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Take a Look Inside: MRI Scans

Take a look inside the human body with full-sized, colorful MRI scans! MRI scans show incredible details of the human skeleton, musculature and important organs. This incredible resource is important for introducing students to basic anatomy concepts.

Note: We have used a real MRI scan to create our art work. We've sharpened the details and colored the different systems. Our artwork accurately portrays what a doctor sees when looking at an MRI. We've created two detailed overlays with high definition illustrations of the organs. Use these to pin point important details on the MRI Scans.

The kit encourages students to put the pieces together to form a complete image and to visualize the functions and placement of various organs of the body. It helps to form an understanding of how the human body works. Learn about basic medical terms and definitions later on in this guide.

There are 3 components to the MRI kit: The base scan, and front and back organ overlays. The base scan is a slice right through the center of the body. We've illustrated two overlays. The overlay featuring the lungs represents the organs near the front of the body. The overlay featuring the heart represents organs near the spine.

The base scan features a complete scan of the entire body. There are 16 pieces that make up the base scan. Each piece represents a portion of the entire body and can be arranged together to make a complete image. The pieces feature a miniature scan which references where each piece goes. The red outline box indicates where the particular piece is located. Hint: Look at the Roylco logo on each piece to determine if it is facing right side up.

The remaining two organ overlays reveal more details of internal organs. Each piece portrays a full color image of various organ systems in the main abdomen area. The front overlay features the digestive and respiratory systems. These go in front of the base scan. The back overlay goes under the base scan, and depicts the circulatory and urinary systems. Place both overlays onto the base layer for a complete overview of organs and organ systems in the human body.

Use a light table, flash light or hold the transparent plastic sheets up to a window to reveal details. The light will illuminate the organs and allow students to see clear distinction between the different types.

As students are observing the MRI, ask them to identify the various parts of the body. What do they recognize at first glance? Can they identify the major parts of the body? Younger grades may be more likely to identify general parts of the body, such as skeleton, arm, leg, elbow, stomach, etc. When students have identified these general parts, ask them how these parts work to help the rest of the body.

The MRI Scans are compatible with R5911 True To Life Human X-Rays! Pull out a pack of the x-rays and lay them onto the base MRI scan. Each of the parts fits to scale. Explore the skeleton in relation to organs and muscles throughout the body. Illuminate both the MRI scans and the x-rays on a light table or shine a flash light through the images to reveal the details.

CURRICULUM RELEVANCE:

- Discover bone and organ arrangements
- Learn medical terms and definitions
- Use for light table play
- Identify parts of the body
- Introduce students to anatomy
- Match pieces together like a puzzle
- Explore connections between organs and body systems

MRI stands for 'magnetic resonance imaging.' MRI scans show the internal structure of the human body. When a person

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has an MRI, they are placed inside a large machine that beams magnetic waves and radio waves into the body. These waves bounce back and are received by a large computer that processes the waves as images.

The images illustrate the details of the body and can help doctors determine if there is a problem. MRIs are conducted when the patient is not feeling well and doctors are unable to determine why. Unlike an x-ray that only shows hard objects like bones. MRI is delicate enough to show muscle tissue in the body; MRIs are used to find problems with muscles, ligaments and tendons in addition to bones and major organs.

BASE SCAN:

This layer shows an image of a skeleton and surrounding muscle structure. The skeleton is the basic frame for the entire body. It is made up of all the bones in the body. Bones are specially-formed deposits of calcium, other minerals and blood vessels that make up the parts of the body. There are long bones (such as the thigh bones), short bones (such as the hand and feet bones) and flat bones (such as the skull). The skeleton helps keep all the internal organs in place and is supported by the muscles that surround it.

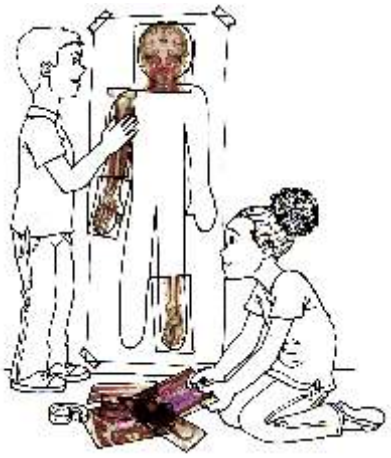
Note: The MRI scans depict an average 5' 4" (1.62 meters) female and shows the addition of the uterus and the Fallopian tubes. You can introduce differences between male and female bodies using the MRI scans at your own discretion.

In addition, the base scan displays cross-sections of several major internal organs, such as the brain, the main artery and vein, liver, lungs, heart, kidneys, spleen, gallbladder, stomach, urinary bladder and more. Pass around the miniature image of the MRI and ask students to describe any of the internal organs they recognize.

Another important part of the base layer is the appearance of the muscles. If you look around the joints of the various bones, you will notice that muscles appear almost whitish in some places. The white parts of the muscles are actually ligaments. Ligaments are made of special joint tissue that helps hold the bones together. Ligaments can be elastic in certain areas, allowing the limbs to stretch for movement.

Tendons are another important type of connective joint tissue which help to hold muscles to bones. Skeletal muscles, which encircle our major limbs (such as arms and legs), are very elastic and are responsible for all bone movement in the body. In order to keep the muscle from stretching too far, the tendons help to anchor these muscles to the bones.

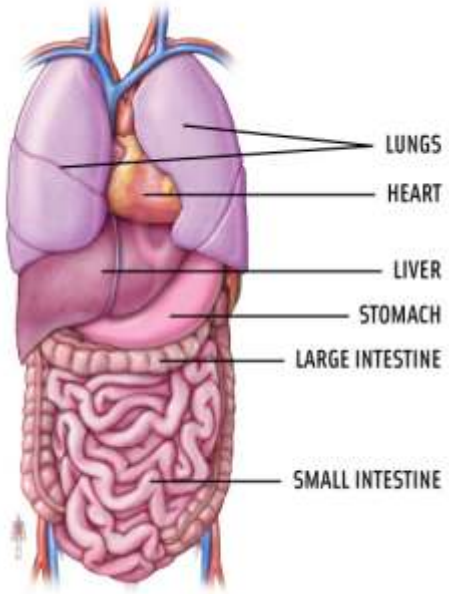
Place the base scan onto a light table or shine a flashlight through the image to illuminate the details in the scan. Use tracing paper on top of the scan to trace the various major bones of the body. Cut out the sketches and research the names of the bones and write them on the back of the cutout. Keep the cutouts to identify the parts of the body.



Trace the outline of the base scan onto a large roll of paper. Hang up the outline and ask students to reconstruct the various bones of the body as they remember from observing the base layer.

MRI FRONT ORGAN OVERLAY:

The front MRI overlay depicts parts of the digestive and respiratory systems. These organs are more prominent at the front of the body. The major organs depicted in this overlay are the liver, stomach, duodenum, heart, inferior vena cava and aorta, large intestine and small intestine. The digestive system is made up of all the organs that help humans eat, digest and dispose of their food, including the liver and stomach.



LIVER: The liver is the battery for the whole body. It is located on the right side of the body, beside the stomach. It is connected to the bloodstream and stores all the energy needed to supply the rest of the organs. This energy is formed from carbohydrates, or essential sugars from food we eat, and the liver is responsible for sending it to wherever energy is needed in the body. The liver simultaneously filters waste from our bloodstream and sends it to the kidneys.

STOMACH: The stomach looks like a J-shaped sac and is located on the left side of the upper abdomen. The stomach is connected to the esophagus, which carries the foods that we eat down into our bodies. The stomach is lined with powerful muscles that help to grind the food down into a liquid that passes into the intestines.

SMALL INTESTINE: In a fully grown adult, the small intestine is about 19½ feet (6 meters) long! The small intestine connects the stomach to the large intestine. As the liquid food passes through the small intestine, tiny finger-like structures called villi project from the intestine wall and absorb the important nutrients out of the liquid. The only thing that remains in the intestine is excess waste, also called excretion.

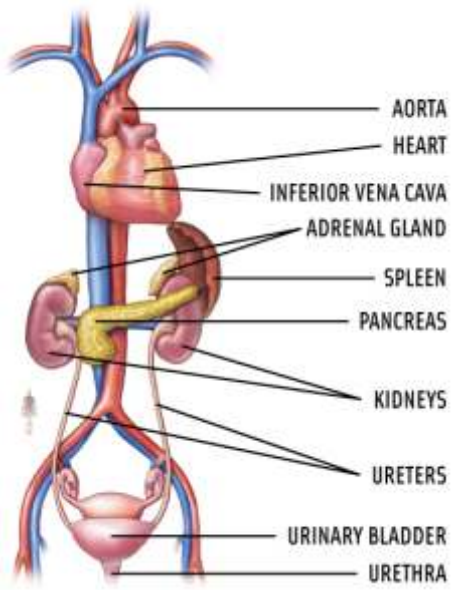
LARGE INTESTINE: The large intestine is responsible for disposing excretion. The large intestine is about 5-8 feet (1.5-2.5 meters) in length and is shaped like an upside-down "U."

The respiratory system helps people to breathe in air and expel carbon dioxide. Breathing in air allows oxygen to pass into our bodies, and supply our bloodstream and internal organs with essential nutrients to work and function effectively. The respiratory system features the lungs, heart, aorta and inferior vena cava.

LUNGS: The lungs allow us to breathe! There are two lungs, one on each side of the upper abdomen. The right lung is bigger than the left lung. The lungs are connected to the trachea or windpipe through hundreds of tiny "branches" called the bronchioles. These bronchioles pass the air that we breathe in through our trachea into the lungs. The lungs are attached to a variety of blood vessels that help pass the essential oxygen atoms into the blood and to the rest of the body. In addition, some blood vessels pass all the used air—known as carbon dioxide—back into the lungs to be pushed out into the environment. This is known as inhaling, or taking in air, and exhaling, or pushing out air.

HEART: The heart is the engine of the entire body. It is a large muscle that contracts and relaxes regularly. As it contracts, the blood vessels connected to it are pumped with blood. The heart forces blood to flow throughout the entire body. As blood travels to the various parts of the body, it supplies organs with vital nutrients.

MRI BACK ORGAN OVERLAY:



The back MRI overlay shows the urinary and circulatory system. These organs are positioned towards the back of the body beneath the first overlay and consist of the liver, adrenal gland, kidneys, pancreas, spleen, heart, aorta, inferior vena cava, ureter, urinary bladder and urethra. Since the model depicts a healthy female, this overlay features the Fallopian tubes and uterus.

The urinary system helps to pass waste from the body. After a person eats or drinks something, the food get filtered through various organs until it is finally passed out of the body. The organs that contribute to this process include the liver, gall bladder, kidneys, adrenal gland, pancreas, ureter, urinary bladder and urethra.

KIDNEYS: The kidneys are two small brown, bean-shaped organs that are placed in the lower abdomen. The kidneys are connected to the major vein and the major artery in the body. All the blood in the body passes through the kidneys and gets filtered by millions of nephrons. These nephrons capture excess waste from the blood, convert the waste and then release it through the ureter as urine.

ADRENAL GLAND: The adrenal glands sit atop each of the kidneys and helps produce hormones such as epinephrine (or adrenaline) and norepinephrine.

SPLEEN: The spleen, located above the stomach, is like a blood filter. It draws in blood, reserves a bit of iron and removes old red blood cells. The spleen provides some of the basic antibodies or white blood cells that the body needs to fight off infections.

PANCREAS: The pancreas is found behind the stomach and it secretes important enzymes that help break down carbohydrates and proteins in food. The pancreas is important in keeping blood sugar at a normal level.

URETERS: The ureters are long, thin tubes that extend from the kidneys to the urinary bladder. All the urine that gets made in the ureter is transferred down the tube using gravity to the urinary bladder.

URINARY BLADDER: The urinary bladder is a sac-like organ that holds all of the urine that the kidneys produce. As the urinary bladder fills up, the muscles lining the bladder begin to contract, signaling that the urine must be removed. This is the urge we feel to go to the bathroom. Once the urine is released, the kidneys continue to fill up the bladder to get rid of the excess waste in the body.

URETHRA: The urethra extends from the bladder to the bottom of the pubic bone. The urethra helps to pass the urine from the urinary bladder to the outside.

The circulatory system is like a nutrient-highway! All the best parts of everything we eat are shuttled to various organs in the body through the circulatory system. The circulatory system features the heart, inferior vena cava and aorta.

HEART: The heart is the engine of the entire body. It is a large muscle that contracts and relaxes regularly. As it contracts, the blood vessels connected to it are pumped with blood. The heart increases blood flow throughout the entire body. As blood travels to the various parts of the body, it supplies organs with vital nutrients.

AORTA: The aorta is the largest artery in the body. The aorta pumps out oxygen-rich blood cells that have been supplied from the heart. The artery travels down the abdomen and then branches off to various parts of the body, such as the organs, through smaller blood vessels and capillaries. This

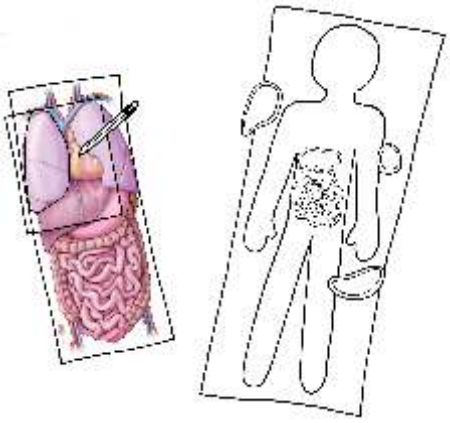
artery appears red in most anatomical diagrams.

INFERIOR VENA CAVA: The inferior vena cava is the largest vein in the body. Veins carry blood that has already passed through all the parts of the body. This blood has already depleted its supply of oxygen and is returning to the lungs and heart for more. This vein appears blue in most anatomical diagrams.

Finally, this diagram shows the uterus and Fallopian tubes, which are part of the female reproductive system. These organs aid in the creation of a human baby. Every month or so, an ovum, or female egg, is released from the Fallopian tubes into the uterus. If the egg is not fertilized by a sperm, it drops further down until it is released from the body through the vagina. The uterus then contracts to shed its nutrient rich membrane walls, and causes the female body to go through menstruation.

If sperm fertilizes the egg, however, the joined structure then attaches itself to the uterine wall, where the nutrient-rich membranes of the uterus help to stimulate growth. In about nine months, a baby is born.

The MRI Scans are useful in talking about how the various organs relate to one another. Place the base scan on a flat surface, such as on the floor, and ask students to trace the outline of the body. Remove the roll of paper and hang up on a wall or lay out across a few desks.



Provide students with the two overlays to trace over. Ask students to place their tracing paper onto the various sections of the overlays and trace one major organ each. Once the students have a tracing of one particular organ, they can use markers or crayons to color the organ in and label it at the back.

Remove the overlays and the full body base layer from the desks and put aside. Ask the students to take their finished tracings and place in the appropriate spot on the human body outline. They can use clues from their observations or communicate with their peers to find out where each organ is located on the body.

To help reinforce students' understanding of the major organs of the body, play the Clue into Your Body game! To play this game, you will need each student's tracing of a major organ of the body. Write down the names of each organ on a list and use this guide to provide your students with clues. Hold up each organ in front of your class and ask them to guess which organ it is. If students have trouble guessing, provide them with clues. For instance, if you were getting students to guess the 'liver' you would mention one of the following clues at a time before the correct guess is made:

LIVER:

* This organ cleans all the bad stuff from our blood.

* This organ pumps about 1.4 liters of blood a minute.

* This organ rests on the right side of the body, in the upper area.

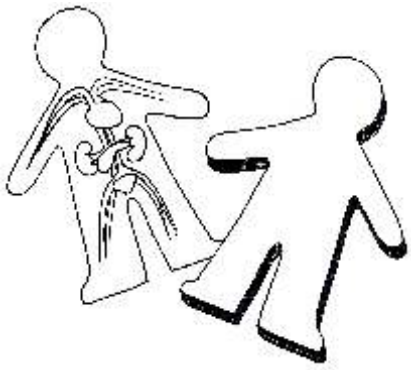
* This organ stores much-needed energy for the rest of the body.

* This organ is connected to the gallbladder that releases a type of acid called 'bile' into the stomach. This helps our bodies break down chunks of food that we eat.

If students guess the name of the organ correctly, place the organ on the appropriate location on the body outline.

USE THE MRI SCANS WITH THESE PRODUCTS:

The R5911 True-to-Life Human X-Rays match perfectly with the MRI Scans. Place the True-to-Life Human X-Rays onto a flat surface. Observe the different types of bones and talk about the way that the skeleton helps to give structure to the rest of the body. Place the MRI Scan overlays onto the True-to-Life Human X-Rays and pinpoint the locations of the various organs in comparison to major bones.



To help reinforce students' understanding of where organs are located in the body, provide students with R51448 Paper Doll Pads. The Paper Doll Pads feature a variety of skin tones. Give students markers or pencil crayons to decorate the Paper Dolls. Ask students to choose a body system and draw it onto the Paper Doll Pad. Use the MRI Scans as reference for the drawings. Alternatively, use R52004 Card Characters!

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