COOPERATION
Week 6

Cooperation

Working well together.

Objectives

Cooperation Systems of the Body Week 6

General Objectives

- To practice cooperation
- To learn about the circulatory system and heart
- To see cooperation among systems of the human body
- To emphasize God's design in the human body
- To learn how to research about the body

Specific Objectives

- To learn parts of circulatory systems and flow of blood
- To learn parts and functions of the heart
- To measure heart rate, stroke volume, pulse
- To dissect beef or pig heart
- To learn about parts of blood and blood counts
- To research heart and blood diseases
- To learn about heart surgery and famous surgeons
- To draw circulatory system on your body roll-out
- To continue writing your body novel

Weekly Supplies

Cooperation Systems of the Body Week 6

- Flashlight 5 (p.38)
- Paper, map colors 6 (p.39)
- Beef or pig heart, sharp scalpel 11 (p.41)
- Play-Doh 12 (p.41)
- Tennis ball 13 (p.41)
- Play-Doh, toothpick 17 (p.41)
- Funnel, tubing 20 (p.41)
- Microscope, slides 32 (p.43)
- Blood typing materials 4 (p.45) (Optional)
- Props - chalk, driveway, 2 folding chairs, blue and red shirts Walk through Heart
- Props…garden hose, hair strand, qt. measure, US map, globe Heart Facts

Bible Verse

Cooperation Systems of the Body Week 6

Create in me a clean heart, O God, and renew a steadfast spirit within me. The sacrifices of God are a broken spirit; a broken and a contrite heart, O God, Thou wilt not despise.

Psalms 51:10, 17

Focus Books / Videos

Cooperation Systems of the Body Week 6

A *Blood and Guts: A Working Guide to Your Own Insides* by Linda Allison (A must!)

* *The Human Body* by Bruun and Bruun (excellent!)

Heartbeats: Your Body, Your Heart by Dr. Alvin and Virginia B. Silverstein (Cute; answers questions)

O *The Heart and Circulatory System* by Robert E. Dunbar (Magnificent and meaning science fair projects for older children)

M *Understanding Your Body* by Rebecca Treays and Christyan Fox

The Heart and Blood by Brian R. Ward

The Heart: the Living by G.P. Davis, Jr., E. Park, and the editors of U.S. News Books

Y *Let's Try It Out: About Your Heart* by Seymour Simon (Excellent ways of showing younger children how the circulatory system works)

Your Heart and Blood by Leslie Jean LeMaster

Websites

Cooperation Systems of the Body Week 6

- http://kidshealth.org/teen/your_body/body_basics/heart.html (Basic information on circulatory system and heart)
- http://www.getbodysmart.com/ap/circulatorysystem/heart/anatomy/coronaryarteries/tutorial.html (Good for anatomy of heart)
- http://www.mplsheartfoundation.org/kids/ (Basic info on how to have healthy heart)
- http://www.pbs.org/wgbh/nova/eheart/ (Cool facts and 17 steps for heart transplant)
- http://library.thinkquest.org/C0115080/?c=circ_sys (3 types of circulation)
- http://kidshealth.org/teen/your_body/body_basics/blood.html (Basic blood info)
- http://www.texasheartinstitute.org/HIC/Anatomy/Anatomy.cfm
- http://nobelprize.org/educational_games/medicine/landsteiner/index.html (Blood typing game)
- http://www.youtube.com/watch?v=w8wXdtoW-HQ&feature=related (heart attack)
- http://www.youtube.com/watch?v=DGxS44-rcps&feature=related (heart attack)
- http://www.youtube.com/watch?v=EQVEdFSlUGU&feature=related (heart attack)

Music

Cooperation Systems of the Body Week 6

- "I Left My Heart in San Francisco"

http://www.last.fm/music/Tony+Bennett/_/I+Left+My+Heart+in+San+Francisco

- "Take My Life and Let It Be"

http://www.cyberhymnal.org/htm/t/m/tmlalib.htm

Writing Assignment

Cooperation Systems of the Body Week 6

Y-M-O 23 (p.9) Write and illustrate a book about traveling through the body.

- This week continue writing.
- Finish writing one or two adventurers.
- Illustrate what you have written.

Writing Tips

Cooperation Systems of the Body Week 6

- Share your 10 ideas on the e-loop.
- Game plan:
  - If you write 2 adventures per week, by Week 6 you will have six adventures and a closing, because Week 6 you will only write one adventure plus closing.
  - Option: Write only one adventure per week and end up with four adventures and a closing by Week 6.
  - Week 7 is for editing, cleaning up, re-drawing, designing the cover and title page, printing, binding.
  - Week 8 is for practicing reading the adventure novel like poetry reading in a coffee house to a large group. This will be our show-and-tell about body.

Timeline Characters

Cooperation Systems of the Body Week 6

William Harvey [2]
Galen
Christiaan Barnard [97]
Barney Clark [15]
Michael DeBakey
Denton Cooley

Vocabulary

Cooperation Systems of the Body Week 6

General

Circulation

Pulse

Transfusion

Clot

Hemoglobin

Blood type

Stethoscope

Blood Parts

Plasma (liquid part of the blood)

Erythrocytes (red blood cells which carry hemoglobin)

Leukocytes (white blood cells which fight disease)

Platelets (non-cellular bodies which help the blood to clot)

Circulatory Problems

Anemia/ Sickle cell anemia

Hemophilia

Heart attack

By-pass surgery

Arteriosclerosis (hardening of the arteries)

Pacemaker

Bruise

Vocabulary (cont'd 2)

Cooperation Systems of the Body Week 6

Parts of the Heart

Cardiac muscle (heart muscle)

Atrium (auricle; chamber in upper part of the heart receives blood from lungs or body)

Ventricle (chamber in lower part of the heart; pumps blood to lungs or body)

Valve

Aorta (main artery from the heart to the rest of the body)

Superior and Inferior Vena cava (veins carrying blue blood to heart)

Pulmonary artery (artery from the heart to the lungs)

Pulmonary vein (vein from the lungs to the heart carrying red blood)

Artery (vessel carrying red blood away from the heart)

Vein (vessel carrying blue blood to the heart)

Capillary (smallest vessel carrying blood between veins and arteries)

Teaching Tip

Cooperation Systems of the Body Week 6

Approach a topic from all angles:

- View a diagram
- Draw a diagram
- Set up a model
- Sculpt a model

Activities

Cooperation Systems of the Body Week 6

Monday: Circulation = Pipes + Pump

1 (p.38) Define circulate.

5 (p.38) Use a flashlight to see veins, arteries, capillaries under tongue.

4 (p.38) Learn how blood circulates through the body AND vies capillaries. Give a general overview.

Use props to demonstrate Heart Facts.

2 (p.38) Research the ideas of Galen and William Harvey.

10 (p.40) Discuss why Middle Age doctors never discovered four chambers.

9 (p.40) Explain why it took so long to discover four chambers.

18 (p.41) Test how long it takes your heart rate to return to normal after an activity. (everyday)

Circulatory Overview

Cooperation Systems of the Body Week 6

- Left side of Heart (pump)
- Lungs (pick up oxygen)
- Right side of Heart (pump)
- Arteries (pipes)
- Capillaries (pipes)
- Veins (pipes)
- Left side of Heart (pump)

Heart Facts

Cooperation Systems of the Body Week 6

- Heart beats 100,000 times a day; 35 million times a year
- Child's heart size of their fist; adult heart size of 2 fists
- Aorta diameter of garden hose; 10 capillaries to be size of 1 human hair
- Body holds 6 quarts of blood
- Blood travels 12,000 miles a day; 4 times from East to West Coast of US
- Blood vessels measure 60,000 miles = $2\frac{1}{2}$ times around the earth

Teaching Tip

Cooperation Systems of the Body Week 6

Props create a lasting picture in the brain

Activities (cont'd 2)

Cooperation Systems of the Body Week 6

Tuesday: Heart Parts/ Blood Flow through Heart

8 (p.40) Draw a heart and show how blood flows through it.

Make a walk though heart labeling all parts.

11 (p.41) Dissect an untrimmed beef or pig heart.

23 (p.42) Older students calculate your stroke volume.

Teaching Tip

Cooperation Systems of the Body Week 6

Use analogies that create word pictures in student's minds

Circulatory Detail

Cooperation Systems of the Body Week 6

- Superior Vena Cava (pipe from head) and Inferior Vena Cave (pipe from lower body)
- Right Atrium (pumps to rt. Ventricle)
- Valve
- Rt. Ventricle (pumps to lungs)
- Lungs (dump O_2 into blood; remove CO_2)
- Pulmonary Artery (pipe from lung to heart)
- Left Atrium (pumps to left Ventricle)
- Valve
- Left Ventricle (pumps to body)
- Aorta (pipe from left Ventricle to body)

Teaching Tip

Cooperation Systems of the Body Week 6

Add More Detail

Activities (cont'd 3)

Cooperation Systems of the Body Week 6

Wednesday: Blood and Blood Vessels

Learn the components of blood.

Research how blood clots.

Research blood type.

6 (p.39) Draw the path blood takes from your heart to your big toe and back.

3 (p.38) Experiment with a tourniquet to show how blood flows towards the heart.

32 (p.43) Look at blood through a microscope (optional).

37 (p.44) Older students research what a blood count is and what is a normal blood count.

41 (p.45) Examine your body for black-and-blue marks and discuss how bruises are formed.

42 (p.45) Test your blood type (optional).

Blood Components

Cooperation Systems of the Body Week 6

Blood Cells – red because of protein hemoglobin which carries four iron molecules that pick up oxygen and take to body and take carbon dioxide back to lungs; made in bones; live 120 days; no nucleus and pinched in on both sides; can change shape as goes single file in capillaries

White Blood Cells – larger than red blood cells and fight germs; produce antibodies or eat germs; increase in number when infection; live days or wks.; made in bones, lymph nodes and spleen

Platelets – irregularly-shaped, colorless bodies sticky surfaced bodies that clot blood to stop bleeding

Plasma - straw-colored, clear liquid; makes up 55% blood

Lymph - blood plasma that escapes from the blood vessels, goes to tissue, remove waste from the tissue's cells, collects in lymph tubes throughout the body, deposits the waste in a lymph node as it passes through thems, then returns to the blood

Hemoglobin

Cooperation Systems of the Body Week 6

Hemoglobin is an oxygen-carrying protein in red blood cell (discovered 1851)

- Each hemoglobin contains 4 iron molecules
- Each iron molecules picks up one O_2 molecule in lungs
- Once in single-file capillaries, each iron molecule releases O_2 to tissue cells and picks up waste CO_2

Blood Components

Cooperation Systems of the Body Week 6

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Blood Count

Cooperation Systems of the Body Week 6

Blood Count – measures type and number of cells in blood; can identify disease/ deficiency

Blood Part	Function	Count
Red Blood Cells	Carries oxygen to body	4-6 million cells
White Blood Cells	Fights infection	4,500-10,000 cells
Platelets	Clots blood	150,000-450,000 platelets

Blood Type

Cooperation Systems of the Body Week 6

Type	Give to	Receive from
A	A, AB	A, O
B	B, AB	B, O
AB	AB	A, B, AB, O (universal receiver)
O	A, B, AB, O (universal donor)	O

Blood Transfusion

Cooperation Systems of the Body Week 6

Blood transfusion - when blood of one person is collected and given to another person through tubes

- **Collected and stored in sterile bags, then refrigerated**
- **Donor = the giver**
- **Recipient = the receiver**
- **Blood must be matched**
- **Blood is given through needle placed in vein**
- **Reasons a transfusion is needed**
  - **Sudden loss of blood**
  - **Low hemoglobin levels after surgery**
  - **Severe heart or lung disease**
  - **Bone marrow failure**
  - **Moderate to severe anemia**

Blood Clotting

Cooperation Systems of the Body Week 6

Blood clotting is process of stopping blood flow from a broken blood vessel

- **Platelets cause Fibrinogen to release fibrin (thread-like sticks) at the cut**
- **Fibrin forms a net**
- **Fibrin net trap more platelets forming dam = clot = scab**

  http://www.youtube.com/watch?v=QqUEjYMXBNw&feature=related

- **Clotting problems**
  - **Hemophilia - No clotting (bleed to death)**
  - **Thrombosis – Clotting in normal blood vessels causing loss of blood flow to area**

Bruise

Cooperation Systems of the Body Week 6

Bruise – capillaries break when you hit something; blood leaks out of vessels and appears as bluish-black mark; body reabsorbs the blood and mark disappears

- **Colors:**
  - **Red – immediately; blood first appears under skin**
  - **Black-Blue/Purple – 1 to 2 days; red-blood cells stop taking oxygen to site**
  - **Green/Yellow – 5 to 10 days**
  - **Light Brown – 10-14 days; bruise fades away**

Activities (cont'd 4)

Cooperation Systems of the Body Week 6

Thursday: Pacemaker/ Pulse/ Heart rate

Define a pacemaker and learn how it works.

Research heart beat and pulse rate.

15 (p.41) Compare your pulse to others in your family.

14 (p.41) Calculate how many times your heart beats in 1 hour, 1 day, 1 year, 70 years.

17 (p.41) Observe your pulse using Play-Doh/toothpick.

16 (p.41) Test different activities affect your pulse.

22 (p.42) Calculate different heartbeats using word problems.

Heart Beat/ Pulse

Cooperation Systems of the Body Week 6

Pacemaker - small mass of specialized cells in top of right atrium that gives electrical impulses causing heart to beat

- A chamber of heart contracts when elec. impulse moves across it
- If defective, heartbeat is too fast, too slow or irregular
- An "artificial pacemaker" is small, battery-operated device placed under the collar bone to send elec. impulses to the heart

Heart rate – how often pacemaker signals the heart to contract

- Nerves connect the brain to the heart; one nerve slows the heart rate and another speeds it up
- Changes in heart rate occur with changes in activity
- Increases during exercise, after meal, fever
- Hear heart rate with stethoscope
  - lub-DUB – lub-Dub sound is heart valves opening and closing
  - lub – tricuspid/mitral valves opening
  - DUB – semilunar valves closing

Pulse – caused by blood stopping and starting in arteries

- Feel arteries stretching and relaxing
- Can only feel it at pulse points
  - Arteries are buried under skin for protection
  - Certain ones are at skin surface – pulse points

Activities (cont'd 5)

Cooperation Systems of the Body Week 6

Friday: Review Diseases, Surgeons

30 (p.43) Illustrate the song "I Left My Heart in San Francisco" OR…

12 (p.41) Sculpt a heart out of Play-Doh.

13 (p.41) Show how strong your heart is using a tennis ball.

20 (p.41) Make a stethoscope.

46 (p.46) Review and fill in the blanks.

Research heart and blood diseases.

Research heart transplants and the men who first began them.

Set up walk-through heart

Heart Attack

Cooperation Systems of the Body Week 5

Heart attack occurs when one of the coronary arteries that supplies blood to the heart muscle is blocked and the heart muscle does not get blood; heart cells die

- Cause: by the buildup of plaque (deposits of fat-like substances) along the arteries
  - Plaque build up causes disease called atherosclerosis = hardening of the arteries
  - Plaque can eventually burst creating a "snag" where a blood clot forms and blocks the artery leading to heart attack
- Results: If blood supply is cut off for more than a few minutes, heart muscle cells die; can kill or disable someone
- Medical term:
  - myocardial infarction
  - coronary thrombosis
  - coronary occlusion

Heart By-Pass Surgery

Cooperation Systems of the Body Week 6

By-pass surgery - using a vein (from leg) to jump around a blockage in a coronary artery to restore blood supply to the heart

- If one or more coronary arteries are blocked, the heart muscle will die in that area
- Angina - chest pain that occurs when heart doesn't get as much blood and oxygen as it needs.
- Testing with dye can show where blockages are.
- Two procedures can be used to remedy the problem:
  - Angioplasty – inserting a balloon to widen the artery, then inserting a tube (stint) to hold the artery open.
  - By-pass – jumping around the blockage with a new artery
- Three, four or more by-passes can be done on one patient during one surgery.

Heart Transplant

Cooperation Systems of the Body Week 6

- 1st transplant performed by Christiaan Barnard in South Africa (1967)
  - Blood is routed through a mechanical pump, the Jarvik 7
  - Heart is removed
  - Donor heart must be ready to place in the chest cavity and hook up
    - Arteries
    - Veins
    - Nerves
- Main concern afterward is infection and rejection; patient given anti-rejection drugs
- http://www.youtube.com/watch?v=hA6g-Cin_Qo&NR=1 (Story of JoJo's heart transplant)

Artificial Hearts

Cooperation Systems of the Body Week 6

An artificial heart is a mechanical heart implanted in the body to replace the God-made, biological heart; to date has only lasted 17 months; used to keep people with heart failure alive while waiting for a heart transplant

- Research about present day artificial hearts http://www.chfpatients.com/implants/artificial_hearts.htm (Present day artificial heart picture and info)

Teaching Tip

Cooperation Systems of the Body Week 6

Tell a story that sticks in child's mind and show a picture of the person you are talking about while you are talking about them…not after

Famous Surgeons

Cooperation Systems of the Body Week 6

Christiaan Barnard – 1922-2001

- South African Heart Surgeon
- Studied at the Univ. of MN 1956-57
- Did 1st kidney transplant in S.A. in 1959
- Did heart transplants in 50 dogs
- 1st human heart transplant; 1967; recipient lived 18 days; assisted by his brother, Marius, a heart surgeon as well
- Within 2 yrs., they did a heart transplant on Dorothy Fisher who lived 24 years

Famous Surgeons

Cooperation Systems of the Body Week 6

Michael DeBakey 1908-2008

- USA heart surgeon in Houston TX
- Changed military surgical policy from hospitals to MASH units near front lines (WWII)
- Invented the roller pump (1931), making open heart surgery possible 20 years later
- 1st to use external heart pump
- Discovered strong link between smoking and cancer of the lung in 1953
- One of the first to perform bypass surgery
- Pioneered Dacron blood vessel replacement
- Intolerant of incompetence and workaholic
- Feuded with Denton Cooley for decades
- Received Congressional Gold Medal for a lifetime of achievement in medicine in 2008
- Practiced medicine to the day he died at 99 yrs.

Famous Surgeons

Cooperation Systems of the Body Week 6

Denton Cooley 1920-

- USA heart surgeon in Houston TX
- Helped develop artificial heart valves; reduced death rate of valve transplant patients from 70% to 8%
- 1968, performed 1st human heart transplant on 47 year-old man who survived for 204 days
- 1969, 22 heart transplants, completing 3 in five days
- 1969, performed 1st artificial heart; after 65 hrs, a human heart became available, and Cooley replaced the artificial heart, but the patient died a day later
- Feuded with Michael DeBakey;, DeBakey saying Cooley had misused funds in performing 1st operations
- He and his heart team performed more than 100,000 open heart operations; nicknamed "The Heartbeats"
- Received the Presidential Medal of Freedom, the nation's highest civilian award

Anemia

Cooperation Systems of the Body Week 6

Anemia - not enough healthy red blood cells to carry oxygen to tissues; number of red cells below normal; "tired blood"

- Symptoms: fatigue, pale skin, fast heartbeat, chest pain, shortness of breath, dizziness, headache, coldness in extremities
- Types and causes:
  - Iron Deficiency Anemia – blood loss; iron deficiency
  - Vitamin Deficiency Anemia – vitamin B12 deficiency
  - Sickle-cell Anemia – inherited; Black people; make sickle-shaped red-blood cells that carry less oxygen
- People at risk:
  - Female
  - Black males
- Treatment and prevention:
  - Taking supplements
  - Eating healthy, vitamin rich meals

Hemophilia

Cooperation Systems of the Body Week 6

Hemophilia – an inherited disorder in which one of the proteins needed to form blood clots is missing; in 30% of cases, there is no family history of the disorder, but the result of a gene mutation; loose large amounts of blood because they bleed longer

- History – from Biblical times recorded; disease of Royalty originating w/ Queen Victoria's son Leopold and two carrier daughters who carried it to royal houses of Spain, Germany, Russia
- Symptoms are prolonged bleeding, swelling in joints, deep/dark bruises, unexplained bruises, nosebleeds, and unexplained bleeding.
- Cause - lack of blood clotting protein needed
- Treatment - Cannot be cured, but can be treated

Leukemia

Cooperation Systems of the Body Week 6

Leukemia – cancer of blood-forming tissues = bone marrow and lymphatic system; bone marrow produces a large number of abnormal white blood cells, which take over and grow faster than good white blood cells

- Treatment:
  - Chemotherapy - drugs to kill leukemia cells
  - Radiation therapy - a large machine delivers high-energy rays to kill leukemia cells/ stop growing
  - Surgery - remove spleen which collects leukemia cells, making it difficult for chemotherapy to work.
  - Bone Marrow Transplantation - destroying leukemic bone marrow cells with high doses of chemotherapy/ radiation; then providing healthy bone marrow cells intravenously to stimulate new bone marrow growths

Permission Slip

Permission Coupon

Free pass to skip one activity or other assignment

(Feel free to copy as often as needed)

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Field Trips

Cooperation Systems of the Body Week 6

Visit a blood drive or a blood bank.

Visit a plasma donation center.

Talk to a phlebotomist.

Suggestions for Dad

Cooperation Systems of the Body Week 6

- Quiz the kids on different heart and blood disorders.
- Take them hunting or fishing and help them clean a bird, animal or fish, pointing out the different parts of the circulatory system.
- Teach Psalm 139:13-16 and discuss that God made each child. All of their inward parts were formed by Him. They are special in God's eyes.

Focus of the Week

Cooperation Systems of the Body Week 6

- Practicing cooperation
- Recognizing cooperation between body systems
- Recognizing God's design in the human body
- Learning how to research about the body
- Learning parts of the circulatory system
- Learning parts and functions of heart
- Learning how blood flows towards heart
- Measuring heart rate, stroke volume, and pulse
- Dissecting beef or pig heart
- Learning about parts of blood and blood count
- Learning diseases of the circulatory system
- Illustrating how blood circulates through body
- Researching heart and blood diseases
- Learning about heart surgery and famous surgeons
- Drawing circulatory system on body roll-out
- Continuing to write body adventures novels

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Thanks,

Wade and Jessica Hulcy