



A PHARMACY CONTINUING EDUCATION PROGRAM

W-F Professional Associates, Inc. 400 Lake Cook Rd., Suite 207 Deerfield, IL 60015 847-945-8050

March 2009 "Drug Considerations During Pregnancy" #707-000-09-003-H01-P



THIS MONTH
"Drug Use During
Pregnancy"

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HAVE YOU RECENTLY MOVED? PLEASE NOTIFY US.

We continue to read articles in the consumer literature (magazines & newspapers) about dangers of taking medications during pregnancy. This is an area where we as pharmacists can make a difference in providing information to patients. That's why we review this topic on a fairly regular basis. This lesson provides 1.25 hours (0.125 CEUs) of credit, and is intended for pharmacists in all practice settings. **The program ID # for this lesson is 707-000-09-003-H01-P. Pharmacists completing this lesson by March 31, 2012 may receive full credit.**

To obtain continuing education credit for this lesson, you must answer the questions on the quiz (70% correct required), and return the quiz. Should you score less than 70%, you will be asked to repeat the quiz. Computerized records are maintained for each participant.

If you have any comments, suggestions or questions, contact us at the above address, or call toll free 1-800-323-4305. (In Alaska and Hawaii phone 1-847-945-8050). **Please write your ID Number (the number that is on the top of the mailing label) in the indicated space on the quiz page** (for continuous participants only).

The objectives of this lesson are such that upon completion the participant will be able to:

1. List the categories of drug safety during pregnancy.
2. List classes of medications that can cross the placenta & are potentially teratogenic.
3. Describe disorders that may be encountered during pregnancy.
4. Discuss use & adverse effects that must be considered during pregnancy.

All opinions expressed by the author/authors are strictly their own and are not necessarily approved or endorsed by W-F Professional Associates, Inc. Consult full prescribing information on any drugs or devices discussed.

INTRODUCTION

For the longest time, it has been assumed that the developing fetus is well-protected by the placenta from drugs and noxious substances that may enter the body of a pregnant woman. While it is true that normal mechanisms may provide protection, there are medications taken during pregnancy, especially in the earlier weeks that can be potentially harmful.

The disastrous outcomes of the use of diethylstilbestrol and thalidomide are reminders of the risks.

These and other examples led the FDA to develop five categories of drugs based on safety during pregnancy. Even though there is an abundance of information dealing with the drug use during pregnancy, such knowledge is incomplete, and absolute safety has not been achieved. Many women become pregnant while suffering from chronic diseases. Others may become ill early or late in pregnancy. At times, it is difficult to determine what is the best dose of a certain drug to administer.

The stage of pregnancy is an essential criterion that must be considered during treatment. Since the risk of causing harm to the fetus is highest early in pregnancy, (major organs of the body are being formed), it is advisable to be aware of the chances for becoming pregnant. This especially applies to administration of all kinds of medications, which have potential outcome upon the fetus. It has been estimated that half of all pregnancies in the U.S. may be unplanned; therefore, exposure to medications including OTC drugs is relatively high.

The physiology of the body during pregnancy changes from one month to the next. Such changes may influence the rate of drug absorption, distribution, metabolism and excretion. Thus, pregnancy may require dosages to be adjusted.

Starting from the 6th week, cardiac output of the female increases, and so does the heart rate and blood volume.

A significant increase in kidney function occurs during early pregnancy, but peaks between the 16th and 24th week. This continues until shortly before childbirth.

The main change in lung function includes increased respiratory rate, an increase in oxygen consumption, and decreased level of PCO₂.

The GI tract may be affected significantly during pregnancy. The enlarged uterus tends to press on the rectum and the adjacent portion of the colon, causing constipation and hemorrhoids. GI motility may slow down due to increased levels of progesterone. Frequently, pregnancy precipitates gastroesophageal reflux (heartburn).

Body hormones may also be affected. For example, adrenal hormone levels may increase, resulting in the formation of edema. Glucose metabolism and increased insulin requirements may increase due to a rise in the level of the glucocorticoids, as well as that of estrogen and progesterone.

Dermatologically, the most notable change is the appearance of chloasma (dark spots on the face). This is a result of an increase in the production rate of melanin. Likewise, the nipples and genitalia become darker.

Weight gain of approximately 25 to 30lb may occur due to increased blood volume and accumulation of body interstitial fluid. Furthermore, there is an increase in the uterine and breast size, additional fat deposition, fetal and placental growth, and interstitial fluid.

Serum creatine concentration diminishes as a result of an increase in glomerular filtration. Results of laboratory tests for liver function remain unchanged in normal pregnancy.

These changes may have an effect on drug activity. Increased blood volume may cause an elevation in the distribution of water-soluble drugs. Likewise, the increase in the deposition of body fat during pregnancy may increase distribution of lipid-soluble drugs. A decrease in serum albumin may lead to a decrease in the amount of protein-bound drugs and make them more available in the free form. Clearance of drugs through the kidneys may increase due to a rise in renal blood flow and glomerular filtration.

Pregnancy is accompanied by an increase in the requirements for nutrients, energy, and protein. The nutritional needs should be assessed early in prenatal care. A balanced diet that provides the needed vitamins and minerals is an objective that should be attained. However, prenatal vitamins that include thiamine, niacin, riboflavin, folic acid, vitamin B₁₂, along with vitamins A, C, E, D and K, as well as minerals such as iron, calcium, phosphorous, magnesium, iodine, and zinc may be taken as a supplement.

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March 2009

DRUG EFFECTS ON THE FETUS

Pregnancy results in the production of many symptoms that are treated with medication and, to a certain extent, by changes in lifestyle. Exposure to drugs, some of which are potential teratogens (produce birth defects), may add risks to pregnancy. Recent studies have shown that a minority of pregnant women did not take medications during pregnancy, while others took an average of three medications. **The most commonly used medications were vitamins, minerals, antiemetics, antacids, antihistamines, analgesics, antimicrobials, tranquilizers and diuretics.** It had been assumed at one time that when a drug is taken, the placenta will act as a barrier to the transfer of that drug to the fetus. However, a large number of drugs can cross the placental barrier.

The placenta consists of four linings that do not fully resist the passage of drugs and noxious chemicals:

1. The endothelial lining of fetal vessels,
2. Connective tissue of the villi,
3. The cytotrophoblastic layer, and
4. The syncytium.

As pregnancy progresses, the surface area of the placenta increases and becomes thinner.

When a drug or nutrient is taken, it crosses the placenta via:

1. Simple diffusion,
2. Facilitated diffusion,
3. Active transport, or
4. Pinocytosis.

The rate at which drugs penetrate the placenta depends on:

1. The molecular weight of the drug,
2. Lipid solubility,
3. Ionization,
4. Degree of protein binding, and
5. Placental and uterine blood flow.

Diffusion of drugs with low molecular weight is much easier than those with higher molecular weight. With the exception of a few, most drugs can cross the placenta and then reach the fetus. Non-ionized, lipid-soluble molecules are transferred rapidly into the mother's circulation, as well as that of the fetus. Ionized molecules at physiologic pH have poor ability to diffuse. However, weak acids and bases with pKa between 4.3 and 8.5 reach the fetus very quickly. Protein-bound drugs in the circulation do not cross the placenta. As stated earlier, pregnancy is accompanied by an increase in the uterine and placental flow. Such an increase results in a rise in the rate of drug transfer.

The effects of drugs during the development of the fetus, especially before the beginning of the formation of organs (14 to 56 days after conception), are not clear. In the two weeks following fertilization (0 to 14 days), teratogenic agents may or may not have effect on the ovum (depending on the quantity taken). However, during organogenesis, teratogens may cause morphologic changes that result in congenital abnormalities.

The following are examples of drugs with proven teratogenic effects:

- Methotrexate,
- ACE inhibitors,
- Antineoplastics,
- Antithyroids,
- Barbiturates,
- Carbamazepine,
- Cocaine,
- Diethylstilbestrol,
- Ethanol in large quantities,
- Lithium,
- Phenytoin,
- Retinoids,
- Tetracycline, and
- Thalidomide.

Drugs that do not cross the placenta may still cause damage to the fetus by constricting blood vessels, thereby reducing blood flow in the placenta and preventing gas and nutrient exchange.

Only a few well-controlled studies of pharmacological agents have been performed on pregnant women. In determining the safety of medications during pregnancy, researchers rely on animal studies and uncontrolled human studies. Only 2 to 3% of fetal congenital abnormalities result from the use of drugs. The remainders are due to genetic, environmental and/or undetermined causes. The extent of the drug's effect on the fetus is influenced by age of the fetus at the time of exposure, drug potency, and the amount administered. Most drugs used in the U.S. carry a disclaimer statement in their package inserts and in published literature indicating that the safe use of the drug in pregnancy has not been established and should be used only if the anticipated benefits outweigh the potential risks to the fetus.

CATEGORIES OF DRUG SAFETY DURING PREGNANCY

In 1975, the FDA classified drugs under one of the five-letter categories based on the safety for use by pregnant women.

Category A: It indicates that controlled studies in pregnant women show no fetal risk, although one cannot rule out a risk of harm to the fetus. Drugs in this category are the safest.

Category B: It refers to drugs in which animal studies show no risk to fetus and no controlled human studies have been conducted, or animal studies show a risk to the fetus, but human studies are lacking.

Category C: This category indicates that human risk cannot be ruled out as no adequate animal or human studies have been conducted, or adverse fetal effects have been demonstrated in animals, but studies in humans are lacking.

Category D: It refers to drugs that show evidence of risk to the human fetus, but the benefits may justify the risks in certain cases as in life-threatening disorders or in diseases for which safer drugs cannot be used or are ineffective.

Category X: It applies to drugs in which studies in humans and animals have shown fetal risk that clearly outweigh any possible benefits.

The FDA has placed regulations on drugs in pregnancy. It is required that labeling should include a subsection on the drug's ability to cause birth defects and other effects on reproduction and pregnancy. Even though the category system is helpful, it was found that it can be confusing. Thus, the need for revamping labeling became a necessity. Pharmaceutical companies would be required to provide periodic updates on any useful or harmful experiences in pregnant women and lactating mothers.

As stated earlier, there are a number of classes of drugs that cross the placenta and are considered potentially teratogenic.

Benzodiazepines

This group may cause congenital malformation especially when the fetus is exposed during the first trimester. Diazepam has been implicated in causing facial clefts. However, teratogenicity tests of the benzodiazepines have failed to confirm or refute this. Reports indicate that chronic use of these medications, and when taken in large doses, may cause floppy infant syndrome, neonatal CNS depression, and withdrawal symptoms.

Hormones

Estrogen, progesterone and androgen intake during pregnancy may result in congenital abnormalities such as masculinization of the female fetus, as well as ambiguous genitalia and clitoral hypertrophy. Progesterone may cause vertebral, cardiovascular, tracheal, esophageal, renal, and limb defects. Diethylstilbestrol not only may cause reproductive tract abnormalities in males and females, but may result in the development of vaginal clear cell adenocarcinoma in the offspring.

Isotretinoin

This vitamin A isomer, used in treating severe cystic acne, is a proven human teratogen. Patients who use this medication are warned not to use it if they are pregnant, or if they intend to become pregnant. The most common abnormalities are craniofacial, CNS, and cardiac in nature.

Lithium

The intake of lithium during the first trimester of pregnancy may result in the development of cardiovascular defects. If taken in late pregnancy, transient fetal abnormalities may occur, but disappear after delivery. These abnormalities include bradycardia and cyanosis.

Antibiotics

Tetracycline, demeclocycline, minocycline, and doxycycline may cause staining of teeth and retardation of the development of the skeletal system. Likewise, fluoroquinolones may cause erosion of the cartilage and other joint disorders in fetuses exposed to these agents.

Anticancer agents

Except for cyclosporine A, antineoplastic drugs may have teratogenic effect in animals. Teratogenicity reports concerning individual agents are difficult to evaluate, since treatment usually involves several drugs. However, because anticancer drugs target and kill rapidly proliferating cancer cells, one can conclude that the cells of fetuses may be detrimentally affected.

COMMON DISORDERS IN PREGNANCY

Anemia

The majority of pregnant women develop some degree of iron deficiency during pregnancy, because normal iron intake is shared with the fetus. Folic acid deficiency can contribute to anemia. The food taken during pregnancy also provides nourishment to the fetus. Regular meals that consist of a well-balanced diet are of paramount importance. Meat, fish, dairy products, beans, and peas are good sources of protein. Dairy products and fortified milk will supply calcium and vitamins A and D; whereas, eggs, liver, enriched bread or cereal and green vegetables will furnish iron, a component of hemoglobin that carries oxygen to various parts of the body. A pregnant woman with a hemoglobin concentration < 10 mg/dl is considered anemic. It is estimated that about 80% of pregnant women suffer from anemia. Another cause of anemia is deficiency of vitamin B₁₂ and folic acid. The intake of iron and folic acid supplements is helpful in preventing anemia.

Nausea

About 50 to 89% of pregnant women experience nausea and vomiting, especially in the morning. This condition usually occurs after 4 to 8 weeks of gestation, and ceases by the sixteenth week. These symptoms are usually mild, unpleasant and harmless. However, in 10% of the cases, vomiting can be frequent and intense (Hyperemesis gravidarum). This condition may lead to dehydration, deprivation of nutrients, metabolic acidosis, electrolyte imbalance, and weight loss. Most mild nausea and vomiting may be managed with diet and lifestyle changes. The intake of a light meal upon rising, avoidance of cooking, food smelling, eating fatty fried food, and eating smaller frequent meals that consist mainly of carbohydrates, may be helpful. Pharmacologic treatment of nausea and vomiting in severe cases is an option, as long as it is under the supervision of a physician. The phenothiazines are effective. However, their use early in pregnancy, when nausea and vomiting are usually at their peak, may cause teratogenicity.

Gastrointestinal Reflux Disease (GERD)

GERD usually occurs in the third trimester and affects more than 25% of pregnant women. It is caused by relaxation of the esophageal sphincter allowing gastrointestinal fluid to re-enter the lower portion of the esophagus, causing reflux esophagitis or heartburn. With advancing pregnancy, the weight of the enlarged uterus places pressure on the stomach, causing increased episodes of GERD. This condition usually disappears at the end of pregnancy.

Weight Gain

Normal weight gain during pregnancy is 2 to 3lb per month. It is usually minimal during the first trimester (2 to 5 lb). The weight gain should be based on body mass index (BMI) which is derived at by dividing weight by height, rather than by weight. Safest weight gains are probably 10 – 35lb. Both excessive or meager weight gains may harm the fetus.

The increase in weight is due mainly to fetus, edema, placenta, enlarged uterus and breasts.

Constipation

It may be encountered by pregnant women mainly due to decreased GI motility, increased intestinal transit time, elevation of estrogens and progesterone, intake of iron, decreased activity and dehydration. These along with increased downward pressure from the uterus may cause hemorrhoids. About 10 to 30% of pregnancies exhibit constipation.

Expectant mothers should be encouraged to increase the amounts of fiber in the diet. Bulk-forming laxatives containing psyllium are recommended because of their safety and efficacy. Irritant laxatives should be avoided. Stool softeners such as docusate sodium provide relief of constipation and may be used during pregnancy. Caution should be exercised when using mineral oil since it may interfere with absorption of lipid-soluble vitamins. Drinking plenty of water, exercising, intake of foods such as vegetables, fruits, and whole grains are recommended.

Backache

Backache is common and may range from mild to severe. Ligaments and the fibrous tissue that controls the joints, especially the pelvis, tend to relax during pregnancy to allow expansion during delivery. However, this characteristic along with the weight gain allows the hip to be more vulnerable to strain. In addition, the change in center of balance, which results from growth of the uterus and fetus, can alter posture. All of these factors can contribute to backache.

Hemorrhoids

Hemorrhoids appear during pregnancy due to pressure that the enlarged uterus exerts on the middle and inferior hemorrhoidal vessels. The increased blood volume results in an increase in venous dilation and congestion. Hemorrhoids trigger itching, pain, burning, and occasional rectal bleeding. Avoidance of constipation may alleviate this condition and its symptoms. Ointments that contain astringents, local anesthetics, anti-inflammatory agents, as well as practicing proper hygiene are recommended.

Urinary Tract Infections

UTIs are common due to reduction in the flow of urine which results from the pressure on the ureter by the enlarged uterus. The slow flow of urine may not remove all bacteria present in the urinary tract, resulting in increased risk of infection.

Hypertension

Hypertension causes complications in 1 of 10 pregnancies. It has been estimated that it affects about 250,000 pregnant American women annually.

It can be pre-existing or may develop after pregnancy. Such hypertension is known as pre-eclampsia – eclampsia. Chronic hypertension is defined as one that existed before gestation. Pre-eclampsia is pregnancy-specific elevation of blood pressure that occurs after 20 weeks of gestation and is characterized by hypertension with edema, proteinuria, or both. If a patient with pre-eclampsia experiences convulsions (very dangerous to fetus), this condition is termed eclampsia.

COMMON AGENTS USED

Antiemetics

Mild to severe nausea and vomiting (morning sickness) is experienced by as many 90% of pregnant women. These symptoms take place mainly during the period from the third to seventh week of pregnancy, but usually cease by the end of the fourth month. Nausea is typically encountered upon arising and gradually diminishes during the day. Many patients take antiemetics to relieve these symptoms. Although nausea and vomiting are annoying, they do not pose harm, either to the fetus or to the woman. However, severe nausea and vomiting (Hyperemesis gravidarum) may result in dehydration and malnutrition.

The exact mechanism that triggers nausea and vomiting is not clear. However, the increased plasma concentration of chorionic gonadotropin hormone and progesterone is believed to play a role in the etiology of these symptoms. Non-pharmacologic measures such as eating a few crackers upon awakening as well as small frequent meals high in carbohydrates or protein, may reduce the intensity of nausea and vomiting. Keeping the stomach empty may aggravate the problem. Avoidance of spicy food, noxious odors, and fatty food is recommended. If these measures fail to provide relief and the condition persists, then the use of drugs may be warranted.

Antiemetics such as meclizine, dimenhydrinate, cyclizine, and certain phenothiazines may be used. Bendectin[®] (doxylamine and pyridoxine) was a popular antiemetic. However, it was withdrawn from the market in 1983 even though there was no concrete evidence of association with birth defects. Meclizine has been shown to be teratogenic in animals, but apparently not in humans. No evidence has been found to suggest the existence of a relationship between the use of dimenhydrinate and fetal malformation. The use of promethazine appears to have no adverse effects on the fetus. Prochlorperazine use has been linked to increased risk of cardiovascular abnormalities. Jaundice and extrapyramidal symptoms have occurred in neonates of mothers who have taken chlorpromazine during pregnancy. Even though meclizine and promethazine appear to have no fetal effects in humans, their use during the last weeks of pregnancy should be avoided. It must be kept in mind that malnutrition, dehydration, and electrolyte adequacy must be considered when using antiemetics.

Antacids

Before attempting to use drugs to combat heartburn, dietary measures should be attempted. Small and frequent meals may provide a symptomatic relief. Avoiding food and water a few hours before bedtime as well as elevating the head of the bed, and minimizing bending over can be helpful. Antacids, that are primarily available as OTC drugs, are used by 30 – 50% of pregnant patients to relieve symptoms of gastroesophageal reflux disorders, often experienced during the last stages of pregnancy. The use of aluminum, magnesium, and calcium salts is believed to be safe during the last two trimesters. Sodium bicarbonate should not be used, as it may lead to acid rebound and metabolic alkalosis. In high doses, magnesium trisilicate use may cause siliceous nephrolithiasis, and thus it should be avoided.

Analgesics

Aspirin as well as acetaminophen are commonly used drugs for headache and pain relief. Although the use of aspirin for rheumatoid arthritis has diminished since the introduction of the non-steroidal anti-inflammatory drugs, it is used during pregnancy. Aspirin was once believed to cause fetal malformations such as cleft palate and congenital heart disease. However, in subsequent and more comprehensive studies, aspirin has been shown to be safe. It is capable of crossing the placenta and causing birth defects in animals, but rarely in humans. Patients should refrain from the intake of aspirin two weeks prior to delivery.

Acetaminophen is recommended for use during all stages of pregnancy. Its short-term use in therapeutic doses appears to be safe. Certain non-steroidal anti-inflammatory drugs may cause constriction of the ductus arteriosus, when used during pregnancy.

Laxatives

As stated earlier, constipation is a problem that is experienced by many patients. Surfactants and bulk laxatives are recommended for use during pregnancy. Bulk laxatives are mild, do not irritate the GI tract and are not absorbed. Therefore, they pose no danger to the fetus. When bulk laxatives are used, the patient should take at least 16 oz of fluids to prevent bowel obstruction. The use of mineral oil should be avoided as it may prevent absorption of oil-soluble vitamins.

Caffeine

Caffeine is a naturally occurring substance found in coffee, tea, and cocoa. It is included in OTC medications for the common cold, appetite suppression and CNS stimulation. It is also found in many soft beverages.

Depending on the way it is brewed, 5 ounces of coffee may contain from 30 to 180 mg of caffeine. Stimulants usually contain from 100 to 200 mg of caffeine per tablet; whereas, anorexics may contain up to 120 mg of caffeine per tablet. Because of its presence in popular drinks and chocolate bars, as well as in coffee and tea, caffeine is believed to be the most widely ingested chemical during pregnancy. Conflicting results from studies concerning the effects of caffeine consumption by expectant mothers have been reported. It appears that the relationship between low to moderate consumption of caffeine and fetal abnormalities or pregnancy complications has not been established. However, low birth weight of infants and spontaneous abortion may be associated with caffeine ingestion. As a result, pregnant mothers should be advised to refrain from heavy intake of coffee, tea, beverages and foods that yield 300 mg of caffeine daily. The FDA has recommended that pregnant women avoid the ingestion of caffeine.

Smoking

It has been estimated that over fifteen million women aged 18 - 44 smoke cigarettes. Studies have shown that cigarette smoking may result in increased fetal, neonatal and infant mortality, low birth weight, as well as complications of pregnancy. The detrimental effects of smoking appear to be amount-related. Smoking less than one pack a day resulted in 20% increase in the risk of fetal mortality; whereas, smoking more than one pack a day caused an increase of 35%. An increase in low birth weight has been found to be associated with the degree of smoking. Patients should be advised as to the importance of smoking cessation at least during pregnancy.

Alcohol

Alcohol consumption during pregnancy can produce a group of fetal abnormalities known collectively as fetal alcohol syndrome (FAS). This is characterized by intrauterine and postnatal growth retardation, characteristic pattern of facial features (i.e., short palpebral fissures, flattened maxilla, hypoplastic philtrum and cleft palate), and CNS abnormalities (i.e., microcephaly, behavioral abnormalities, and mental retardation). As the infant becomes older, the facial changes may become less apparent, but short stature, microcephaly, and behavioral abnormalities may persist. These anomalies are usually seen in infants of women, who during pregnancy, consumed the equivalent of 2-3 ounces of absolute alcohol (4-6 drinks of hard alcoholic beverages) per day throughout pregnancy, or with frequent binge drinking (6 or more drinks on one occasion per month). Moderate consumption (more than one ounce of absolute alcohol per week) may result in low birth weight, spontaneous abortion and impaired motor and mental development. Consumption of one to two drinks daily may be associated with growth-retarded babies. It has been estimated that about 20% of pregnant women consume some alcoholic beverages during pregnancy and only 1-2% consume 4 or more drinks daily. The incidence of FAS is 1 per 1000 live births. About 4% of women who consume alcohol heavily may give birth to infants with FAS.

The mechanism of fetal abnormalities induced by alcohol is unknown. It is possible that ethanol or its metabolite, acetaldehyde, may directly or indirectly affect neuronal and non-neuronal brain cells.

Opioids

The incidence of opioid intake during pregnancy is relatively significant. About 0.2% of pregnant women are heroin or methadone users and up to 75,000 babies, annually, receive opioids in utero. Growth retardation involving weight and length are encountered in infants exposed to opioids. Additionally, neonatal withdrawal syndrome characterized by hyper-irritability, GI disturbances, respiratory distress, and seizures may be encountered. Acute heroin withdrawal symptoms occur within 24 hours; whereas, that of methadone is mostly delayed in nature.

Cocaine

It is estimated that 1% of pregnant women in the U.S. use cocaine. In certain segments of the population, estimates may be as high as 15%. It is believed that about 100,000 babies annually are exposed to cocaine in utero. The most commonly encountered obstetric complications among users include placental abruption, premature delivery, and uterine rupture. Other effects include cerebral infarction, seizures and intrauterine growth retardation. Congenital malformation, especially involving the cardiovascular and genitourinary systems, have been reported. Other studies failed to observe any significant abnormalities.

SUMMARY

A large percentage of patients take prescription or OTC drugs to manage disorders that occur as a result of pregnancy. Most of these drugs are capable of crossing the placental barrier and enter the fetus blood, and can potentially cause harm to the fetus.

The drugs may affect the fetus by:

1. Direct toxicity or teratogenicity
2. Constricting the blood vessels of the placenta resulting in deprivation of oxygen and nutrients to fetus, and
3. Changing the biochemical dynamics of the pregnant woman.

Because of the increased concern for the safety of using medications during pregnancy, the FDA established five categories of drugs based on the potential benefits and risks for the mother and the fetus.

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REMAINING TOPICS FOR 2009

Pharmacy Waste	Update on the HPV Vaccine
Herbals	Commonly Acquired MRSA
Contemporary Parkinson’s Therapy	Update: Chronic Fatigue Syndrome & Fibromyalgia
Current Status of Hormone Replacement Therapy	Review & Update on Immunizations

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LESSON EVALUATION

Please fill out this section as a means of evaluating this lesson. The information will aid us in improving future efforts. Either circle the appropriate evaluation answer, or rate the item from 1 to 7 (1 is the lowest rating; 7 is the highest).

1. Does the program meet the learning objectives?

List categories of drug safety during pregnancy Yes No

List classes of drugs that cross placenta & are potentially teratogenic Yes No

Describe disorders that may be encountered during pregnancy Yes No

Discuss use & adverse effects that must be considered during pregnancy Yes No

2. Was the program independent & non-commercial Yes No

	Poor		Average		Excellent
	1 2	3	4 5	6	7

3. Relevance of topic

4. What did you like most about this lesson? _____

5. What did you like least about this lesson? _____

Please Select the Most Correct Answer

- | | |
|--|---|
| <p>1. The absolute safety of drug use during pregnancy has been established.
 A. True
 B. False</p> <p>2. A drug that may cause birth defects is called:
 A. Teratogen
 B. Teratoblastoma
 C. Teratoma
 D. Teratophobia</p> <p>3. Which of these factors does not influence rate of crossing the placenta?
 A. Molecular weight of drug
 B. Age of pregnant woman
 C. Degree of protein binding
 D. Placental & uterine blood flow</p> <p>4. Which percentage of congenital abnormalities results from drug use?
 A. 9 – 10%
 B. 2 – 3%
 C. 0.5 – 1%
 D. 5 – 8%</p> <p>5. Which statement is true about anticancer drugs?
 A. They have shown no teratogenic effect on animals
 B. Cyclosporine A has teratogenic effects on animals
 C. Anticancer drugs target & kill rapidly proliferating cancer cells
 D. Early in pregnancy, fetus cells are not rapidly proliferating</p> | <p>6. The use of lithium during pregnancy may cause:
 A. Reproductive tract abnormalities
 B. Esophageal defects
 C. Ambiguous genitalia
 D. Cardiovascular defects</p> <p>7. Nausea during pregnancy:
 A. Usually occurs after 4 - 8 weeks of gestation
 B. Occurs in about 20% of pregnant women
 C. Hyperemesis gravidarum is a mild episode of nausea & vomiting
 D. Must not be treated with medications</p> <p>8. Weight gain during pregnancy:
 A. Occurs as result of weight of fetus
 B. Occurs during 1st trimester
 C. Gain of less than 10lbs throughout pregnancy is warranted
 D. Is normal if it does not exceed 2 – 3 lbs per month</p> <p>9. Laxative(s) of choice during pregnancy is:
 A. Mineral oil
 B. Bulk laxatives
 C. Irritant laxatives
 D. Magnesium sulfate</p> <p>10. The intake of caffeine during pregnancy has been associated with:
 A. Teratogenicity
 B. Cleft palate
 C. Low birth infant weight
 D. CNS abnormalities such as retardation</p> |
|--|---|

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Pharmacists completing this course by March 31, 2012 may receive full credit.

This program has been approved by the State Boards of Pharmacy in Alabama and Oklahoma.

This lesson furnishes 1.25 hours (0.125 CEUs) of credit.

Program ID #707-000-09-003-H01-P.

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