

**UNITED STATES MARINE CORPS**

MARTIAL ARTS CENTER OF EXCELLENCE

THE BASIC SCHOOL

24191 GILBERT ROAD

QUANTICO, VIRGINIA 22134

**STUDENT OUTLINE**

**ANATOMY AND PHYSIOLOGY**

**MAIB1000**

**MARTIAL ARTS INSTRUCTOR COURSE**

**M02MMET**

APPROVED BY: Maj. Carter, C.T. DATE: 1 January 2020

**LEARNING OBJECTIVES**a. ENABLING LEARNING OBJECTIVES

(1) Given exam materials, identify vulnerable points on a human body in accordance with MCRP 3-02B. (MCCS-GREN-1028a)

(2) Given exam materials, identify a human body's primary weapons in accordance with MCRP3-02B. (MCCS-GREN-1028b)

1. **TARGET AREAS OF THE BODY**. There are five major target areas of the body: Head, Neck, Torso, Groin, and Extremities.

a. **The Head**

(1) Cranium. The cranium or skull houses and protects the brain. The cranium is made up of eight dense bones, which are fused together, therefore, is not a good target. However, a powerful blow delivered with a weapon such as a club, can cause a concussion, unconsciousness, or death.

(2) Ears

(a) Anatomy. The ear consists of three major parts: the external ear, the middle ear, and the internal ear. The external auditory canal allows external sound vibrations to pass into the skull. The opening to this canal is called the external auditory meatus. The eardrum lies at the innermost part of the external ear, next to the middle ear. Sound waves transform into mechanical impulses within the middle ear and internal ear. The internal ear controls equilibrium and balance.

(b) Results of an Attack. When the ears are struck, immobilizing effects can occur due to air being trapped and forced down the external auditory canal and into the eardrum. The eardrum can burst causing extreme pain, loss of hearing, or bleeding from the mouth or ear. In addition, balance can be disrupted and a loss of equilibrium could occur. A cupped hand strike is particularly effective on the ears.

(3) Nose

(a) Anatomy. The nose is comprised of cartilage and two nasal bones fused at the mid-line to form the bridge of the nose.

(b) Results of an Attack. Strikes to this region can cause watering of the eyes and nose bleeding. The bone and

cartilage can easily break if struck at a 45-degree angle or straight on with dominant force.

(4) Mandible

(a) Anatomy. The mandible (jaw) is attached to the skull by a hinged joint called the temporomandibular joint (TMJ).

(b) Results of an Attack. The mandible can be dislocated when struck downward or upward at a 45-degree angle. The preferred target area is the tip of the mandible (chin). Hitting the jaw can cause unconsciousness because the vagus nerve running up against the socket behind the jaw controls some motor function and neurological functions of the body including regulating breathing and heart rate. Striking the side of the mandible near the TMJ may break the joint.

**b. The Neck**

(1) Sides of the Neck

(a) Anatomy. The sides of the neck contain the sternocleidomastoid muscles and numerous arteries and veins. The Sternocleidomastoid muscle is responsible for supporting and flexing the head. Beneath this muscle lies the carotid artery and jugular vein. The carotid artery feeds oxygenated-blood from the heart to the brain; the jugular vein returns oxygen-depleted blood from the brain to the heart. The carotid sinus is located at the juncture of the carotid arteries and regulates blood pressure.

(b) Results of an Attack. Effects of a strike to this area range from dizziness, unconsciousness, and death due to a complete collapse of the bloodlines carrying blood to and from the brain. Striking the carotid sinus can fake the body into shutting down, and it can stop the heart.

(2) Throat

(a) Anatomy. The front of the neck or throat region contains the esophagus and the trachea. The esophagus is a straight, collapsible tube that allows food to enter the digestive system. Directly in front of the esophagus is the trachea, which is the air tube, leading to the lungs. The larynx serves as the opening to the trachea. The jugular notch is located at the base of the neck in the notch formed at the center of the clavicle.

(b) Results of an Attack. When the front of the neck is struck, cartilage can puncture the trachea, disrupting breathing. Pressure applied to the jugular notch with a quick stabbing motion serves as a distraction technique. Strikes to this area can cause serious damage including shock, unconsciousness, and even death.

(3) Back of the Neck

(a) Anatomy. The vertebrae house protects the spinal cord. There are 7 cervical vertebrae immediately behind the skull that are identified as C1-C7. C1 is the top most vertebrae which forms the joint connecting the skull and the spine.

(b) Results of an Attack. Over-rotating the neck can misalign the vertebrae and damage the spinal cord. This will disrupt the neurological functions controlled by the spine in this area, including respiratory functions. Strikes to the back of the neck (cervical vertebrae) where the base of the skull meets the spine can have a devastating effect causing paralysis or even death.

**c. The Torso**

(1) Spinal Column

(a) Anatomy. The spinal column is made of 33 vertebrae that are divided into five regions (cervical, thoracic, lumbar, sacral, coccyx). It supports the structure of the body and protects the spinal cord, which combines with the brain to form the central nervous system.

(b) Results of an Attack. If the spinal column is damaged it will result in extreme pain and loss of mobility. This could also sever the spinal cord, resulting in paralysis. Shock, cardiac arrest, unconsciousness, and death could be the result.

(2) Thorax

(a) Anatomy. The thorax (ribcage) consists of 12 pairs of ribs that house the major internal organs of the torso. They are connected to the thoracic vertebrae and the sternum. The last two pairs are called floating ribs because they are not connected to the sternum. The xiphoid process is a small brittle extension of the lower part of the sternum.

(b) Results of an Attack. Strike to this area can cause intense pain and loss of motor function. The floating ribs and xiphoid process are more susceptible to damage because they are not supported. Fractured bones may cause damage to internal organs.

(3) Internal Organs

(a) Anatomy. The major internal organs of the torso include the lungs, heart, liver, spleen and kidneys. The lungs primary function is to transport oxygen to the bloodstream and excrete carbon dioxide. The heart is a pear shaped, muscular organ, responsible for pumping blood through the body by repeated, rhythmic contractions. The liver plays a major role in metabolism and has a number of functions in the body, including glycogen storage and drug detoxification. The spleen destroys old red blood cells and holds a reservoir of blood. The kidneys are located just under the bottom ribs on either side of the spinal column. They filter waste from the blood and excrete it as urine.

(b) Results of an Attack. Damage to the lungs will disrupt or stop breathing. Damage to the heart can cause shock, unconsciousness, and death. Strikes to the kidneys, liver and spleen will cause severe pain and disrupt bodily function.

**d. The Groin**

(1) Groin

(a) Anatomy. The groin is the region where the legs meet the torso. It includes the lower abdomen and inner thighs. This is a good target area because it contains large arteries and nerves, making it highly sensitive. The pelvis supports the weight of the entire upper body.

(b) Results of an Attack. An attack can be quickly debilitating, due to the large number of sensitive nerves. A groin attack is found painful by both genders, and can be incapacitating. A powerful strike can fracture the pubic bone, resulting in immediate loss of mobility.

(2) Coccyx

(a) Anatomy. The coccyx, commonly referred to as the tailbone, is the final segment of the human vertebral column. It provides an attachment for muscles, such as the

gluteus maximus, and serves as a shock absorber when the person sits down.

(b) Results of an Attack. Strikes to the tailbone at an upward angle can result in severe pain and paralysis, immediately disabling an opponent.

**e. The Extremities**

(1) Joints

(a) Anatomy. Two primary types of joints in the body are hinge joints and ball and socket joints. The elbows and knees are hinge joints that will only bend in one direction. The shoulders and hips are ball and socket joints that have range of motion in all directions. The wrists and ankles are complex joints with many bones and a wide range of motion.

(b) Results of an Attack. Joints can be manipulated by forcing them in the opposite direction they are designed to bend or by forcing them beyond their natural range of motion. Applying the correct pressure will cause pain compliance allowing the control of the subject. Striking or forcefully bending a joint can damage tissue, causing intense pain and loss of functionality.

(2) Muscles

(a) Anatomy. The three types of muscles are skeletal, smooth and cardiac. Skeletal muscle or "voluntary muscle" is anchored by tendons to bone and is used to affect skeletal movement such as locomotion and in maintaining posture. Smooth muscle or "involuntary muscle" is found within the walls of organs and structures. Unlike skeletal muscle, smooth muscle is not under conscious control. Cardiac muscle is also an "involuntary muscle" but is found only within the heart.

(b) Results of an Attack. Skeletal muscles can be separated from the bone or squeezed with the fingers to cause pain. In addition, muscles can be struck with any weapon available to cause massive bruising and tearing which will result in pain serving to weaken an opponent.

(3) Bones

(a) Anatomy. The bones in the arms are the humerus (upper arm), radius (thumb side), and ulna (pinky side). The clavicle (collarbone) acts as a strut for the arm and supports

movement. The bones of the legs are the femur (thighbone), tibia (shinbone), and fibula. The femur is the longest and strongest bone in the body.

(b) Results of an Attack. A powerful strike with a hard object can bruise or fracture a bone. This will result in extreme pain and loss of functional in the limb. Broken bones in the lower body will prevent mobility.

#### (4) Nerves

(a) Anatomy. The radial and ulnar nerves travel along the radial and ulna bones, respectively, and make excellent striking areas. The femoral nerve (inside of thigh) and peroneal nerve (outside of thigh) are good targets especially since targets below the waist are not usually covered with body armor.

(b) Results of an Attack. A powerful blow to a nerve can cause a temporary paralysis of the nerve, causing pain and serving to weaken an opponent. Effectiveness will vary due to individual sensitivity and pain tolerances.

**2. PRESSURE POINTS OF THE BODY**. There are many pressure points on the body. We will discuss the nose, eyes, mastoid process, and brachial plexus.

##### **a. Nose**

(1) Anatomy. The nose is positioned right across several nerves of the face and head. The infra-orbital nerve is located at the base of the nose.

(2) Results of an Attack. Pressure applied beneath the nose and above the upper lip at an upward angle can produce pain compliance.

##### **b. Eyes**

(1) Anatomy. The eyes are soft tissue set into sockets in the skull called orbital fissures.

(2) Results of an Attack. The eyes are vulnerable because they are extremely sensitive to touch and could easily be gouged. Dirt and debris can be thrown into the eyes of an opponent as a distraction. Attacking the eyes may result in watering, involuntary closing, pain, and even shock.

**c. Mastoid Process**

(1) Anatomy. The mastoid process is the point of attachment for many neck muscles, located behind the ear.

(2) Results of an Attack. Pressure applied at an upward angle to the mastoid process results in pain, which can be used to gain compliance.

**d. Brachial Plexus**

(1) Anatomy. A plexus is a point at which several nerves combine. The brachial plexus is in the shoulder at its juncture to the torso, underneath the collarbone. It can be accessed underneath the armpit.

(2) Results of an Attack. Pressure applied upward into the armpit can cause pain and can be used to gain compliance.

**3. WEAPONS OF THE BODY**. The arms and legs are the two primary weapons of the body. They are each broken down into secondary weapons. Although not generally a weapon, the head can be used to strike or bit an opponent if necessary.

**a. The Arms**. The arms are the most commonly used weapons of the body, consisting of the hands and elbows.

(1) The Hands. The hands are the instant response weapons of the body. The primary technique of the hands is striking but they can also be used for choking, grabbing, and wielding a weapon.

(2) The Elbows. The elbow does not have all the functions of the hands, but can deliver a higher volume of force at close range. The bones of the elbows are larger and harder than those in the hands, making a stronger striking surface.

**b. The Legs**. The legs are considered the most powerful weapon of the body, consisting of the feet and knees.

(1) The Feet. The feet are not easily employed as weapons during an engagement. It takes training, coordination, and skill to use the feet as weapons. The primary techniques used are kicks and stomps. They produce more force than any weapons of the arms because the lower body and hips are larger and more powerful. The shins may also be utilized for a striking surface.

(2) The Knees. The largest amount of power can be delivered from knee strikes. The striking surfaces of the knee are larger than the feet, and the weight of the leg along with the drive of the hips produce the power of the strike. Knee strikes can be used on various target areas of the body and dropping the knee on an opponent is affective.

**REFERENCES:**

Gray's Anatomy, 13<sup>th</sup> Edition, Clemente, 1985

Marine Corps Martial Arts, MCRP 3-02\_

Physiology of Sport and Exercise, 2<sup>nd</sup> Edition, Wilmore, Jack H.; D.L. Costill, ISBN: 0736062262