

ANATOMY AND PHYSIOLOGY (N3)
1st Semester AY 2022-2023
STUDY GUIDE

INTEGUMENTARY and SKELETAL SYSTEM

Introduction

Hi everyone! Welcome to Week 2 of your Anatomy and Physiology. For this session, you will learn how the components of the integumentary system (the epidermis, dermis, hair, nails, and glands) help protect our body. You will also discover how the skeletal system protects and allows the body to move. This is quite interesting.

After you have learned and understood the concepts on levels of organization, the next unit will be all about support and movement which includes the Integumentary system. In this module, you will encounter familiar concepts which pertain to the structure and function of this system. In addition, this module will help you understand the relationship of these structures in maintaining homeostasis of the body.

Learning Outcomes:

After studying this module, you should be able to:

1. Describe the structures and functions of the skin and its appendages
2. Explain the structural and functional differences of the layers of the skin
3. Describe the integumentary system and its role in homeostasis
4. Explain the different phases of wound healing
5. Identify the effects of aging on integumentary system

For this week, here are my expectations/instructions:

1. You should have received a link for the lecture by now. If not, notify any of the faculty handling the course.
2. Watch the overview of the topic through this link <https://ed.ted.com/on/pG3kIN66>. You can find options such as think, dig deeper and discuss in the above-mentioned site. Going through them is optional.
3. Read about the topic and make your own notes. You may read through the following references for better understanding:
 - a. the open education resource about Integumentary System, Unit 2 Chapter 5 (5.1 to 5.4) through this link: <https://openstax.org/books/anatomy-and-physiology/pages/5-1-layers-of-the-skin>. * Do not answer the interactive link questions found in each page of the site. All interactive exercises are found in the LMS and should be answered after the lecture session.
 - b. the Principles of Anatomy & Physiology book by Tortora, G., & Derrickson, B. Unit 5 **page 143-168**
4. Written below is the outline of the lecture.
Module 4: Integumentary System
4.1. Introduction
4.1.1 Components of Skin

- 4.1.2 Functions of Skin
- 4.2. Integumentary Structures and Functions
 - 4.2.1 Layers of the Skin
 - 4.2.2 Types of Skin
 - 4.2.3 Accessory Structure of the Skin
- 4.3 Maintaining Homeostasis
 - 4.3.1. Skin Wound Healing
 - 4.3.2. Thermoregulation

5. After you have read about the topic, kindly watch the following pre-recorded videos:

- a. Integumentary System_Introduction
Your integumentary system is your body's outer layer. It's made up of your skin, nails, hair and the glands nerves on your skin. Your integumentary system acts as a physical barrier, protecting the body from bacteria, infection, injury, and sunlight. It also helps regulate your body temperature and allows you to feel skin sensations like hot and cold.
- b. Integumentary System_Layers
The skin is composed of three layers, with nerves that recognize different sensations in each layer:
Epidermis - the top layer of your skin. This is the part of your skin that you can see and touch. It's made up of three cells: melanocytes, keratinocytes and langerhans. It gives your skin its color and provides a waterproof barrier.
Dermis - the middle layer of your skin. This layer is the thickest. It contains sweat and oil glands and hair follicles.
Hypodermis - the bottom layer of your skin. It's the fatty layer of your skin that helps insulate your body.
- c. Integumentary System_Accessory Organs
Your nails protect the ends of your fingers and toes. Our hair does more than help us look nice. The hair on your head helps keep heat in your body. Your eyelashes and eyebrows help protect your eyes from dirt and water. Your hair is made of a protein called keratin. Your hair consists of three parts: the shaft, follicle, and bulb. Glands are found throughout your skin. They release materials like water, salt or oil from under your skin to the surface of your skin.
- d. Integumentary System_Maintaining Homeostasis
Your integumentary system protects your body from infection and injuries you could get from your external environment. It's your body's coat of armor and the first line of defense against viruses, bacteria and other microbes. It shields your body from harmful light and helps regulate your body temperature. Your integumentary system stores fat, water, glucose and vitamin D, and helps support your immune system to protect you from diseases.

6. Once you have read and viewed the materials about the topic, answer the 10-item timed quiz in LMS.
7. Be ready for the discussion about the topic during the lecture session (Week 2). You should have read about the Integumentary System and view the pre-recorded videos.

Activity 1. Pigmentation

Watch the video entitled Albinism. Caught Between Dark and Light https://youtu.be/i_WYW-Zrv6E. Answer the questions below. Write your answers in the Discussion Forum at VLE.

1. Explain the reason behind Albinism.
2. How would you feel if you are Kenyan and how do you deal with it?
3. As a future nurse, how will you deal with this concern?

8. Read the additional articles related to our topic.

- a. **Thermoregulation of the Human Body.** This article will help you gain a deeper understanding about how the blood flow of the skin responds in response to the changes in the body's core temperature and changes in temperature of the external environment.

Please click on the link:

[https://www.earthslab.com/physiology/thermoregulation-human body/#](https://www.earthslab.com/physiology/thermoregulation-human-body/#)

- b. **Mechanisms and modifiers of reflex induced cutaneous vasodilation and vasoconstriction in humans.** The processes of reflex cutaneous vasodilation and vasoconstriction are both modified by acute factors, such as exercise and hydration, and more long-term factors, such as aging, reproductive hormones, and disease (Charkoudian N, 2010) Please click on the link

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2963327>

From the two articles that you have read, choose one and explain what idea/ concept in the article caught your attention. Explain. What new knowledge have you gained from the article?

Activity 2. Reflection

Choose one concept in our lesson today, give a brief explanation about the concept and cite how this learning can be applied in your everyday life.

Additional Resource

Below is short video on the overview of Integumentary System focusing on the functions of the skin from Khan Academy

<https://youtu.be/mr2rwWhDD0I>

Here is a short video on the processes of wound healing.

<https://youtu.be/zgc11n-Bw00>

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For additional information on how ageing affects our integumentary system, click the link below: <https://innvista.com/health/anatomy/integumentary-aging-effects/>

References:

Tortora, G., & Derrickson, B. (2014). *Principles of Anatomy & Physiology*. 14th ed. Hoboken, NJ: John Wiley & Sons, Inc.

J. Gordon Betts, Young, K. A., Wise, J. A., Johnson, E., Poe, B., Kruse, D. H., Korol, Oksana , Johnson, J. E., Womble, Mark , & DeSaix, P. (2013, April 25). *Anatomy and Physiology*. <https://openstax.org/books/anatomy-and-physiology/pages/23-interactive-link-questions>

Charkoudian N. (2010). Mechanisms and modifiers of reflex induced cutaneous vasodilation and vasoconstriction in humans. *Journal of applied physiology (Bethesda, Md. : 1985)*, 109(4), 1221– 1228. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2963327>

Volker, D. (2018, August 30). Thermoregulation of the Human Body. Retrieved August 30, 2020, from <https://www.earthslab.com/physiology/thermoregulation-human-body/>.

Nucleus Medical Media (2020). *Skin layers and functions* [Video]. Retrieved from <https://ebSCO.smartimagebase.com/skin-layers-and-functions/view-item?ItemID=71995>
https://youtu.be/i_WYW-Zrv6E .

SKELETAL SYSTEM

Introduction

Skeletal System defines an organ system which gives the ability to the body for movement, shape, and support. The skeletal system makes a structure or framework of all bones, or rough rigid material which support the body of animals, or humans (Rabiya, 2019). In this lesson, you will be able to appreciate the different functions of each component and its relationship to each other in order for us to function in our day to day life.

Learning Outcomes:

After studying this module, you should be able to:

1. Discusses the structure and function of skeletal system
2. Describes the bone formation and different types of bones
3. Explain the types of fracture and the process of bone healing

4. Describes the types of joints and joint movements

As you proceed through today's session, be mindful of the following:

1. Read about the topic and take down your own notes. You may read through the following references for better understanding:
 - a. the open education resource about Skeletal System, Unit 2 Chapter 6-9 through this link: <https://openstax.org/books/anatomy-and-physiology/pages/6-introduction>
* Do not answer the interactive link questions found in each page of the site. All interactive exercises are found in the LMS and should be answered after the lecture session.
 - b. the Principles of Anatomy & Physiology book by Tortora, G., & Derrickson, B. Units 6-9 **pages 169-272**

2. Written below is the outline of the lecture for reference.

Module 5: Skeletal System

5.1. Introduction

5.1.1 Functions of the Bone and Skeletal System

5.1.2 Components of Skeletal System

5.2. Skeletal Structures and Functions

5.2.1 Structure of Bone

5.2.2 Bone Formation and Bone Growth

5.2.3 Axial Skeleton

5.2.4. Appendicular Skeleton

5.2.5 Bone Classification

5.2.6 Articulations

5.3. Maintaining Homeostasis

5.3.1 Maintaining Calcium Levels in the Bones

5.3.2 Bone Response to Force

3. After reading the lesson, you must view the following pre-recorded video:

- a. Skeletal System_Introduction
- b. Skeletal System_Structure of Bone
- c. Skeletal System_Bone Formation
- d. Skeletal System_Bone Types
- e. Skeletal System_Axial Skeleton
- f. Skeletal System_Appendicular Skeleton
- g. Skeletal System_Joints
- h. Skeletal System_Maintaining Homeostasis

4. Accomplish the quiz after reading the lesson and viewing the pre-recorded videos. 6) Be ready for the discussion about the topic during the lecture session (Week 2). You should have read about the Skeletal System and view the pre-recorded videos.

Activity 3. Topic Exercises

1. Watch this video to view a rotating and exploded skull with color-coded bones. Which bone (yellow) is centrally located and joins with most of the other bones of the skull? Access the video through this link: <https://youtu.be/FrpVzSK23Q0>. Take note of the parts of the skull.
2. View this video to review the two processes that give rise to the bones of the skull and body.

You may also access the video thru this link: <https://youtu.be/p-3PuLXp9Wg>. Answer the following questions in the discussion forum in VLE.

- a. What are the two mechanisms by which the bones of the body are formed and which bones are formed by each mechanism?
3. Watch this video thru this link: <https://youtu.be/VNbrvU7MgY0>, to see an animation of synovial joints in action. After watching the video, answer the following questions.
- a. What are the synovial joints being described in the video?
 - b. Which type of synovial joint allows for the widest ranges of motion?

Additional Resource

Intramembranous ossification: https://youtu.be/gh6J2CHR_q4

Endochondral ossification: <https://youtu.be/RpV1t9ZMSxY>

Activity 4. Laboratory Activity

Answer and complete laboratory worksheet 4.

References:

- Cork, Alejandra(Director). (2011, January 05). *Synovial Joints* [Video file]. Retrieved August 25, 2020, from <https://www.youtube.com/watch?v=VNbrvU7MgY0&feature=youtu.be>
- Ebraheim, N. (Director). (2011, October 28) *Fracture of the Femur and its fixation-Everything you need to know [video file]*. Retrieved August 25, 2020 from <https://www.youtube.com/watch?v=1S1nrCwm1qc&feature=youtu.be>
- J. Gordon Betts, Young, K. A., Wise, J. A., Johnson, E., Poe, B., Kruse, D. H., Korol, Oksana , Johnson, J. E., Womble, Mark , & DeSaix, P. (2013, April 25). *Anatomy and Physiology*. Houston, Texas. Rice University. Retrieved from <https://openstax.org/details/books/anatomy-and-physiology>.
- K. (Director). (2020). *Skeletal System: Bone Formation (Intramembranous Ossification & Endochondral Ossification)"* [Video file]. Retrieved from <https://www.youtube.com/watch?v=p3PuLXp9Wg&feature=youtu.be>
- Rabiya. (2019, September 09). Skeletal System: Introduction , Parts, Functions, Diagram & Fact. Retrieved August 30, 2020, from <https://ibiologia.com/skeletal-system/>
- Sechrest, R. (Director). (2012, August 05). *Elbow Anatomy Animated Tutorial* [Video file]. Retrieved August 30, 2020, from <https://www.youtube.com/watch?v=3l3-5Ij3JZ8>
- Tortora, G., & Derrickson, B. (2014). *Principles of Anatomy & Physiology*. 14th ed. Hoboken, NJ: John Wiley & Sons, Inc.
- W. (Director). (2011). *Human skull - exploded skull with bones labelled, based on CT scanning* [Video

file]. Retrieved from <https://youtu.be/FrpVzSK23Q0>