that are derived from the dental lamina, the successional lamina, the parent lamina, and the rudimentary lamina.
11. Use knowledge of the eruption sequence to gain understanding of the histologic development and sequential replacement of the primary teeth.
12. Apply knowledge of tooth development and sequential replacement of primary teeth to the DNH 141 mixed dentition charting exercise.
13. Use diagrams and pictures to identify and differentiate between the bud, cap, and bell stage.
14. Describe the formation of three components of the tooth germ.
15. Identify the structures derived from the enamel organ, the dental papilla and the dental sac/follicle.
16. Discuss the structure, location, and function of the four layers of the enamel organ.
17. Draw and label a diagram of the tooth germ in the bell stage.
18. Discuss the significance of the cervical loop.
19. Describe the relationship between ameloblasts and odontoblasts during amelogenesis and odontogenesis.
20. State the function of the basement membrane in relationship to amelogenesis and odontogenesis.
21. Compare ameloblasts and odontoblasts as to cell type/derivation, matrix and ground substance, deposition of secretions, and cell life.
22. Differentiate between dentinoid and mature dentin.
23. Differentiate between Korff's fibers, matle dentin, and circumpulpal dentin.
24. Differentiate between tubular and peritubular dentin.
25. Draw and label a diagram of the dentin and pulp.
26. Discuss the role of the pulp and odontoblastic processes in dentin hypersensitivity.
27. Differentiate between aprismatic and prismatic enamel.
28. Describe the role of Tome's process
29. Describe the location and role in amelogenesis of the terminal bar.
30. Describe the location and role role in amelogenesis of Tome's process.
31. Discuss the role of incremental lines and Stria of Retzius in the diffusion of ions and uptake of acids and fluoride.
32. Differentiate between the primary enamel cuticle and the reduced enamel epithelium.
33. Describe the development of the junctional epithelium and the sulcus following enamel formation and during eruption.
34. Use diagrams and pictures to gain an understanding of the development of cementum, alveolar bone, and periodontal ligament.
35. Describe the process of cementogenesis and relate the time frame to crown formation.
36. Discuss the role and significance of Hertwig's sheath.
37. Describe the relationship between dentinogenesis and cementogenesis during root development.
38. Describe the process of multiple root development and formation of furcas.
39. Differentiate between cellular and acellular cementum.
40. Relate your understanding of intramembranous bone formation to the development of alveolar bone.
41. Locate and identify the three aspects of the alveolar process.
42. Describe the cellular and structural relationship between cementum, periodontal ligament, and alveolar bone.
43. State the significance of interstitial space tissue.
44. Identify the factors related to the eruption process.
45. Describe the sequence of events in the pre-eruptive, pre-functional eruptive, and functional eruptive stages.
46. Describe the relationship between eruption and exfoliation of primary teeth and the eruption of permanent teeth.
47. Use panoramic radiographic views of mixed dentition to gain understanding of the relationship and eruption sequence of primary and permanent teeth.