Anatomy and Physiology

You will learn:
The Building Blocks of the Human Body
and
The Basic Body Systems
Fun Facts

• Did You Know:
  – …that your ears and nose are the only areas that continue to grow and develop until you die?
  – …that your eyes remain the same size as it is at birth?
  – …that the skin is the largest organ of the body?
  – …that the brain weighs almost 1 pound at birth and 4 pounds at adulthood?
  – …that the pepcid acid used to create the protein that hair is made of, actually comes from the digestive process?
Why learn about anatomy and physiology?

• Be better prepared to recognize the warning signs if we don’t feel well.
• Understand how our body functions affect our hair, nails and skin.
• Build our confidence in making decisions based on a client’s hair, skin and nail condition.
• Understand the role that exercise, eating well-balanced meals and managing our emotions play in regard to a healthy body.
• Know what is happening when services such as facials or massage are offered.
• Recognize the correct movements to make when massaging muscles or manipulating nerve endings.
Building Blocks of the Human Body

• Anatomy
  – The study of organs and systems of the body.
  – Primary interest to cosmetologist are muscles, nerves, circulatory system and bones of the head, face, neck, arms and hands.
Gross Anatomy

- The study of structures that can be seen with the *naked eye.*
**Microscopic Anatomy**

- Also called *histology*, studies structures too small to see without the aid of a microscope.
Physiology

• The study of the **FUNCTIONS** organs and systems perform.
• What is it and what does it do?
Cells

- The **basic units of living matter**.
- The **smallest unit** in living organisms that is capable of integrating life processes.
  - All cells share at least two common parts
    - They **store information** in genes made of **DNA** (deoxyribonucleic acid)
    - They **synthesize proteins**
- **Cells are composed of 3 basic parts.**
• Cells are composed of a gel-like substance containing water, salt and nutrients obtained from food.
  – The physical basis of life.
  – It is the substance of all plants and animals.
  – Main ingredient is water.
3 Basic Parts of a Cell

• Nucleus
  – The control center of cell activities.

• Cytoplasm
  – Production part of the cell, most of cell activities take place here.

• Cell Membrane
  – Outer surface of cell
Metabolism

- Chemical process in which cells receive nutrients for growth and reproduction.
  - Cells need food, oxygen, water, proper temperature and the ability to eliminate waste products.
  - 2 phases of metabolism
    - **Anabolism** – Building up larger molecules from smaller ones.
      - The body stores water, food and oxygen for the times when they are needed by the body.
    - **Catabolism** – Breaking down larger molecules into smaller ones.
      - Causes a release of energy within the cell, necessary for the performance of specific body functions, including muscular movements and digestion.
Tissues

- Made up of groups of cells of the same kind.
  - There are 4 Primary types of tissue in the human body.
• Epithelial Tissue – Covers and protects the body surface and organs (skin).
• Connective Tissue – **Supports, protects and holds the body together.**
• Nerve Tissue – Carries messages to and from the brain, coordinates body functions.
• Muscular Tissue – Contracts to produce motion.
Organs And Their Functions

Organs – Separate body structures that perform specific functions. They are composed of two or more different tissues.
Brain

• Controls all body functions.
Eyes
• Controls Vision

Heart
• Circulates Blood
Lungs
• Supply blood with oxygen.

Stomach/Intestine
• Digest food
Liver

• Removes toxic by-products of digestion.
Kidney

- Eliminates water and waste products.

Skin

- Largest organ, external protective layer of the body.
Body Systems Vital Functions

- System – group of structures/organs that perform one or more vital function of the body.
- It is necessary for the professional cosmetologist to identify the functions of the eight major body systems in order to utilize proper massage, styling and other cosmetology services.
The Skeletal System

- The physical foundation of the body.
  - Composed of 206 bones of different shapes and sizes, each attached to others at moveable or immovable joints.
  - Accounts for 14% of the body’s total weight.
- Osteology – The study of bones
Types of Bones

- **Long bones** are found in the **arms** and **legs**.
- **Flat bones** are found in the **skull**.
- **Irregular bones** are found in the **wrist**, **ankle** and **spinal column**.
Bones

• Is the **hardest** structure in the body.

• Composition – 2/3 mineral, 1/3 organic matter
Four Major Functions of the Skeletal System

M - Movement
A - Attach muscles
P - Protect organs
S - Support and shape the body
Skull

• Skull - Skeleton of the head. Encloses and protects brain and primary sensory organs.
  – 2 groups:
    • CRANIUM – 8 bones
    • FACIAL SKELETON – 14 bones
Major Parts of the Cranium

Cranium – 6 of 8 bones affected by scalp massage.
Frontal

- Frontal - From eyes to top of head- forehead.
Parietal

- Parietal - 2 bones – form crown and upper sides of head.
Occipital

- Occipital - Forms **back** of skull – indent above nape area.
Temporal

- Temporal - 2 bones – sides of head above ears, below parietal.
Sphenoid

- Sphenoid - Behind eyes and nose – connects all bones to cranium. No part in massage or styling.
Ethmoid

- Ethmoid - **Spongy** bone between eyes – forms part of **nasal cavity**. No part in massage styling.
Knowing the parts of the skull can help you to become a super hairstylist!
Stylist use the occipital area to help create more shape or definition to a hair cut or style.

Graduation mostly in the occipital area

Haircut fades from occipital to neckline
Stylist is shaping the occipital area first.
This is the starting point of most haircuts.

The stylist has finished the occipital area.
The next step would be to move on to the parietal area.
A stylist can determine the length of the fringe area (bangs) based on the height of the frontal bone.
The parietal areas can be used to determine where to change projection angles while cutting hair.
Have you ever had a massage or a shampoo where the stylist took the time to give you a scalp massage?
Facial Skeleton

- Of the 14 facial bones, only 9 are involved in facial massage.
  - Mandible
  - Maxillae
  - Nasal
  - Zygomatic (Malar)
  - Lacrimal
Mandible

- Mandible - Lower jaw – LARGEST of facial skeleton
Maxillae

• **2 bones – upper jaw**
Nasal

- 2 bones – bridge of nose
Zygomatic (Malar)

- 2 bones – upper cheek, bottom of eye sockets
Lacrimal

- 2 bones – smallest of facial skeleton. Front part of inner, bottom wall of eye socket.
Neck Bones

- Neck Bones - Top part of spinal column and Adam’s apple.
Cervical Vertebrae

- Cervical Vertebrae - 7 bones – often manipulated in extended scalp massage.
Hyoid

- U-shaped, Adam’s apple
  - Serves as a base of attachment for the tongue.
Back, Chest and Shoulder Bones
Thoracic Vertebrae, Sternum, Thorax and Ribs

- Chest - Bony cage composed of thoracic vertebrae, sternum and 12 ribs.
  - Protects organs.
Clavicle

- Clavicle - Bone that forms area from throat to shoulder.
Scapula

• Scapula - Flat bone – extends from middle of back to where it attaches to clavicle.
Arm, Wrist and Hand Bones

The human hand has 27 bones!
Humerus

• Largest bone of upper arm – elbow to shoulder.
Radius

- **Small bone on the thumb side of lower arm in forearm.**
Ulna

- Bone located on the little finger side of lower arm.
Carpals

- **Eight** small bones held together by **ligaments** to form the **wrist** (carpus).

  - **Carpal Tunnel** - Improper manipulation of tools or extension of the wrist can lead to a build up of calcium that presses against the carpal nerves to cause pain and less mobility.
Metacarpals

- 5 long thin bones – form \textit{palm of hand.}
Phalanges

- 14 bones that form digits or fingers. Fingers have 3, thumb has 2.
  - The human thumb has two separate flexor muscles that move the thumb in opposition and make grasping possible.
What We Just Read
Head to Head Challenge
Dem Bones

• Turn to the next page in your notes packet and complete the “Dem Bones” worksheet.
  – Use your notes as reference.
  – You may also get a text packet if you need it.
The Muscular System

- Myology - The study of muscles.
- More than 500 muscles – make up 40% of body’s weight.
Four Major Functions of the Muscular System

1. Support **Skeleton**
2. Production of **body movements**
3. Contouring of the body
4. Involved in **functions** of other body systems (digestive, circulatory and nervous)
Two Types of Muscle Tissue

- **Striated**
  - **Voluntary** (skeletal) – respond to commands regulated by will.
    - Over 400 – make up the largest category of muscles.

- **Non-Striated**
  - **Involuntary** (smooth) - Respond automatically to control body functions including those of internal organs.
    - Responsible for internal operations.
Straited Muscular Actions
Non-Striated Muscular Movements

INHALATION
Diaphragm contracts (moves down)

EXHALATION
Diaphragm relaxes (moves up)

Aerobic exercise builds endurance by keeping the heart pumping for an extended period of time.
Special Terminology

The following terms will be used to describe what a muscle does or where it is located.

- **Anterior** – In front of
- **Posterior** – Behind or in back
- **Superior** – Located above or is larger
- **Inferior** – Located below or is smaller
- **Levator** – Lifts up
- **Depressor** – Draws down or depresses
- **Dialator** – Opens, enlarges or expands
Cosmetologist’s Primary Concern

- Cosmetologists are concerned with VOLUNTARY muscles of head, face, neck, arms and hands.
Three Parts of the Muscle

1. Origin: Non-moving fixed portion, attached to bones or other fixed muscle; means attached to bone.
2. Belly: Midsection of muscle
3. Insertion: Portion of muscle joined to moveable attachments (bone, movable muscles or skin).
How the Muscle Produces Movement

- Muscles **pull** but do **not push**.
7 Ways To Stimulate Muscles

• Massage
• Chemicals – certain acids and salts
• Nerve Impulses
• Moist Heat – steamers, steam towels
• Electric Current – high frequency and faradic
• Light Rays – IR and UV
• Heat Rays – Heat lamps and heating caps
Scalp and Face Muscles

• Primary interest to the cosmetologist’s as you perform scalp and neck massages and/or facials.
Scalp (Epicranius)

- Epicranius - Covers epicranium, formed by 2 muscles joined by APONEUROSIS tendon.
- Also called occipitofrontalis.
Frontalis

• Frontalis - Front part of epicranius – forehead to top of skull – raises eyebrows or draws scalp forward.
  – The frontalis muscle is right over the frontal bone.
Occipitalis

- Occipitalis - At nape of neck – draws scalp back.
  - The occipitalis muscle is right over the occipital bone.
Ear Muscles

• Have no recognized function.
  – Unless you can wiggle your ears!
Auricularis Anterior

Front of ear
Auricularis Superior

Above ear
Auricularis Posterior

Behind ear
Eye and Nose Muscles
Corrugator

Located between the eyebrows. Draws eyebrows inward and downward; causes frown lines.
Levator Palpebrae Superioris

• Located **above** the eyelids and **raises** the eyelids.
  – Levator means to **lift up**.
Orbicularis Oculi

Circles the eye socket and closes the lid.
Procerus

- Located **between** the **eyebrows**, across the **bridge of the nose**.
- Draws **brows down**, wrinkles the area across the bridge of the nose.
Mouth Muscles
Oris Obicularis

- Circles the mouth.
  - Function: Contracting, puckering and wrinkling of the lips, kissing or whistling.
Quadratus Labii Superioris

- Consists of 3 parts.
  - Located above the upper lip
  - Function: raises both the nostrils and upper lip, as in expressing distaste.
Quadratus Labii Inferioris

- Located **below the lower lip**.
  - Function: **pulls the lower lip down, as is sarcasm.**
Mentalis

- Located at the tip of the chin.
  - Function: Pushes the lower lip up and/or wrinkles the chin, as in expressing doubt.
Risorius

• Located at the corner of mouth.
  – Function: draws the mouth up and out, as in grinning.
Caninus

• Located **above the corners of the mouth**.
  – Function: **raises the angle of the mouth, as in snarling**.
Triangularis

- Located **below the corners of mouth**.
  - Function: draws the **corners of the mouth down**, as in depression.
Zygomaticus

- Located outside the corners of the mouth.
  - Function: draws the mouth up and back, as in laughing.
Buccinator

• Located between the jaws and the cheek.
  – Function: compresses the cheek, as in blowing.
Mastication Muscles (Chewing)

• **Temporalsis**
  – Above and in front of ear.
  – Function: opens and closes the jaw, as in chewing.

• **Masseter**
  – Covers the hinge of the jaw.
  – Function: closes the jaw, as in chewing.
The back is actually a large collection of muscles that extend from the neck and shoulders to the upper part of the legs; many of these muscles crisscross and support one another or work in harmony with just about every other area of the body.
Platysma

- Extends from the **tip of the chin** to the **shoulders** and **chest**.
  - Function: **depresses the lower jaw and lip**, as in sadness.
Sternocleido Mastoideus

- Extends along the side of the neck from the ear to the collarbone.
  - Function: causes the head to move from side to side and up and down, as in nodding “yes” or “no”.
Trapezius & Latissimus Dorsi

- Pair of muscles that covers the back of the neck and upper back.
  - Function: draw the head back, rotate the shoulder blades and control swinging of the arm.
Shoulder, Chest and Arm Muscles

- Trapezius
- Deltoid
- Infraspinatus
- Triceps
Pectoralis

• Major and Minor
  – Extend across the front of the chest
  – Swing the arms.
Serratus Anterior

- Under the arm
  - Helps in lifting the arm and in breathing.
Deltoid

- Covers the shoulder
  - Lifts or turns the arm.
Bicep

- **Front of the upper arm**
  - Raises the forearm, bends the elbow and turns the palm down.
Tricep

• Extends the length of the upper arm to forearm
  – Forward movement of forearm.
Supinator

• Parallel to the ulna
  – Turns the palm up
• Mid-forearm, inside of arm – bends wrist and closes fingers (flexes).
Extensor

- Mid-forearm, inside of arm
  - straightens the fingers and wrist (extends).
• Hand muscles stretch over the fingers, connect the joints, provide dexterity.
Abductor

- Separates the fingers (think of abduct or take away)
Adductor

- Draws the **fingers together** (think of add).
Opponens

• Located in the **palm** – cause the **thumb** to move **toward the fingers** – gives the ability to **grasp** or make a **fist**.
What We Just Read
Head to Head Challenge
The Circulatory System

Also called the vascular system – transports blood and lymph. Massage treatments stimulate or relax circulation.
Cardiovascular System

- Responsible for circulation of blood using arteries, veins and capillaries.
Lymph-Vascular System

- Reaches parts of body not reached by blood.
- Circulates lymph through lymph glands, nodes and vessels.
- Circulates only as a result of muscle movement; there is no heart-like pump.
- Lymph filters blood by removing toxins (poisons).
Lymph

- Colorless liquid; byproduct of plasma passing nourishment to capillaries and cells.
Glands

• Filter out toxic substances like bacteria.
Nodes

- Filter out toxic substances like bacteria; swollen or tender nodes indicate infection in the body.
The Heart

- Cone-shaped
- Size of closed fist
- Located in chest cavity.
- Only muscle of its kind; involuntary
Pericardium

- Membrane that encases the heart (peri means around) (cardium relates to heart).
- Contracts and relaxes to force blood to move through the circulatory system.
Four Compartments

- Right Atrium
- Right Ventricle
- Left Atrium
- Left Ventricle
Blood

- Sticky, salty fluid that circulates to carry nourishment and oxygen to body parts and carries toxins and waste products to liver and kidneys.
8-10 Pints

- Average adult blood supply.
Erythrocytes (RBC)

- Red blood cells; carry oxygen and contain hemoglobin; oxygenation is when hemoglobin attracts oxygen; when oxygen is low, blood is deep scarlet red.
Leucocytes (WBC)

- White corpuscles; fight bacteria and other foreign substances.
Thrombocytes (Clot)

- Blood platelets responsible for clotting the blood.
Plasma

• Fluid part of blood
• 90% water
• Carries RBC and WBC and blood platelets through the body.
One square inch of skin contains up to 15 feet of blood vessels.
Arteries

- Tubular, thick walled
- Branching vessels
- Carry pure blood
- Bright red in color
- Carry blood away from heart
Veins

- Thin walled
- Branching vessels
- Carry blood from capillaries back to heart.
- Cup-like valves prevent back-flow
- Impure blood is dark red
- Closer to body surface than arteries
Capillaries

- Small vessels
- Take nutrients to cells
- Take waste from cells to veins
Arteries of the Face, Head and Neck

- Posterior auricular artery
- Occipital artery
- Maxillary artery
- Internal carotid artery
- External carotid artery
- Carotid sinus
- Vertebral artery
- Common carotid artery
- Thyrocervical trunk
- Superficial temporal artery
- Facial artery
- Lingual artery
- Superior thyroid artery
- Subclavian artery
- Brachiocephalic artery
- Internal thoracic artery
Common Carotid (CCA)

- Supplies **blood** to the **head, face and neck**; located on either side of the neck; splits into **internal and external carotid**.
Blood Supplied To:

• The INTERNAL CAROTID ARTERY supplies blood to the brain, eyes and forehead. The EXTERNAL CAROTID branches into smaller arteries, supplying blood to the skin and muscles of the head.
Returns Blood From:

- All blood from the head, face and neck returns through two veins, the INTERNAL JUGULAR VEIN and the EXTERNAL JUGULAR VEIN.
External Carotid Artery

- Splits into smaller branches to supply blood to:
  - Occipital – back of head, up to crown.
  - Posterior Auricular – scalp above and behind ears.
  - Superficial Temporal – sides and top of head.
  - External Maxillary – lower portion of face, including mouth and nose.
Circulatory System Talking Points

Complete Circulatory System Talking Points worksheet.
The Nervous System

• Neurology – study of the nervous system.

• 3 parts: Central, Peripheral, Autonomic or sympathetic.

• Primary components: Brain, spinal cord, nerves.
Four Parts of the Brain
• Mental activity
• Upper front of cranium
Cerebellum

- Muscle movement
- Occipital area below cerebrum
Pons

- Connects other parts of brain to spinal column
- Below cerebrum; front of cerebellum
Medulla Oblongata

- Connects other parts of brain to spinal column; below pons.
Peripheral Nervous System

- Composed of sensory and motor nerves that extend from the brain and spinal cord to other parts of the body; carries messages to and from the central nervous system.
Nerve Cells

- Also called neurons; like other cells, have nucleus, cytoplasm and membrane; differ in appearance – long and short thread-like fibers called axons extend.

- Nerve terminals at end of axon – send message as impulses, short fibers, dendrites – receive messages.
### Types of Nerves

- **Motor**
  - Carry messages from brain to muscles

- **Sensory**
  - Carry messages to brain and spinal cord
  - Sense of smell, sight, touch, hearing, taste

- **Mixed**
  - Perform both motor and sensory functions
Face, Head and Neck Nerves

- 2 of the 12 pairs of cranial nerves control face, head and neck: **Trifacial** (trigeminal) **and** facial.
  - Trifacial is also called the 5\(^{th}\) cranial nerve.
  - Facial is also called the 7\(^{th}\) cranial nerve.
Trifacial and Facial Nerves

- Trifacial is **largest** of cranial nerves
  - Divides into **3 main** branches and **8 smaller** branches.
Autonomic Nervous System

• Also called the **sympathetic nervous system**.

• The autonomic system is responsible for all **involuntary** body functions: Respiratory, Digestive, Excretory, Endocrine, and Reproductive.
What We Just Read
Head to Head Challenge
Nervous System

Talking Points

Complete Nervous System Talking Points worksheet.
Digestive System

• The digestive system breaks down FOOD into simpler CHEMICAL compounds that can be easily ABSORBED by cells or, if not absorbed, eliminated from the body in WASTE products.

Digestive Process
Pharynx → esophagus → stomach → small intestine → large intestine
Takes approx. 9 hours!
Excretory System

- The excretory system eliminates solid, liquid and gaseous waste products from the body.
Body’s largest organ
Liver

Neutralizes ammonia and converts it to urea.
Kidneys

Receive urea from liver; nephrons filter out waste and water.
Respiratory System

- Primary functions
  - Intake **oxygen**
  - Exhale **carbon dioxide**
  - Primary organs are **lungs** and **diaphragm**
  - Breathing through the nose is the healthier option
Endocrine System

- Glands that manufacture hormones
- Affects hair growth, skin conditions and energy levels.
Integumentary System
Two Primary Glands

- **Sebaceous** glands (Oil glands)
- **Sudoriferous** glands (Sweat glands)
Have a nice day!
Scalp Massage

• Using gentle circular motions, massage your scalp.
  – Begin with the frontal bones
  – Move to the temporal bones
  – Then the parietal ridge
  – And end massaging from the occipital bone down to the nape of the neck.

Didn’t that feel great?
Facial Massage

• Using gentle circular motions, give yourself a facial massage.
  – Begin at the chin and massage the mandible bone all the way to the bottom of the ear.
  – Then from the corner of the mouth to the top of the ear.
  – Continue from the corner of the nose to the temple.
  – Then down the nose.

Did you know?
Getting a facial that includes a massage once a month can keep you looking young much better than any botox or collagen treatment! And, it will save you big bucks in the long run!