



Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
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The Aquatic Environment

Curriculum Unit 02.05.04
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I am currently teaching at East Rock Global Magnet School. I am a certified Special Education teacher. For the past five years, I have taught in a co-teaching fifth grade classroom. We collaborate on all subjects. My partner and I share the content areas of study. The Science curriculum has been revised to meet the needs of testing standards. We are currently gearing lessons to the inquiry-based method of learning. Science is an area that children need more knowledge of and exposure to. Using all modalities of learning helps children gain and retain knowledge. Hands-on exposure is something they'll remember throughout their school years. Mathematics is a critical piece to learning as well as language arts.

The New Haven School District and the State of Connecticut have implemented standards that measure a student's performance. Teaching methodologies have been challenged. What once was the ideal method has become almost obsolete. All students are required to take the Connecticut Mastery Test (CMT). There are standards and objectives that must be covered and taught in the fifth grade. Unfortunately, what has occurred quite frequently, we score below State Standards. Students need the opportunity of being exposed to different places, people and many facets of learning. Knowledge of the world around them will minimize the gaps of learning and application.

My unit will focus on the aquatic environment and the fisheries. The unit will address 'Fishing Advisories' that are in place to protect individual fish species. The various fishing methods and aquaculture will be explored. The children will research and design experiments dealing with the current health risks that Mercury presents to the health of both fish and humans. They will have a long term project cultivating and growing sea animals. Field trips will also be a part of their study and research. This year my class visited the Northeastern Fisheries Science Center in Milford, CT. The research projects and general information were quite impressive. Next year, I will take my class there on a field trip. I will also modify the information acquired during our seminar to teach to my students.

During our culminating activity, our students will present with confidence their findings to their parents during our "What Will Happen If We Don't Start Preserving Planet Earth?" They will present their projects as well as address possible solutions to the problem they investigated.

The following standards will be covered:

Science Standards

Life Science Content Standard 2.0

Compare and contrast the variety of species and describe their inter-connectedness and interferences in the ecosystem.

Scientific Inquiry Standard 1.0

Estimate and measure volume in metric units, and measure force with scale.

Arrange objects in order according to size, mass, volume or quantity.

Set up and conduct an experiment using control and experimental groups.

Design and conduct scientific investigations which will result in a project to be presented in a form such as a science fair.

Ecology Environmental Science and Society Content Standard 6.0

Identify the characteristics of an environment and how these characteristics affect the quality of life.

Identify and describe the ways humans change the environment for better or worse.

Recognize and identify the physical and biological features of the Long Island Sound estuary within the context of a study of the physical and biological sciences.

Reading Comprehension Framework

Forming an Initial Understanding

1. Determine the main ideas (non-fiction) or theme (fiction) within a written work (reworded).
2. Identify or infer important character, setting, problems, events, relationship and details within a written work (added to).

Developing an Interpretation

The reader will interpret and/or explain the text and connect the text to outside knowledge.

Make connections between the text and outside experiences and knowledge (new).

Demonstrate a Critical Stance

The reader will elaborate on the text and make judgments about the texts quality and themes.

Identify or infer important character, setting, problems, events, relationships and details within a written work (added to).

Writing Objectives

Expository writing is taught at the fifth grade level.

Reasons are fully elaborate with specific details

The paper shows strong organization strategy, a progression of ideas and transitions.

The writing is fluent.

The unit will include the following sections:

Background

a) Long Island Sound

b) Mercury

c) Dioxins

Fishing Advisories

a) How they affect fish

b) How they affect humans

c) State by State

The type of fish/seafood consumed by humans

- a) Salt water fish
- b) Fresh water fish

Our bodies

- a) Immune System
- b) Organs -- Heart, Kidney, Nervous System, Respiratory System

Food allergies

- a) Fish, salt or fresh
- b) Shellfish
- c) Our bodies' reaction to good and bad elements
- d) Dairy/ Lactose
Wheat

Background

Long Island Sound

The Long Island Sound is approximately 11,000 years old. Many centuries ago it was a river. Emerging into a valley then a lake. Today it's a body of water. It is salt water and is considered to be an estuary. The bottom is muddy with beach ridges. The shoreline cliffs are dark and resemble ribbons. Clay exist form when it was a lake. In the sediments the shells of animals are buried deeply. They were alive during the days of being a valley.

Today Long Island sound houses more than 8 million people in its watershed. Twenty -- one million live within a 50-mile radius of Long Island Sound. The watershed is all the land from which the water drains into the

sound. It extends into Canada, and covers an area of about 16,00 square miles. As an estuary fresh water from the draining rivers of Vermont, New Hampshire, Massachusetts, Connecticut, and New York mixes with the salt-water from the ocean.

Any pollutants that enter the water from as far as Canada and New Hampshire can harm the sound. It can cause problems for ate wildlife and people dependent upon the sound. The sound is a place where many plants and animals live, called a habitat.

It also has recreational and commercial uses for the people. The economy from the sound is more that 5 million dollars a year. The regional economy includes boating, fishing, swimming, and beach going.

Unfortunately, humans have been using the Long Island watershed as an disposal site since the beginning of the industrial era. Chemicals have been dumped into these rivers for centuries. In the last few years point sources of water pollution, which comes from factories and sewage treatment plants, has been reduced. The number one water pollution source now comes from cars that leak oil; fertilizers that runs off field, lawns and gardens; septic systems that aren't in good working condition. When it rains these pollutants are washed into the storm water drainage system. The systems usually lead directly into the rivers, oceans, lakes, and ground water.

Mercury

Mercury can exist in many forms. Metallic mercury is a silver metal that is liquid at room temperature. Mercury salts and organic mercury compounds can be powders or liquid. In it liquid state, Mercury can be used in thermometers and some electrical switches. When Mercury evaporates it changes into an odorless, colorless vapor. Organic Mercury compound is derived from Methyl-mercury (MeHg). This type of Mercury is the greatest threat to the environment.

How can mercury affect our health?

High levels of Mercury especially in the form of Methyl-mercury can cause harm to an adults Kidneys and brain. Damage to the Nervous System can also occur. There may be a tingling sensation that affects the body extremities. Symptoms can also result from exposure to high levels of Mercury. They include irritability, shyness, and tremors, changes in vision or hearing, or memory problems. Some children can develop learning problems and poor growth development. Pregnant women should be especially cautious to Mercury exposure. Women who wish to become pregnant should avoid it as well.

Mercury can enter ponds, lakes and rivers through air pollution. The Mercury pollutes the water, which contaminates the fish supply. It is found more commonly in fresh water. Only a few types of fish are found in salt water that contains levels of Mercury. They can have high levels of PCB's as well. Pregnant women should avoid eating the following types of fish: Shark, Swordfish, Bluefish, Striped Bass, Tuna and Catfish. The list below shows water bodies in CT. that have high levels of mercury, PCB's and dioxins. Therefore, following fish species from these rivers should be avoided for human consumption.

(chart available in print form)

The EPA has put some safeguards in place for human health. Only two parts per million (ppm) for mercury is recommended in drinking water, nationwide. In the rivers, lakes and streams, there should be no more than 0.144 mercury ppm in water level for human health consumption. EPA's Office of Water issued guidelines that

make reference to methyl-mercury in the consumption of fish. The EPA has recently given a report that linked pollutants to the threat in our nation's waters, which directly affect public health. It has been confirmed that the water has been contaminated from air pollution. The advisories have warned people to limit or avoid the consumption of fish.

The statewide advisory suggests one meal of fish per month. You should eat smaller fish, preferably pan fish, such as Yellow Perch, White Suckers and sunfish. When considering young children, limit the consumption of other seafood and also Tuna. They should only have one or two meals per week. The consumer should buy light tuna not white or chunk white. Light tuna has less Mercury than other types. Women who are pregnant are encouraged not to eat any Swordfish or Shark. The Mercury levels are too high.

Dioxins

Dioxins are known as persistent organic pollutants. They are very dangerous chemicals. Dioxins proper name is 2,3,7,8 tetrachlorodibenzo -- para -- dioxin (TCDD). Its name is also used to identify the family of structurally and chemically related polychlorinated dibenzofurans PCDDs and polychlorinated biphenyls PCB's. There have been biphenyls PCB's. There have been 419 types of dioxin related compounds identified. Only 30 are significantly toxic. TCDD is the most toxic compound.

When dioxins have entered the body or environment they stay there. The dioxins dissolve in fat cells along with their chemical stability. In the environment they can bio -- accumulate into the food chain. The higher one goes in the food chain the concentration of dioxins are evident.

Sources of dioxins are mostly by products of industrial processes. It can also be from Natural processes as well. They can come from volcanic eruptions and forest fires. These compounds produce chlorine -- containing organic substances. They're formed through a thermal process. These are also unwanted by products, through the manufacture process -- smelting, bleaching of paper pulp. Manufacturing herbicides and pesticides. Release of the compounds from solid waste incinerators is the worst culprit. The reason it is so awful is that the combustion process is incomplete.

Dioxins are found in air, soil, water, sediment and food. Dioxins are found more frequently in dairy products, meat, fish, and shellfish. Higher levels are found in some soils, sediments and chemicals. Lower levels are found in the water and air. Throughout the world there are stores of waste industrial oils. The levels of dioxins are high. When waste is stored for a long period of time the materials can be released. It then spreads to the environment. Contamination can result affecting the human and animal food supply.

In Belgium high levels of dioxin were found in the eggs and poultry. It started with the feed that was given to the animals. TCDD has been linked to the herbicide Agent Orange which was used in the Vietnam War.

In 1976 a chemical factory in Seveso, Italy had a serious chemical accident. A study discovered TCDD in the air. There were clouds of toxic chemicals in which dioxins were released. The contamination, covered 15 square kilometers, the population was 37,000.

In 1997 dioxin contamination was found in the southern part of the U.S.A. There were chickens, eggs and catfish that were contaminated with an ingredient bentonite, which is a dioxin. The ingredient was in manufacturing animal feed. When the incident was investigated it was speculated that perhaps the source of the dioxins were of a prehistoric origin.

Most contamination incidents have occurred in industrialized countries. The reason is that adequate monitoring; awareness of possible contamination in the food supply provides better regulatory controls and detection of any dangerous chemical substances.

The effects of dioxins on human health are both long and short term. Short-term exposure of humans to high levels of dioxins can result in adverse effects to the skin. Lesions can form, such as chloracne and also patchy darkening parts of the skin. The liver's function can also be altered. Long-term exposure affects the immune system, developing nervous system, endocrine system and reproductive functions.

When animals were exposed frequently to dioxins the results found several types of cancer in the animals. The International Agency for Research on Cancer evaluated TCDD in 1997. Based on the data of human epidemiology dioxin was categorized as a known carcinogen. However TCDD does not affect genetic material. There is a level of exposure below which cancer risk would be negligible.

Fetuses are the most sensitive to dioxin exposure because of their diet. Consumers of large amounts of fish in certain parts of the world are at a greater risk. Individuals who work in the paper and pulp industry, incineration plants, hazardous waste sites are also included. The risks to the dioxins are calculated case by case. Accurate information is given to assess the health impact on the sub groups or population. It can be used as a basis for policy decisions to be made. A Tolerable Daily Intake (TDI) is an assessment that is used to assess long-term exposure to dioxins.

The TDI is then calculated based on how much the body has accumulated dioxins and over a long duration of time. It's estimated that 90% of human exposure to dioxins is through the food. To ensure the safety of the food process good practices must be apparent. Processing from farm to the table must be carefully followed. Food contamination monitoring systems should be in place.

The consumer can reduce the risk of exposure by doing the following: trim fat from meat, consume low-fat dairy products, a balanced diet with adequate amounts of fruits and vegetables, and cook foods which can eventually decrease the body's exposure of dioxin compounds. The suggestions are limited. The government is ultimately responsible for monitoring the safety of the food supply.

To measure dioxins in the environment and food an analysis is conducted. Its availability is limited to a certain number of laboratories around the world. One hundred laboratories are able to analyze dioxins in environmental samples such as, ashes, soil, or water and food. For analysis of dioxins in blood and breast milk there are approximately twenty laboratories. They are mostly located in industrialized countries. The cost varies from \$1,200 of a single biological sample to \$10,000 or more for a comprehensive waste and incinerator assessment in the U.S.A.

Dioxins are best destroyed through incineration. The process requires high temperatures that are over 850 °C. When destroying large amounts of contaminated material, higher temperatures of 1000 °C or more are required.

An agency called WHO has contributed to helping reduce dioxin intake. In 1988 held a consultation in Geneva to evaluate the TDI of dioxins to which humans are exposed without harm. The new epidemiological data showed the effects of dioxins at low levels of exposure. The data along with animal studies showed that the TDI was reduced from 10 picogrammes / kilogram body weight to a range of 1 to 4 picogrammes / kilogram body weight. Current levels of exposure in industrialized countries are 1 to 3 picogrammes / kilogram body weight. This TDI is internationally recognized as a reference value to ensure that the levels of exposure are beyond the

guidelines.

WHO has collaborated with the Food and Agriculture Organization. The Codex Alimentarius Commission is considering establishing guideline levels for dioxins in foods.

In 1976 WHO was responsible for the Global Environment Monitoring System's Food Contamination Monitoring and Assessment Program. It's known as GEMS / Food. The program provides information on levels and different trends of contaminants in food. The network has participating laboratories in over 70 countries.

(Dioxins, 1999)

Lesson Plan I

Geography

Objectives:

Students will be able to recognize and label the various rivers, lakes and ponds in Connecticut.

Procedure:

Students will be given a list of rivers, ponds, and lakes. This list will be used as a vocabulary list. The children will be divided into three groups. Each group will have maps of Connecticut.

Group A River Group B Lakes Group C Ponds

Activity:

The Connecticut Map (large) will be cut into pieces. The students will put the map together as a puzzle.

Lesson Plan II

River Activity / Watershed Activity

Objectives:

The students will be able to name the parts of the river

They will also be able to explain the function of a watershed.

The students will be able to explain the process and functions of the Water Cycle.

Materials:

photocopies of the River System Diagram (interactive version of this river system can be found at www.nationalgeographic.com/geographyaction.)

blue enamel paint
miniature objects to simulate a model river system: e.g. Monopoly game houses or hotels, small
plastics animals, trees, boats, cars
modeling clay
tempera paint
toothpicks and construction paper
sheet of plywood, or plastic or metal trays
water

Procedure:

Day One

With students, examine the river system diagram. Have students speculate where they are located in their watershed. Where is the nearest river? The nearest tributary? Remind students that the drawing is a generic representation of elements of rivers, and that every river system is unique. Does a local river resemble the river diagram?

Explain that rivers connect to land, and that people connect to rivers either directly or indirectly, via their watershed. Ask, How do people use rivers? (drinking water, other fresh --water needs, agriculture, industry, manufacturing, power, transportation, recreation) How does wildlife use rivers? (food, habitat) Write students' answers on the board.

Now, divide students into three groups. Each group will build a model watershed from clay, either on a sheet of plywood, or on a plastic or metal tray. Have students label parts of the river: source, tributary, floodplain, meander, wetland, main river, mouth. Students should then paint "river" areas with blue enamel paint and paint the "land" with tempera paint. Have students place miniature objects on the model to stimulate a model river system, or make figures from construction paper and back them with toothpicks.

Day Two

Allow the model to dry overnight. The next day, have students pour a slow, steady stream of water from the top of the mountain. As students pour water, discuss flooding and drought.

End by reminding students that what people put into the water, and how people use the water available to them, is very likely to affect the quality of the water -- and the quality of life of its users -- both locally and in other areas of a watershed.

(lesson adapted from www.nationalgeographic.com/geographyaction)

Fish Advisories

Fish advisories are put into place to protect people from potential health risk due fish contamination, and wildlife by the shore. It's the primary responsibility of the states and Native American tribes to make sure the advisories are enforced. If high concentrations of chemicals such as PCB's and mercury happen to be found in the local fish or wildlife, the state then issues the advisory. It's called consumption advisory for the general public. They also classify pregnant women, children, and nursing mothers as a sensitive subpopulation. Consumption advisory may recommend avoiding or limiting the types of fish to be eaten. There are five types of advisories and bans that are issued by states.

No consumption for the general population health risk when levels of contamination are high
No consumption for sensitive subpopulations chemical levels is high in fish and wildlife. They should avoid eating certain types of fish caught locally.

Restricted consumption for the general population.

Health risk when too much fish or wildlife is consumed. General population should limit eating certain types of fish locally caught. This includes wildlife.

Restricted consumption for sensitive subpopulations. Health risk if too much fish is consumed when chemical levels are high. Limit the eating of only certain types of fish and wildlife by the shore.

Commercial Fishing Ban

This ban is issued when the levels of contamination are high in fish that are caught for commercial purposes. The bans prohibit the sale fish, shellfish and wildlife from certain bodies of water.

Advisories have increased from 1993 to 2000. In the United States the advisories have increased due to four dominant contaminants: mercury, PCB's, dioxins, and DDT.

Assessments, quality monitoring, and data collection reflect an increase in fish advisories. In 2000 the number of advisories 2,838 which is a 7% increase from 1999. In 1999 there were 2,651 advisories. Since 1993 the total number of advisories has increased by 124%.

(GPO, 2001)

The types of fish/shellfish consumed by humans.

Fish and shellfish should be included in normal diet. Two- to three servings a week are a part of the food pyramid. Studies have shown that Omega three oils are beneficial in lowering the risk of cardiovascular diseases. It lowers the risk of arrhythmias that can be potentially fatal. The Omega three oils, which are an unsaturated fat, are found naturally in the fish. The oils absorb into the cell membranes and help to make the platelets in the blood not as sticky. It can help the plaque not to build up, which leads to a stroke or heart attack.

DHA could help to stabilize the rhythm of the heart. When people are recovering from heart attacks, this can be very beneficial. This may be able to also help regulate cell membrane functions that are a part of transmitting signals within the brain cells. All three work together to promote a healthier heart.

Humans consume a variety of fish and shellfish. The list below is divided into various groups.

(charts available in print form)

The fish that has been as a good source containing the Omega three oils is Salmon. Pink and Copper River Salmon are frequently consumed. The Copper River Salmon is extremely nutritious. The fatty acids can lower cholesterol.

In a recent study conducted by the American Medical Association (AMA) November 1, 1995 tracked people who ate salmon and those who did not. The people who ate a quantity of fish that averaged 5.5 grams had half the risk of cardiac arrest and opposed to those who didn't consume fish in the Omega three oils. The 5.5 grams balanced out to a three ounce serving of Salmon on a weekly basis. Dietary Omega three's can be effective quickly. Within a few days to a week the oils are absorbed into the cell membranes.

(chart available in print form)

As in everything, make careful selections into your diet. Fish is an excellent source of nutrition.

Lesson Plan III

Fish Identification Activity

Objective:

The students will be able to identify the parts of a fish.

Math Skills:

observing
classifying

Materials:

activity sheets (used for making model of fish)
crayons
scissors
live gold fish for observation (four groups)
tape or glue
journals

Procedure:

Have students observe a gold fish for 5 -- 10 minutes (4 groups) asking them to locate the various fins.

Each group records their observations in their journals.

Discuss the function of each fin

Ask how fish are able to breathe under water.

Have students assemble their own fish models.

Students will then research fresh water and salt water fish; for similarities and differences. (2 days)

Each group will orally present their findings.

Our Bodies

Immune system - there are two main types of immune cells in the body. The T or thymus cell lymphocytes are under the control of the thymus. The thymus cells are found in the blood. They are important to the body's defense against disease. (White blood cells) the cells are also found in bone marrow, lymph glands, and the

spleen. In the early years of life the thymus's main concern is to program the body to resist infection. It's quite large in the infant, by puberty it shrinks in size. It grows quickly until age seven then it slows down.

The second immune cell lymphocyte is responsible for manufacturing antibodies to foreign substances. Bacteria, microbes, and viruses are considered to be foreign substances. An important mechanism of the T cell lymphocyte is to allow the thymus to develop only these cells which can attack outside cells or foreign substances. Ninety-five percent of the new types of lymphocyte that are made in the thymus are destroyed before they can reach the rest of the body. White blood cells are classified into three groups. Lymphocytes, polymorphs, monocytes. Lymphocytes make up 25% of the white blood cells in the body.

Polymorphs are made in the bone marrow. They make up 50-75% of the white blood cells.

Lesson Plan IV - Immune System

Objectives:

To tell the process of how the immune system works

Materials:

overhead projector
picture of the immune cells function copied on overhead paper.

Procedures

The students will go through the steps with teacher as she teaches the parts of the immune system. Each student will then produce his or her own drawing of how the process works.

Heart

The parts of the heart are the aorta, superior vena cava, pulmonary arteries, pulmonary vein, pulmonary valve, tricuspid valve, mitral valve, and aortic valve. The four chambers the right atrium, left atrium, right ventricle, left ventricle and the inferior vena cava. The heart is a large muscular organ. Its location is in the middle of the chest area. The valves ensure that blood travels in one direction through the heart by preventing backflow. Two or three leaflets close off then the blood has passed through. The mitral and aortic valves control the flow of oxygenated blood on the left side of the heart. The tricuspid and pulmonary valves control the passage of deoxygenated blood on the right. The atrium (left and right) is the two low-pressure pumping chambers of the heart. The hearts pump the blood to their corresponding ventricle chambers. The coronary arteries supply the heart muscle with the oxygen and nutrients it needs. There are three main arteries. Two parts are on the left artery and one part on the right artery. The arteries are like pipes. They carry the blood outwards from the heart to the tissues. The veins carry the blood on the return journey.

Veins

The veins are similar to arteries. They are distributed the same way. The difference however, is that a vein can have valves an artery does not. Veins are tubes of muscular and fibrous tissue. The vein has a wall that is

divided into three sections, the outer layer, middle layer, and inner lining. Veins only contain a very thin layer of muscle. The vena cava is the large vein by which the blood returns to the heart.

Respiratory system

The respiratory system consists of the lungs, diaphragm, and the upper respiratory tract (nose, mouth, larynx, pharynx and trachea.)

Nose

An organ used for smell; the pathway by which air enters the body through normal breathing. External nose comprises of bones and cartilage. Internal the nose is divided into two narrow cavities that go from the front to the back. There is a partition between the two parts called the septum. It's made of bone and cartilage. It's covered with a soft, delicate membrane called mucous membrane.

Throat

This area leads to the respiratory and digestive tract. The throat is divided into two parts, the pharynx and trachea, and the larynx. The pharynx is located at the back of the mouth; it extends a little down inside the neck.

Larynx

The larynx is the voice box through which we speak. The outer tissue layer continues with the lining of the mouth. The lining contains mucus-producing glands, which keeps the throat and mouth lubricated, which is necessary for eating the speaking. Pharynx has three sections:

The nasopharynx - the palate closes off the nasopharynx when you swallow to prevent food being forced up and out of the nose. In the roof of the nasopharynx are the adenoids, which are two clumps of tissue. They are found predominantly in children.

The oropharynx - part of the airway between the mouth and lungs. The squeezing actions of the pharynx muscles help shape the sounds of speech when come from the larynx. The oropharynx organs that are important us are the tonsils. They are two mounds of soft tissue. They are often linked to sore throats.

The laryngeal -- the lower part of the larynx is involved with swallowing.

Trachea

The front part of the throat. It consists of hoops of cartilage that hold open elastic tissue. It's lined with mucous membrane, which keeps germs and dust from backing up into the throat to be swallowed.

Lungs

The lungs fill most of the thorax. The right lung is larger than the left. The heart takes up more room on the left side of the lung. The lungs are held up by surface tension. It's created by fluid produced by a thin lining around the lungs and chest wall. This holds the lungs open. When the chest expands the lungs are pulled out and the air is taken into the alveoli. As the body exhales the rib muscles relax gradually. If the body relaxes completely the lungs would spring back rapidly. When air gets between the lungs and chest wall the surface tension breaks and the lungs collapse. The lung is connected to the trachea by the bronchus and to the pulmonary blood vessels. In normal lungs, oxygen from the air is transferred to the capillaries that surround each alveolus. A person who has a lung disorder experiences air constriction.

Pneumonia - air sacs are filled with fluid

Emphysema - the walls of the air sacs break down

Asthma - muscular walls of the bronchioles are narrowed

Bronchitis - bronchus fills with mucus.

Kidney

Each body has two kidney located on the back wall of the abdomen. On the inner side of each kidney is a tube called the urethra. It runs down the back of the abdominal cavity and enters the bladder. The tube that leads from the bladder is called the urethra. It contains thousands of filtering units, which are very tiny. The units are thousands of filtering units, which are very tiny. The units are also called nephrons. Each nephron can be divided into two important parts - the filtering or glomerulus's and the tubule. The tubule part is where water and essential nutrients are extracted from the blood. The glomerulus's is a knot of tiny capillaries. The capillaries have thin walls. Water and waste dissolve in the walls and can pass freely across them, into the collecting system of tubules on the other. The collection of system drains into the bladder.

Nervous System

The nervous system enables all organs and other systems of the body to function. It's the body's communication and control center. The system consists of approximately fourteen billion cells called neurons. They allow us to feel different sensations such as heat, cold, and pain. The cells work through tiny chemical signals that send messages. The signals reach the brain and thus the body knows what to do. The brain and the spinal are central nervous system, which controls the main functions of the body. Smaller nerves branch out to the outer part of the body. It's called the peripheral nervous system. This system connects to the central nervous system.

There are two divisions of the peripheral system the somatic and autonomic system. Somatic system plays a two-part role. First it collects information from outer stimulus from the sensory organs, which are the eyes. Secondly, it signals are transmitted through motor fibers. These signals come from the central nervous system. It then goes to the skeletal muscles, which causes movement in the body.

(Tevor, 1993)

Food Allergies

Many people have a difficult time distinguishing between food allergy and food intolerance. A food allergy is an abnormal immunologic response to a particular food or food component, which is usually a protein. Allergic reactions are classified into four categories. Type I, II, III, and IV. Types I, III, IV occur with foods.

Type I

Allergic reaction type I - is an acute or immediate hypersensitivity. The immune system reacts and responds to the allergen exposed through food. It's produced by immunoglobulin E (IgE). It's a protein, which is an antibody. As the cells (plasma cells) expose themselves to the allergen it attaches itself to the surfaces of mast and basophils cells. Most cells are found in the body's tissues. The cells then become sensitized. The allergens cross-link IgE molecules where the surface area has been sensitized (mast cell, or basophiles). The cell deregulates and is now granules. They serve as mediators of the allergic reaction. The important mediator is histamine. It's responsible for the immediate reaction humans experience during an allergic reaction. Symptoms manifest themselves quickly in a variety of ways: gastrointestinal (e.g. vomiting, diarrhea, nausea, and cramps), skin related (e.g. dermatitis, eczema), respiratory (e.g. asthma, rhinitis), and others (e.g. laryngeal edema, and anaphylactic shock). An individual will experience not all symptoms.

Type III

Type III - reactions are also known as immune complex reactions. It has resulted from an inflammatory process, which can begin with antigen - antibody complexes. The reaction can occur four to six hours after ingesting the food.

Type IV

Type IV - is a delayed-hypersensitivity reaction or cellular hypersensitivity. The symptoms to this reaction surface usually six to twenty-four hours after food has been ingested. It develops a slow reaction. The peak occurs after 48 hours of onset. It settles down approximately 72 to 96 hours of the initial reaction. This reaction produces a localized inflammatory response to the food ingested. True food allergies affect 1-2% of adults and 2-8% in children and infants. Type I reactions is less than 2% in children and less than 1% in adults.

Anaphylaxis can be associated with Type I, II, III, IV allergic reactions. Anaphylaxis is a sudden severe, and a potentially fatal allergic reaction that is systematic. It involves various parts of the human body, the skin, respiratory, gastrointestinal tract, and the cardiovascular system. Symptoms can occur with minutes up to two hours after ingestion has taken place. In rare cases it occurred four hours later. Anaphylactic reactions range from mild to life threatening. There are 30 out of 100,000 people and individuals who have asthma, eczema, or hay fever who are at a greater risk of experiencing an anaphylaxis allergic reaction, which the occurrences have increased annually. Foods, which induce the onset of anaphylaxis, have caused approximately 30,000 trips to the emergency room. There have been approximately 150-200 deaths occurring each year due to this allergic reaction. Again those individuals with asthma are at a greater risk for developing the reaction.

Anaphylaxis in relation to food occurs in the following food groups: Proteins (tree nuts, walnuts, cashews, peanuts), Dairy (milk, soy, eggs), Meats (fish, shellfish).

The most common foods that cause allergic reactions in adults are crustacean (shrimp, crab, lobster, crayfish) fish, molluses, tree nuts (walnuts, hazelnuts, especially almonds), legumes, peanuts, soy, and eggs. In children the most common are milk, soy, eggs, peanuts, wheat and fish.

Infants and children are more susceptible to experience food allergies than adults. A newborn's intestinal tract and immature immune system could be two factors causing food allergies. A study was conducted of 480 newborns 39% were said to have had food allergies. Out of the 39% only 8% actually had food allergies. Infants sometimes outgrow their allergies. However, fish and peanut allergies may linger into adulthood. Foods that are consumed often by adults and children can cause reactions as well. In Japan rice allergy is quite common. In Scandinavia, codfish allergy is common.

(Kotsonis,1994)

Fish and Shellfish Allergies

Allergic reactions to fish and shellfish are common among adults and children. It is an immunologic reaction to the food. Anaphylaxis is associated with this food group. As stated previously the reaction can be sudden, severe and in some cases fatal. It affects the skin, respiratory tract, gastrointestinal tract and cardiovascular system. This can be a Type I, to a Type IV reaction. It's recommended that individuals who have had an allergic reaction to fish or have gone through skin testing should avoid all types of fish. The same rule applies with shellfish. However, if the individual sees an allergist he/she can ask if there are some types of fish that could be less harmful. People with fish allergies as well as shellfish allergies must be cautious when eating away from home especially restaurants.

In the food preparation process, non fish foods could be contaminated by utensils, cooking oils, grills, and fryers with fish exposure. There are also some hidden sources of fish.

Caponata is a traditional sweet and sour Sicilian relish, which can contain anchovies.

Caesar salad dressing, steak sauce, and Worcestershire cause can also contain anchovies. Surimi, which is imitation crabmeat, can often contain fish. Reading labels is vitally important to individuals with food allergies.

(Liener, 1974)

Dairy Allergy

Infants and children are apt to have milk and soy allergies. Sometimes the presence of hives is not apparent neither asthmatic symptoms. Instead they can become colicky or poor growth. Their allergy develops within days up to months of the infant's birth. If an infant is having difficulty-drinking cow's milk the doctor may suggest changing the diet to a soy formula. In the event an allergic reaction to soy occurs, the doctor will prescribe corticosteroids to treat an infant with severe food allergies. In most cases the child heals with time. It can resolve itself within the first few years of the infant's life. Another alternative to avoid allergies is to breast feed, and to exclude all other foods. In the infants first year is when breast-feeding is most effective. It helps to avoid mild and soy allergies from developing in the first year's growth. However, some children are so sensitive that whatever the mother eats affects the child. She must avoid eating certain foods. The benefit to breast feeding is also that it bypasses the infant feeding problems, especially if the parent is allergic to certain foods. Children will likely inherit the same allergies.

Wheat Allergy

People often ask if there is a distinction between a wheat allergy and celiac disease. There is a definite difference between the two. Adults and children can be allergic to wheat. They should avoid only wheat products. Reading labels is imperative for them. They have an IgE (immunologic response) to wheat protein. This a Type I allergic reaction. Most wheat-allergic children out grow this particular allergy.

Celiac disease or celiac sprue is a permanent adverse reaction to gluten. This is followed by ingestion of wheat, rye, epithelial cells of the small intestinal become damaged. These cells are vital for digestion and absorption. Mucosal enzymes are also damaged and altered. These results in diarrhea, bloating, weight loss, anemia, bone pain, chronic fatigue, weakness, muscle cramps. In children it can also cause growth retardation and failure to gain weight age appropriately. Celiac disease is an inherited trait. In the United States this disease affects about 1 in every 3,000 people. It occurs more frequently in Europeans than Americans. Celiac disease has been predominantly almost non-existent in individuals of Chinese or of African descent. The diagnosis is usually a small bowel biopsy. Blood tests are also conducted. This procedure is not very reliable with children.

Food Intolerance

Food intolerances affect a limited number of people. The occurrence of these intolerances is through a number of nonimmunologic mechanisms. Metabolic food disorders are genetically acquired defects. There are three major classes of intolerances. A) metabolic food disorders B) anaphylactic reaction C) idiosyncratic reactions

Lactose- is the most common food intolerance. Affects 1 out 10 people. It's a lactose deficiency. Lactase is an

enzyme that is in the stomach's lining. This enzyme is found in the sugar in milk. It degrades the lactose in the milk. If a person does not have enough lactase the body cannot digest the lactose in most milk products. Bacteria instead use the lactose and gas is then formed. A person may experience bloating, abdominal pain, and sometimes diarrhea.

The undigested lactose cannot be absorbed by the small intestine and pass into the colon correctly. Lactose intolerance affects a large number of people all around the world. Lactose intolerance affects the following groups African Americans, Native Americans, Hispanics, Asians, Jews, and Arabs. The percentage is 60-90%. Only 6-12% of Caucasians are affected in the United States.

Another type of food intolerance is sulfite-induced asthma. This is an adverse reaction to certain products where food additives, are added to enhance the food's taste. Additives that enhance crispness or to prevent mold from growing can also be another cause of asthma attacks. Sulfite can occur naturally in foods as well. Sulfites are also added to pharmaceutical products as an antioxidant. Sulfites give off a gas called sulfur dioxide. An asthmatic person can inhale this while eating the food with sulfite in it. This irritates the lungs and sends an asthmatic into a severe bronchospasm. It constricts air to come into lungs. The first occurrence came about in 1976, where an anaphylactic reaction occurred following the digestion of sulfite. The FDA has had over 20 reports of deaths due to sulfite allergic reactions, since 1982. The FDA has banned the use of sulfites on vegetables and fruits intended to be consumed raw by people. The FDA also requires all packaged food containing certain amounts be labeled stating what type of sulfite that was used to process the food.

Tartrazine (FD&C yellow #5) dye is used in foods and beverages as a coloring agent. The Food Drug and Cosmetic Act have approved this agent. Studies have proved that it does not induce asthma.

Treatments/Management

Food/Allergies - avoid the foods one is allergic to. Read labels carefully. Children need for parents and caregivers to be knowledge about the particular allergy. Schools should be aware and precautions put into practice. Adults and children with severe allergic reactions need to wear a medic alert bracelet or necklace. If possible carry an EpiPen Kit or have one in place in school for children.

Immediate medical attention, medical evaluation, proper treatment, and regular visits to allergist are required. In conclusion food allergies and intolerances affect a small percentage of the human population. However, for a large portion of these illnesses much study still continues. We need to learn as much as possible to have improvement be shown in a significant way.

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