Why Teach Middle and High School Students about Fetal Alcohol Syndrome (FAS) and Other Alcohol-Related Birth Defects?

Maternal alcohol abuse results in irreversible emotional, mental and physical damage in approximately 50,000 U.S. newborns per year. (http://www.nofas.org, 2004)

These alcohol-related birth defects affect all races and socio-economic groups.

The annual cost estimates for FAS and related conditions in the U.S. is estimated to be as much as $7.8 billion. (Addiction Biology, Vol.9, No.2, 2004)

FAS and other alcohol-related birth defects are 100% preventable.

Middle and high school students need to be taught about this issue as they make their life-style choices.

How to Use This Curriculum

The Better Safe Than Sorry Curriculum is designed to promote education regarding alcohol-related birth defects and their prevention. It is available herein as hard copy, and also with printable pages on CD-ROM. This curriculum is designed to be flexible with respect to a range of student ages and experiences as well as the amount of class time that can be set aside for this topic. Based on available time, the curriculum appears as a one, two or three star program (pages 16-20). Classroom activities can range from viewing an informative video (15 minutes) to inclusion of a simple hands-on experiment, playing a fun and fact-filled game and conducting other teacher- or student- driven activities (>90 minutes). The subject matter readily lends itself to being taught in science or health classes and meets the National Science Education Standards for Science Content Standards. Additionally, the activities may be integrated with the teaching of language arts and math skills.

Included in this curriculum are teacher preparation materials in the form of **fact sheets, video tapes, transparencies,** a **power point presentation** with text and **internet links** to informational sites. In addition, worksheets with answers and suggestions for **topics of discussion** are available. For those who with to either demonstrate or have their students conduct and experiment, **kits** are available through Carolina Biological Supply Company
https://www2.carolina.com/webapp/wcs/stores/servlet/ProductDisplay?memberId=-1002&productId=42048&langId=-1&storeId=10151&catalogId=10101
To insure facility with the experiment set-up, a short video illustrating all of the necessary steps is included with the curriculum.

Please share this curriculum with your fellow teachers so that we can educate as many individuals as possible regarding this country's leading known case of mental retardation.

Instructional Objectives

Instructional Objectives

1. To promote independent evaluation and critical thinking to assess the impact of maternal alcohol use on individuals and society as well as strategies for prevention.

2. To apply the scientific method to test and observe the adverse effects of ethanol on a developing organism.

3. To utilize language arts skills in a science context and to acquire knowledge of alcohol related birth defects to prevention strategies.

Performance Objectives

1. Students will be able to describe the consequences of maternal alcohol abuse on a developing baby.

2. Students will be able to demonstrate the effect of alcohol exposure on a developing organism.

3. Students will be able to identify the benefit of support from fathers, other family members, and the community for discouraging the use of alcohol during all stages of pregnancy.

Compliance with National Science Content Standards

One Star Program
Activities 1 and 2, General Information Videos

Standard	Grade level	Sub Topics
Science as Inquiry	5-8 & 9-12	----------
Life Science Standards		
	5-8	Regulation and behavior
	9-12	Behavior of organisms
Science in Personal and Social Perspectives		
	5-8	Personal health risks and benefits
	9-12	Personal and community health
		Natural and human-induced hazards

Two Star Program

Activities 1 and 2, General Information Videos

Standard	Grade level	Sub Topics
Science as Inquiry	5-8 & 9-12	----------
Life Science Standards		
	5-9	Regulation and behavior
	9-13	Behavior of organisms
Science in Personal and Social Perspectives		
	5-9	Personal health risks and benefits
	9-13	Personal and community health
		Natural and human-induced hazards

Activity 3, Hands on Science Brine Shrimp Experiment

Standard	Grade level	Sub Topics
Science as Inquiry	5-8 & 9-12	----------
Life Science Standards		
	5-8	Structure and function in living systems
		Regulation and behavior
	9-12	Behavior of organisms
Science in Personal and Social Perspectives		
	5-8	Personal health risks and benefits
	9-12	Personal and community health

		Natural and human-induced hazards
		Environmental quality
History and Nature of Science Standards		
	5-8 & 9-12	Science as a human endeavor
		Nature of scientific knowledge

Three Star Program

Activities 1 and 2, General Information Videos

Standard	Grade level	Sub Topics
Science as Inquiry	5-8 & 9-12	----------
Life Science Standards		
	5-10	Regulation and behavior
	9-14	Behavior of organisms
Science in Personal and Social Perspectives		
	5-10	Personal health risks and benefits
	9-14	Personal and community health
		Natural and human-induced hazards

Activity 3, Hands on Science Brine Shrimp Experiment

Standard	Grade level	Sub Topics
Science as Inquiry	5-8 & 9-12	----------
Life Science Standards		
	5-8	Structure and function in living systems
		Regulation and behavior
	9-13	Behavior of organisms
Science in Personal and Social Perspectives		
	5-9	Personal health risks and benefits
	9-12	Personal and community health

		Natural and human-induced hazards
		Environmental quality
History and Nature of Science Standards		
	5-8 & 9-12	Science as a human endeavor
		Nature of scientific knowledge

Activty 4, The Knowledge is Money Game

Standard	Grade level	Sub Topics
Science as Inquiry	5-8 & 9-12	----------
Science in Personal and Social Perspectives		
	5-8	Personal health risks and benefits
	9-12	Personal and community health
		Natural and human-induced hazards
History and Nature of Science Standards		
	5-8 & 9-12	Science as a human endeavor
		Nature of scientific knowledge
Science and Technology Standards		
	5-8 & 9-12	Understanding about science and technology

Activity 5, What Would You Tell Someone to Avoid Alcohol-Related Birth Defects

Standard	Grade level	Sub topics
Science in Personal and Social Perspective		
	5-8	Personal health risks and benefits
	9-12	Personal and community health
		Natural and human - induced hazards

FACTS ABOUT FETAL ALCOHOL SYNDROME AND OTHER ALCOHOL-RELATED BIRTH DEFECTS

* BIRTH DEFECTS ARE ABNORMALITIES OF BODY STRUCTURE OR FUNCTION THAT ARE PRESENT AT BIRTH.

* FETAL ALCOHOL SYNDROME (FAS) CONSISTS OF THE COMBINATION OF CENTRAL NERVOUS SYSTEM PROBLEMS, REDUCED GROWTH, CHARACTERISTIC FACIAL FEATURES THAT OCCUR IN AN INDIVIDUAL AS A RESULT OF THE MOTHER DRINKING ALCOHOL DURING HER PREGNANCY. FAS REPRESENTS THE SEVERE END OF THE SPECTRUM OF BIRTH DEFECTS CAUSED BY ALCOHOL.

* FETAL ALCOHOL EFFECT (FAE) IS THE TERMINOLOGY USED TO DESCRIBE ABNORMALITIES THAT ARE LESS SEVERE THAN THOSE IN FAS OR THAT ARE PRESENT IN AN INDIVIDUAL WHOSE MOTHER ABUSED ALCOHOL BUT WHO DOES NOT HAVE ALL OF THE FEATURES OF FAS.

* MATERNAL ALCOHOL ABUSE IS THE LEADING KNOWN CAUSE OF MENTAL RETARDATION IN THE UNITED STATES.

* MANY INDIVIDUALS WITH ALCOHOL-RELATED BIRTH DEFECTS ARE NOT ABLE TO UNDERSTAND CAUSE AND EFFECT RELATIONSHIPS AND LONG-TERM CONSEQUENCES.

* IN THE US, FAS AND OTHER ALCOHOL-RELATED BIRTH DEFECTS AFFECT APPROXIMATELY 1 IN 100 LIVE BIRTHS OR AS MANY AS 40,000 INFANTS EACH YEAR (www.nofas.org, 2004).

* FETAL ALCOHOL SYNDROME AND OTHER ALCOHOL-RELATED BIRTH DEFECTS CANNOT BE CURED. MATERNAL ALCOHOL ABUSE CAUSES PERMANENT DAMAGE.

* APPROXIMATELY ONE IN 30 PREGNANT WOMEN IN THE US REPORTS "RISK DRINKING" (SEVEN OR MORE DRINKS PER WEEK, OR FIVE OR MORE DRINKS ON ANY ONE OCCASION) (www.cdc.gov/ncbddd, 2004).

* FAS AND FAE ARE FOUND IN ALL RACES AND SOCIOECONOMIC GROUPS.

* THE INSTITUTIONAL AND MEDICAL COSTS FOR ONE INDIVIDUAL WITH FAS ARE ESTIMATED TO BE BETWEEN $800,000 TO $2 MILLION OVER A LIFETIME (www.nofas.org, 2004; Addiction Biology, Vol. 9, No. 2, 2004).

*** IN THE UNITED STATES, IT IS ESTIMATED THAT EACH YEAR AS MUCH AS $7.8 BILLION IS SPENT TO HELP THOSE WITH FAS (Addiction Biology, Vol. 9, No. 2, 2004).**

*** WINE, BEER OR LIQUOR ALL CONTAIN ALCOHOL AND ALL CAN CAUSE DAMAGE TO A DEVELOPING BABY.**

*** ALCOHOL CAN DAMAGE THE BABY AT ANY STAGE OF ITS DEVELOPMENT.**

*** SOME OF THE SERIOUS BIRTH DEFECTS THAT ARE CAUSED BY ALCOHOL MAY OCCUR IF THE MOTHER ABUSES ALCOHOL EVEN BEFORE SHE MIGHT REALIZE THAT SHE IS PREGNANT.**

*** THE PROBABILITY OF HAVING A CHILD WITH FAS INCREASES WITH THE AMOUNT AND FREQUENCY OF ALCOHOL CONSUMED.**

*** RESEARCHERS CAN LEARN A GREAT DEAL ABOUT THE WAY ALCOHOL DAMAGES EMBRYOS BY STUDYING ANIMAL MODELS OF FAS AND FAE.**

*** ALCOHOL KILLS SPECIFIC CELLS IN THE DEVELOPING BRAIN. THE PATTERN OF CELL DEATH AND SUBSEQUENT DEFECTS VARY WITH THE STAGE OF DEVELOPMENT AT THE TIME OF ALCOHOL EXPOSURE.**

*** THERE IS NO KNOWN SAFE AMOUNT OF ALCOHOL THAT A PREGNANT WOMAN CAN DRINK WITHOUT RISKING DAMAGE TO HER UNBORN BABY.**

*** PREGNANT WOMEN SHOULD NOT DRINK ALCOHOL.**

*** ALCOHOL-RELATED BIRTH DEFECTS ARE 100% PREVENTABLE IF A PREGNANT WOMAN DOES NOT DRINK ALCOHOL.**

FETAL ALCOHOL SYNDROME AND OTHER ALCOHOL-RELATED BIRTH DEFECTS

THIS MAY BE USED AS SUPPLEMENTARY INFORMATION FOR THE TRANSPARENCIES AND POWER POINT PRESENTATION

AN INTRODUCTION TO THE PROBLEM OF FETAL ALCOHOL SYNDROME (FAS) AND OTHER ALCOHOL-RELATED BIRTH DEFECTS (ARBDs)

When a mother drinks, her unborn child is exposed to alcohol. As opposed to a common misconception, the baby is not protected in the uterus from alcohol exposure. Excessive drinking by the mother at any time after fertilization of the egg may result in damage to the developing child.

The problem of Fetal Alcohol Syndrome (FAS) and other alcohol-related birth defects (ARBDs) is very large. In fact, **maternal alcohol consumption is the leading known cause of mental retardation in the Western world (transparency #1)**. Although the range of intellectual deficits is wide, the average IQ of individuals with FAS is approximately 70.

The prevalence of FAS is typically quoted as 1 in 750 live births in the general population. However, the reported incidence varies, depending on the study population and design. The incidence of FAS currently exceeds that of Down Syndrome, spina bifida, as well as cerebral palsy. The incidence of all ARBDs, including FAS, is estimated to be 1 in 100 live births in the general population (*www.nofas.org*, 2004).

In spite of the fact that FAS and other ARBDs can be prevented by women simply avoiding alcohol consumption throughout their pregnancies, the problem remains.

FETAL ALCOHOL SYNDROME (FAS)

FAS is one of several consequences of maternal alcohol abuse. A diagnosis of FAS is based on the combination of 1) prenatal or postnatal growth deficiency or both (weight or length or both below the 10th percentile when corrected for gestational age), 2) central nervous system disorders including neurological abnormality, developmental delay, intellectual impairment, and structural abnormalities, and 3**) a distinctive pattern of facial anomalies, including short palpebral fissures, a thin upper lip, an elongated, flattened midface, and an indistinct philtrum (transparencies #2 &3).**

Recently, **magnetic resonance imaging (MRI) has made it possible to examine the brains of living individuals with FAS. Scientists have discovered that the brains of individuals with FAS illustrate specific structural abnormalities (transparency #4).** In addition to deficiency in the corpus collosum, other areas of the brain including the basal ganglia and the rostral portion of the cerebellar vermis have been shown to be structurally deficient. These deficiencies are not reparable. The effects of maternal alcohol abuse last a lifetime!

ALCOHOL-RELATED BIRTH DEFECTS (ARBDS)

FAS represents only a fraction of the consequences of maternal alcohol abuse. Prenatal alcohol exposure leads to a continuum of reproductive health effects ranging from infertility, miscarriage and stillbirth to low birth weight, prematurity, and a variety of neurobehavioral deficits in addition to physical malformations. Individuals with ARBDs

may not have all of the features noted in those with full blown FAS (i.e. they have fetal alcohol effects, FAE). They frequently have attention deficits, language difficulties, learning disabilities, behave impulsively and have poor judgment. Attention deficits are the most consistent neurobehavioral effect of prenatal alcohol exposure observed in older children. Cognitive deficiencies and other alcohol-related neurobehavioral deficits are the most common, but least diagnosed sequellae associated with prenatal alcohol exposure. Behavioral and mental problems of children with FAE can be just as severe as those with FAS. Many children with FAS/FAE are not able to understand cause and effect relationships and long-term consequences. These characteristics predispose the affected individuals to delinquency.

THE BIOLOGICAL BASIS FOR FAS AND OTHER ARBDS

The presentation of alcohol-induced prenatal damage is dependent on the timing of the insult and the amount and pattern of maternal drinking (peak blood alcohol concentration). Although excessive alcohol exposure can cause damage at all stages of in utero development, the embryonic period (weeks 3-8 after fertilization) is the time when the conceptus is most susceptible to the development of major abnormalities. This is not surprising considering that during this short period of time, the embryo changes remarkably in form. It transforms from a "worm-like" shape the size of Roosevelt's ear on a dime at four weeks of development to the distinctly human form that is the size of a quarter by the eighth week after fertilization. At early stages, animals such as rodents that researches use in order to study the effects of alcohol, are very similar in their development to humans. This is one of the reasons that the results of experiments on these laboratory animals can be extrapolated to humans. In fact, **exposure of mouse embryos to a high dose of alcohol at the time of development that corresponds to the third week of human development (when the human embryo is about the size of the inside of the 9 in the year "1994" on the dime) can cause all of the facial features in mice that are typical of children with FAS (transparency #5).**

Research has shown that **alcohol can kill cells of the developing embryo. Different cells of the embryo are sensitive at different stages of development. Some of the cells in the developing brain and face are particularly sensitive (transparency #6).** Finding the pattern of cell death caused by ethanol at various stages of development provides important clues for understanding the long-term consequences of maternal alcohol abuse in affected humans.

Research in animals has made it clear that alcohol can be very damaging even at very early stages of development. In fact, at some of the early, vulnerable stages, most women are unaware that they are pregnant.

DOSAGE AND WARNINGS

Everyone wants to know "how much is too much". Although alcohol-related birth defects are believed to be induced in a dose-response manner, low dose effects are very difficult to scientifically assess in human populations. Whether there is a threshold below which alcohol can be consumed without harming the conceptus is not known. Also, due in part to individual variability (susceptibility), research will not be able to provide an accurate answer for everyone. To date, studies indicate that most neurobehavioral effects can be caused by a pregnant woman drinking from 0.5 to 2

ounces of absolute alcohol per day (7 – 28 drinks with each containing 0.5 ounces of absolute alcohol per week; an 8 oz. can of beer contains the same amount of alcohol as a glass of table wine or a serving of fortified wine or a 1 oz. shot of liquor). Although this would indicate that even one drink per day can cause measurable consequences to the offspring, the drinking patterns of many of the women studied were such that the majority of the drinks consumed in one week were on only one or two occasions, rather that one drink each day. It is expected that self-reported data showing a relationship between moderate use and alcohol-related birth defects may often underestimate the true level of drinking. High peak blood levels of alcohol are important predictors of adverse outcome. Binge exposures (at least 5 standard drinks on any occasion) result in a greater frequency of neurological sequellae than the same amount of alcohol distributed across a greater time course.

Certainly, the best advice is to totally abstain from alcohol use during pregnancy, even at stages prior to the time that pregnancy is recognized. Although some clinicians believe that recommending total abstention for pregnant women may subject them to unwarranted guilt about drinking small amounts of alcohol, most accept the need for clinical caution. **Because it is not known at what dosage alcohol damage begins, it is prudent to recommend that pregnant women abstain from alcohol use (transparency #7).** In spite of public warnings the Centers for Disease Control reports a fourfold increase in frequent drinking from 1991-1995 among pregnant women

In addition to considering consequences of alcohol exposure prior to birth, it is also important to note that alcohol that a lactating mother consumes is present in her milk and may affect the brain of her nursing infant.

ARBDs are expensive. For one person with FAS, the institutional and medical costs over a lifetime have been estimated to be between $800,000 to $2 million (*www.nofas.org*, 2004; and Addiction Biology, Vol 9., No. 2, 2004). Recent estimates indicate that total annual costs of care to US society are as high as $7.8 billion for individuals with FAS (Addiction Biology, Vol 9., No. 2, 2004).

PREVENTION

The traditional ARBD prevention approach of focusing intervention efforts during pregnancy is after much damage has already occurred. Physicians and other health care providers should encourage sexually-active childbearing age alcohol consumers to prevent pregnancy or to avoid any alcohol use during preconceptional and prenatal periods.

Ideally, appropriate screening of all childbearing age patients for alcohol use combined with preconception health promotion, contraceptive counseling, and referral to substance abuse programs for high risk consumers should become a routine standard of care in primary care settings. Serving this role, physicians and other health care providers will play a critical role in the primary prevention of FAS and other ARBDs.

Education of physicians, other health care providers, parents, and prospective parents is essential!!

Dear Parents and Guardians:

In the coming days we will be studying the biological basis of Fetal Alcohol Syndrome and other alcohol-related birth defects. Because these birth defects are very prevalent, costly to individuals and society, yet are completely preventable, the need to educate our youth on this topic is critical.

The curriculum "Better Safe Than Sorry", was funded by the National Institute of Alcohol Abuse and Alcoholism (NIAAA), and developed in partnership with scientists and teachers, alike. This curriculum is designed to provide students with age-appropriate factual, non-judgmental information conveyed through videos, experiments and activities. The goal is to give students basic information about the cause, consequences and prevention of birth defects caused by drinking during pregnancy. This information can help students make the choices that, in the future, will help prevent birth defects. The foundation for those choices is being formed now.

We hope your child will make good use of his or her new knowledge—even share it with his/her friends, family and community. We encourage you to use this opportunity to discuss openly at home the information your child is learning. Together we can prevent birth defects such as Fetal Alcohol Syndrome.

I, _____ grant permission for _____
(Parent or guardian's name) (Child's name)

to participate in the alcohol-related birth defects curriculum.

_____ _____
(Signature of parent or guardian) (Date)

ONE STAR PROGRAM

Brief Description:

Designed to take 15-45 minutes of class time, the One Star Program will engage the attention of the class on the topic of Fetal Alcohol syndrome (FAS) and other alcohol-related birth defects and provide fundamental information on the nature, impact, biological basis and importance of preventing these birth defects.

Objectives:

1. To inform students that alcohol should not be used during pregnancy because it can cause permanent and severe damage to babies.

2. To increase the student's understanding of the biological basis for birth defects.

3. To stimulate thought regarding ways to help prevent birth defects.

Activities:

1. Students view the first segment (approximately 1 minute) of the Better Safe Than Sorry video. Showing an affected young woman, and with narrative by her mother, this clip introduces the topic of birth defects caused by maternal alcohol use. At the end of this segment, prompted by the question "Did you know that alcohol consumption during pregnancy can cause permanent damage to an unborn child?", the teacher may stop the video and break students up into small groups for discussion of their existing knowledge regarding birth defects that are caused by alcohol and the need to know more. Alternatively, a show of hands in answer to the question may be followed by resumption of video viewing by the class.

2. Students view the remainder (approximately 14 minutes) of the video in which parents, doctors and scientists share their perspectives to provide basic information on the characteristics, biological basis and importance of preventing Fetal Alcohol Syndrome and other alcohol-related birth defects. Working in groups to allow discussion, or working independently, students answer questions on a worksheet developed for this video. (Teachers may modify the worksheet, if only single word answers are preferred.) Comparison of responses to those that followed the query at the end of the first one minute video segment (activity one), allows learning assessment. In addition, or alternatively, the teacher or students may bring up discussion points for class consideration. Some possible discussion topics, with brief "answers" and suggested resources for teacher and student information are provided. Teachers may provide the students with lists of available resources for additional study of this topic.

3. For "extra credit" individual students may play "The Knowledge is Money Game" available on this CD-ROM. This is a fun, fact-filled game that tests the student's knowledge of FAS and other alcohol-related birth defects. Students may print out and turn in their final score from the game as an indication of their completion of the activity.

TWO STAR PROGRAM

Brief Description:

Designed to take 30 to 90 minutes of class time over the course of four days, the Two Star Program will

1. engage the attention of the class on the topic of Fetal Alcohol syndrome (FAS) and other alcohol-related birth defects
2. provide fundamental information on the nature, impact, biological basis and importance of preventing these birth defects
3. provide an opportunity to directly observe the affect of alcohol on a developing organism through a hands-on science experiment.

Objectives:

1. To inform students that alcohol should not be used during pregnancy because it can cause permanent and severe damage to babies.

2. To increase the student's understanding of the biological basis for birth defects.

3. To stimulate thought regarding ways to help prevent birth defects.

4. To demonstrate the effects of alcohol on a developing organism.

Activities:

1. Students view the first segment (approximately 1 minute) of the Better Safe Than Sorry video. Showing an affected young woman, and with narrative by her mother, this clip introduces the topic of birth defects caused by maternal alcohol use. At the end of this segment, prompted by the question "Did you know that alcohol consumption during pregnancy can cause permanent damage to an unborn child?", the teacher may stop the video and break students up into small groups for discussion of their existing knowledge regarding birth defects that are caused by alcohol and the need to know more. Alternatively, a show of hands in answer to the question may be followed by resumption of video viewing by the class.

2. Students view the remainder (approximately 14 minutes) of the video in which parents, doctors and scientists share their perspectives to provide basic information on the characteristics, biological basis and importance of preventing Fetal Alcohol Syndrome and other alcohol-related birth defects. Working in groups to allow discussion, or working independently, students answer questions on a worksheet developed for this video. (Teachers may modify the worksheet, if only single word answers are preferred.) Comparison of responses to those that followed the query at the end of the first one minute video segment (activity one), allows learning assessment. In addition, or alternatively, the teacher or students may bring up discussion points for class consideration. Some possible discussion topics, with brief "answers" and suggested resources for teacher and student information are provided. Teachers may provide the students with lists of available resources for additional study of this topic.

3. Students explore the effects of different concentrations of alcohol on brine shrimp hatching. This hands-on experiment is easy, should at the least stimulate interest in biology, and can be used to teach science, math and reasoning skills. It can also be modified to examine the effects of water contaminants or other environmental factors on aquatic life. A video of the experiment is

available on the CD-ROM or at http://www.niaaa.nih.gov/publications/Science/curriculum.htm for teacher preparation or classroom viewing.

Time requirement:10 minutes on Day 1, followed by 2-30 minute periods on Days 2 and 4. Kits are available from Carolina Biological Supply (https://www2.carolina.com/webapp/wcs/stores/servlet/ProductDisplay?memberId=-1002&productId=42048&langId=-1&storeId=10151&catalogId=10101) with materials for the entire class (10 groups) or for a single set up for a teacher to demonstrate.

4. For "extra credit" individual students may play "The Knowledge is Money Game" available on this CD-ROM. This is a fun, fact-filled game that tests the student's knowledge of FAS and other alcohol-related birth defects. Students may print out and turn in their final score from the game as an indication of their completion of the activity.

THREE STAR PROGRAM

Brief Description:

Designed to take greater than 90 minutes of class time over the course of four or more days, the Three Star Program will

1. engage the attention of the class on the topic of Fetal Alcohol syndrome (FAS) and other alcohol-related birth defects
2. provide fundamental information on the nature, impact, biological basis and importance of preventing these birth defects
3. provide an opportunity to directly observe the affect of alcohol on a developing organism through a hands-on science experiment
4. challenge students to consider prevention strategies.

Objectives:

1. To inform students that alcohol should not be used during pregnancy because it can cause permanent and severe damage to babies.

2. To increase the student's understanding of the biological basis for birth defects.

3. To stimulate thought regarding ways to help prevent birth defects.

4. To demonstrate the effects of alcohol on a developing organism.

Activities:

1. Students view the first segment (approximately 1 minute) of the Better Safe Than Sorry video. Showing an affected young woman, and with narrative by her mother, this clip introduces the topic of birth defects caused by maternal alcohol use. At the end of this segment, prompted by the question "Did you know that alcohol consumption during pregnancy can cause permanent damage to an unborn child?" the teacher may stop the video and break students up into small groups for discussion of their existing knowledge regarding birth defects that are caused by alcohol and the need to know more. Alternatively, a show of hands in answer to the question may be followed by resumption of video viewing by the class.

2. Students view the remainder (approximately 14 minutes) of the video in which parents, doctors and scientists share their perspectives to provide basic information on the characteristics, biological basis and importance of preventing Fetal Alcohol Syndrome and other alcohol-related birth defects. Working in groups to allow discussion, or working independently, students answer questions on a worksheet developed for this video. (Teachers may modify the worksheet, if only single word answers are preferred.) Comparison of responses to those that followed the query at the end of the first one minute video segment (activity one), allows learning assessment. In addition, or alternatively, the teacher or students may bring up discussion points for class consideration. Some possible discussion topics, with brief "answers" and suggested resources for teacher and student information are provided. Teachers may provide the students with lists of available resources for additional study of this topic.

3. Students explore the effects of different concentrations of alcohol on brine shrimp hatching. This hands-on experiment is easy, should at the least stimulate interest in biology, and can be used to teach science, math and reasoning skills. It can also be modified to examine the effects

of water contaminants or other environmental factors on aquatic life. A video of the experiment is available on the CD-ROM and at http://www.niaaa.nih.gov/publications/Science/curriculum.htm for teacher preparation or classroom viewing.

Time requirement:10 minutes on Day 1, followed by 30 minute periods on Days 2 and 4. Kits are available from Carolina Biological Supply (https://www2.carolina.com/webapp/wcs/stores/servlet/ProductDisplay?memberId=-1002&productId=42048&langId=-1&storeId=10151&catalogId=10101) with materials for the entire class (10 groups) or for a single set up for a teacher to demonstrate.

4. Students play "The Knowledge is Money Game" available on this CDROM. This is a fun, fact-filled game that tests the student's knowledge of FAS and other alcohol-related birth defects. Students may print out and turn in their final score from the game as an indication of their completion of the activity.

As an extension of this activity, students may develop questions for an "expert's round" of "The Knowledge is Money Game" based on their exploration of the internet or printed resources listed in the "Learning More" section of the curriculum. Students will generate 5 multiple choice questions and correct answers that will be submitted to the teacher. From these new questions, the teacher can select those that are appropriate for the second round of the game. This round can be played as a class following the instructions for the printed version of the game that are available in the printed curriculum.

5. Students are asked to write a letter or email message that could be sent to someone, telling of the risks of alcohol exposure to a developing baby. They are also asked to include their advice regarding the importance of preventing these problems and their ideas about how prevention should be achieved. The teacher would encourage the students to make their letters as compelling and effective as possible. Students present their letters or email messages to their teacher and/or to their classmates, either orally or by posting them in the classroom. The teacher or students may select the most effective letter(s) or prevention strategies. The teacher may lead the class in a discussion of how to distribute this information beyond the classroom. Teachers evaluate the letter written by each student.

Safety issues:

Activities 1 and 2: NONE
Activity 3: This experiment involves the use of small volumes of ethanol, which is a combustible liquid. Appropriate safety measures should be followed.

Sensitivity issues:

1. Alcohol use, pregnancy and birth defects are sensitive topics.
2. Alcohol use in our society is widespread.
3. Alcoholism is a disease that causes denial and shame.
4. Although it is illegal for use by those under 18 in many states, some of your students may drink alcohol.
5. It is possible that students in your class may know someone who has alcohol-related problems.
6. In the classroom it is important to avoid blame and shame and to focus, instead, on individual responsibility and not on judging others.
7. It is important to instill in students the need to respect one another's points of view, individual differences, and to treat one another with dignity, respect and kindness.

Possible discussion topics:

What do you think it would be like to have Fetal Alcohol Syndrome (FAS)?

As the leading known cause of mental retardation, FAS can result in a reduced I.Q and learning disabilities for an affected individual. Simple tasks of everyday life, such as writing one's name or understanding money can be very difficult. Individuals with FAS have difficulties with problem-solving and understanding the consequences of their own actions. Many individuals with alcohol-related birth defects require supervision and support throughout their entire lifetimes.

For additional information see "Learning More…A message from someone with FAS."

Why is it important not to drink while you are pregnant?

Maternal alcohol use during pregnancy can result in damage to the developing baby. This damage can be severe and permanent.

For additional information, see the website for the National Organization on Fetal Alcohol Syndrome (NOFAS) http://www.nofas.org/

Why is it important not to drink even if there is a chance that you might be pregnant?

Alcohol can cause damage to the developing baby at all stages of pregnancy.

For more information see the CD-ROM included with this curriculum "Facts for Students…Powerpoint Presentation"

and the Bowles Center for Alcohol Studies' website at

http://www.med.unc.edu/alcohol/ed/fas/

How are families and society affected by alcohol-related birth defects?

Because alcohol-related birth defects can affect an individual's ability to carry out the simple tasks of everyday life, affected individuals need a strong support network provided by family, friends, schools and the healthcare system.

For more information on this topic, visit the website of the Fetal Alcohol Syndrome Family Resource Institute at http://www.fetalalcoholsyndrome.org/

What kinds of things can research with laboratory animals tell us about birth defects caused by alcohol?

Scientific research tells us that developing animals can be affected by maternal alcohol exposure, much like humans are. From their work, scientists have learned that there is no safe time during pregnancy for a developing animal to be exposed to alcohol.

For more information see the CD-ROM included in this curriculum "Facts for Students…Powerpoint Presentation"

and the Bowles Center for Alcohol Studies' website at

http://www.med.unc.edu/alcohol/ed/fas/

How can fathers help improve the health of their unborn babies?

During pregnancy the father's life-style and emotional support can affect a mother's behavior. The mother should be encouraged by the child's father not to drink alcohol during the pregnancy. For more information on this topic see the March of Dimes website at http://www.modimes.org

How would you "get the word out" to help prevent Fetal Alcohol Syndrome and other alcohol-related birth defects?

Make a poster
Write a song
Make a video
Send a letter
Speak out

"Don't drink if you are pregnant. Better safe than sorry."

Better Safe Than Sorry Video Worksheet

What are some of the characteristics of individuals diagnosed with Fetal Alcohol Syndrome?

What is the leading known cause of mental retardation in this country?

At what stages of development can alcohol adversely affect a baby?

Describe how scientists can learn about how alcohol damages a developing individual.

Is it safer for a pregnant woman to drink beer than wine? Why?

Can the damage to a developing baby caused by alcohol be cured?

How can alcohol-related birth defects be prevented?

Answers to Better Safe Than Sorry Video Worksheet

What are some of the characteristics of individuals damaged by maternal alcohol abuse?

The most severe form of alcohol-related birth defects is Fetal Alcohol Syndrome (FAS). Facial characteristics of FAS include:
Small eyelid openings (palpebral fissures)
Short upturned nose
Long upper lip (from nose to mouth) with a thin red border and a deficient central groove (philtrum)
Reduced size of the head (microcephaly) Additionally, affected individuals have learning difficuluties and behavioral problems.

What is the leading known cause of mental retardation in this country?

Maternal alcohol use

At what stages of development can alcohol adversely affect a baby?

All

Describe how scientists can learn about how alcohol damages a developing individual.

Scientists can do research on animals. Since laboratory animals like mice develop in a manner very similar to humans, scientists can determine when during development alcohol is damaging and how the damage occurs

Is it safer for a pregnant woman to drink beer than wine? Why?

No. Alcohol is present in both beer and wine. Regardless of the type of alcoholic beverage, the same type of damage can occur to the baby.

Can the damage to a developing baby caused by alcohol be cured?

No. This damage is permanent and cannot be cured.

How can alcohol-related birth defects be prevented?

Don't drink if you are pregnant, are planning a pregnancy, or if there is a chance that you could become pregnant.

“Hands-On Science: Brine Shrimp Experiment”
Kit

Order kits from:
Carolina Biological Supply
2700 York Rd.
Burlington, NC 27215
or

https://www2.carolina.com/webapp/wcs/stores/servlet/ProductDisplay?memberId=-1002&productId=42048&langId=-1&storeId=10151&catalogId=10101

#14-2233 classroom set (without ethanol, suitable for use with own source of ethanol or other environmental contaminants)
#14-2235 individual demo set (without ethanol, suitable for use with own source of ethanol or other environmental contaminants)
Allow two weeks for delivery.

"Hands-on Science: Brine Shrimp Experiment"
Instructions

I. Question to be explored: Does alcohol damage a developing organism?

II. Hypothesis or prediction: Alcohol will decrease the number of brine shrimp that will hatch from their eggs.

III. Experimental Design

Materials

1 Brine shrimp egg pack
1 Screw-capped jar containing premeasured marine salt
4 60 mm Petri dishes with lids
3 1 ml Pipets
1 5 ml Pipet
4 Toothpicks
1 Ruler
1 Magnifying glass (dissecting microscope, optional)
Bottled spring water (recommended) or *tap water that is dechlorinated
1 ml of 100% Ethanol (alcohol; ethyl alcohol)***

***Important information regarding ethanol (alcohol) to be used for this experiment.

1. Absolute (100% also known as 200 proof), non-denatured grain alcohol is required. Do not use rubbing alcohol, or ethanol that is denatured with a contaminant such as benzene.
2. If you elect to substitute an over-the-counter alcoholic beverage, be sure to note the "proof" and adjust volumes accordingly. For example, should you utilize a 100 proof alcoholic beverage such as some vodkas or bourbons, simply double the volume of alcohol added to each dish. For the 1% condition use 0.2 mls; for the 2.5% use 0.5 mls and for the 5% condition use 1.0 mls.
3. In order to keep volumes reasonably small, we recommend that you use alcoholic beverages that are greater than 80 proof. Particularly useful is 190 proof grain alcohol (95% ethanol) which is readily obtainable and can be delivered at volumes that are virtually the same as those for 100% ethanol (For the 1% condition use 0.1 mls; for the 2.5% condition use 0.25 mls and for the 5% condition use 0.5 mls.)
4. Alcoholic beverages suitable for this experiment can be obtained by adults from local alcoholic beverage suppliers or from on-line liquor stores.

Procedures

Day 1. Preparation.

This experiment requires dechlorinated water. The day before the start of the experiment, fill a 500-1000 ml container with tap water and leave out overnight, uncovered. This will dechlorinate the water. *The effectiveness of this dechlorination method can be variable depending upon the chemical treatment of a given water supply. Alternatively, bottled spring water, available in most grocery stores, can be used successfully in this experiment. (Tip: To improve brine shrimp egg hatching, aerate the water overnight beginning on Day 1 by using an airstone attached to an aquarium pump.)

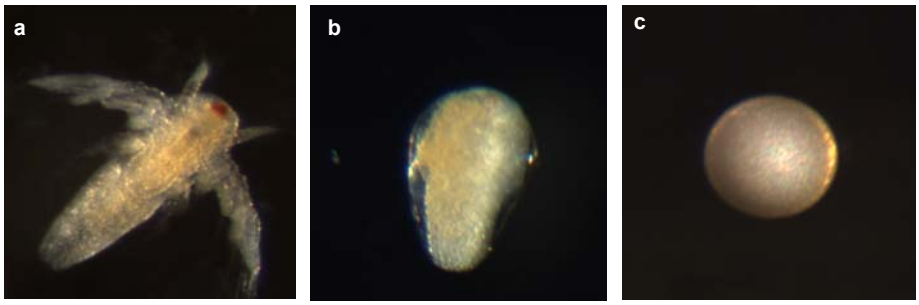
Day 2—Set up experiment.

1. Add 500 mls of dechlorinated water to the screw-capped jar with the premeasured marine salt, or mix with 12g (1 Tablespoon) of marine salt. Secure the cap and shake vigorously to dissolve. Using a 5 ml pipet, transfer 10 mls of the marine salt solution into each of the four 60 mm petri dishes.
2. Label the bottoms (lids can get mixed up) of the petri dishes 1 through 4.

3. Petri dish #1 will have no ethanol added to it. This will be the control condition.
4. To petri dish #2, add 0.1 ml of 100% ethanol (final ethanol concentration of 1%).
5. To petri dish #3, add 0.25 ml of 100% ethanol (final ethanol concentration of 2.5%).
6. To petri dish #4 add 0.5 ml of 100% ethanol (final ethanol concentration of 5%).
7. Mark each of the toothpicks at an equal point (about 1/4 inch or 6 mm from the end) so that each can be used to transfer relatively equivalent numbers of eggs. Wet a toothpick in the marine salt solution and insert it up to the 1/4 inch mark into the packet of brine shrimp eggs. Release the adherent eggs by submerging the toothpick in the pertri dish. Repeat for each of the four petri dishes using a fresh toothpick for each petri dish.
8. Cover each petri dish with the correct lid.
9. Allow the dishes to sit 48 hours, undisturbed. Dishes may sit up to 72 hours, if necessary. To increase the number of hatched brine shrimp, place the petri dishes under an incandescent lamp for 48 hours, or double the number of eggs added to each petri dish.

Day 3. Wait

Day 4. Data collection and analysis
10. After forty-eight hours, examine each petri dish with a magnifying glass or dissecting microscope and record your observations. You may observe a) live brine shrimp, b) dead or immature brine shrimp and c) unhatched eggs, as shown in the picture below. *(See #1 below for possible extended activities.)



After 48 hours students may observe a) live brine shrimp b) dead or immature brine shrimp and c) unhatched eggs.

IV. Results and Conclusions

11. Summarize your results by making a table that shows what you observed for each condition, each day of the experiment or by filling out a data sheet provided by your teacher.
12. Answer the questions on the worksheet.

Assessment

Students submit the completed tables, their conclusions and completed worksheets for evaluation.

Extended Activities

*1. Students may quantify their results by sampling a small volume from each petri dish at two different time points; at 0 hours to determine the density of eggs (eggs per unit volume), and 48 hours later to quantify the ratio of live brine shrimp to other (which includes unhatched eggs, partially hatched eggs and dead brine shrimp) as a measure of viability. Students remove a 0.1 ml sample from each dish using a 1 ml pipet, and place the droplet on a slide. A fresh pipet should be used for each sample. Care should be taken to replace lids as soon as possible to avoid evaporation of the alcohol. Using the magnifying glass or dissecting microscope, the number of live brine shrimp, unhatched eggs, partially hatched and dead brine shrimp can be determined and recorded in the data sheet entitled "Quantification of Brine Shrimp Egg Hatching". Graph the results.

2. For greater impact and with local approval, you may consider replacing 100% (200 proof) ethanol with a 100 proof alcoholic beverage such as some vodkas or bourbons. Simply double the volume of alcohol added to each dish. For the 1% condition use 0.2 mls; for the 2.5% use 0.5 mls and for the 5% condition use 1.0 mls.

3. Students can explore the influence of additional variables that may influence brine shrimp egg hatching. Some suggested variables to consider are a) temperature and b) other agents that may be dissolved in the salt water.

Brine Shrimp Egg Hatching Data Sheet

Dish #	% Alcohol	Observations at Time 0 hrs.	48hrs	Comments

Extended Activity: Quantification of Brine Shrimp Egg Hatching

Plate Number	Conditions	0 hours #eggs/volume (density)	48 hours #eggs	 #dead and immature	 #swimming	48 hrs Ratio #swimming: #eggs + #dead and #immature (viability)

Questions to consider (an aid to interpret the experimental results obtained)

1. Are there similar numbers of eggs in each condition at time 0? If not, identify which are different. Explain how this might affect your interpretation of the results.

2. After 48 hours, what did you observe about the appearance of the hatched brine shrimp in the control dish?

3. After 48 hours, what do you observe in each of the dishes containing alcohol? (Compare 1%, 2.5% and 5% conditions.)

4. What do your results tell you about the affect of alcohol on hatching of brine shrimp eggs?

5. Do you think the development of other organisms can be affected by alcohol?

6. If you could run this experiment again what other variable would you like to consider?

7. How would you test the influence of that variable on brine shrimp egg hatching?

Answers to Questions to Consider Worksheet

1. Are there similar numbers of eggs in each condition at time 0? If not, identify which are different. Explain how this might affect your interpretation of the results.
   Answers will depend upon individual results

2. After 48 hours, what did you observe about the appearance of the hatched brine shrimp in the control dish?
   They should be actively swimming in the marine salt solution.

3. After 48 hours, what do you observe in each of the dishes containing alcohol? (Compare 1%, 2.5% and 5%conditions.)
   1% alcohol: There should be several live brine shrimp swimming, but fewer than in the control. Some brine shrimp will appear dead or immature and there will be many unhatched eggs.
   2.5% alcohol: There would be few live brine shrimp; some dead or immature brine shrimp, and many unhatched eggs.
   5% alcohol: There would be no live brine shrimp, no immature brine shrimp. Virtually all the eggs are unhatched.

4. What do your results tell you about the affect of alcohol on hatching of brine shrimp eggs?
   The higher the concentration of alcohol the more damaging the effects on brine shrimp hatching and well-being.

5. Do you think the development of other organisms can be affected by alcohol?
   Yes, as shown in the introductory video, humans and mice can be affected by alcohol exposure during pregnancy. In fact, we would expect that all organisms might be adversely affected.

6. If you could run this experiment again what other variable would you like to consider?
   This answer will vary. Variables might include, temperature, incubation time or even a different pollutant.

7. How would you test the influence of that variable on brine shrimp egg hatching?
   The answer will depend upon the variable selected. Experiments should include a comparison between the control condition and the experimental condition(s).

“Instructions for “The Knowledge is Money Game”

Students participate in a game with a quiz-show format. Questions are selected from a game board and are based on topics relating to FAS and other alcohol-related birth defects. Correct answers earn dollars while incorrect answers result in lost winnings. A final round allows each player to wager up to their entire winnings before they answer the final question. Student’s can compare their cash earnings to levels of expertise achieved.

Materials List

Hard Copy version

1. Twenty-six 3”x5” cards
2. Six, 8 ½” x 11” sheets of paper or poster board

CD-ROM version

Safety Issues

None

Instructions

Hard Copy version of “The Knowledge is Money Game”.

1. The teacher makes up a set of 3”x5” cards with one question and four possible answers on each card. Place the value of the question ($100-$500) on the back of the 3”x5” card.
2. The teacher writes the name of each of the five categories and the final round question on the 8 ½” x 11’ paper.
3. Five cards, each with a different value ranging from $100-$500, are placed on the chalk board under one of the five separate categories.
4. The class is divided into two to three teams.
5. A team is selected to begin. The team selects a category and a value. The question and the four multiple choice answers are read aloud by the teacher. The team that provides the correct answer first, earns the value indicated for the question and gets the right to chose the next question. If an incorrect answer is given, the team loses the value of the question from their score.
6. The teacher keeps track of the amount of money earned by each team.
7. For the final round, each team with a positive cash score can participate. Before hearing the last question, each team writes down the amount of their respective winnings to wager on correctly answering the final question. Once each team has selected their wager, the final question and answers are read. Each team writes down their answer. The teacher then asks each team what answer they selected and how much was wagered. Teams increase or decrease their earnings depending upon whether they answered the question correctly and the amount of their wager.
8. Each team can compare their earnings to the scale provided to determine what sort of “expert” they have become.

CD-ROM Instructions or internet alternative for “The Knowledge is Money Game”

1. Individuals may play against themselves or if a computer screen projector is available, the game can be played by the entire class divided into teams with the teacher acting as the “master of ceremonies”.
2. The game board is divided into 5 categories. Each category has questions ranging in value from $100 to $500.
3. The player selects a question by clicking on the value.
4. The question and four possible answers appear.
5. The player clicks on the selected answer.
6. The screen indicates whether the question is correct or incorrect. Correct answers result in the value of the question being added to the player’s score. Incorrect answers result in the value of the question being subtracted from the player’s score. The screen will reveal the score earned.
7. If the player has a positive cash score after answering all the questions on the game board, the player may participate in the final round of the game. Prior to seeing the question of the final round, the player selects the amount of respective winnings to wager. The player clicks on a selected answer. Depending upon the amount wagered and the answer selected, the player may increase or decrease the amount of his or her earnings.
8. The player can compare the player’s winnings to the scale provided to determine what sort of “expert” they have become.

Assessment

Student participation and performance in the activity can provide criteria for assessment.

Questions for “The Knowledge is Money Game”

Category: Biological Effect of Alcohol
$100
Question: A developing baby is exposed to alcohol when the
a. father drinks alcoholic beverages.
*b. *mother drinks alcoholic beverages.*
c. mother sees an alcoholic beverage.
d. mother touches a bottle of alcohol.

$200
Question: What have scientists learned about the effects of alcohol on a developing organism?
Answers: *a. *Alcohol can kill cells.*
b. Alcohol has no affect on a developing organism.
c. Alcohol does NOT harm humans.
d. Scientists have not done any research on this question.

$300
Question: What part of the human body can be affected by alcohol exposure during development?
Answer: a. Brain
b. Facial features
c. Heart
*d. *All of the above.*

$400
Question: During pregnancy, when can exposure to alcohol result in harm to the developing baby?
Answer: a. The first trimester (1-3 months)
b. The second trimester (3-6 months)
c. The third trimester (6-9 months)
*d. *All of the above.*

$500
Question: How do scientists study the effects of alcohol on a developing organism? They
Answers: a. ask a question or formulate an hypothesis.
b. test the hypothesis in an experiment.
c. analyze the results and draw conclusions.
*d. *All of the above.*

Category: What’s in a name?
$100
Question: What is a birth defect?
Answer: a. **An abnormality of body structure or function present at birth*
b. Delivering a baby after the “due date”
c. A birthday on February 29th
d. Any premature birth

$200
Question: What does the term “prenatal” mean?
Answer:
a. Under-aged
b. A region of the brain
*c. *Before birth*
d. Before Christmas

$300
Question: What is FAS?
Answer:
a. It stands for “First and Always Sober”.
b. **A disorder characterized by growth retardation, facial abnormalities and central nervous system dysfunction caused by maternal alcohol use during pregnancy*
c. A substance which causes birth defects
d. All of the above

$400
Question: What is FAE?
Answer:
a. It stands for Fetal Alcohol Effect.
b. It refers to the presence of some, but not all, symptoms of FAS in an individual.
c. It means a disorder which should be diagnosed only by a doctor.
*d. **All of the above*

$500
Question: What is a “syndrome”?
Answer:
a. An organization or institution
b. A sports arena
c. **A group of physical signs and symptoms which, when seen together, characterize a single disorder or disease*
d. None of the above

Category: Pregnancy and Drinking
$100
Question: How much alcohol is KNOWN to be safe to drink during pregnancy?
Answer:
a. One glass of wine a day
b. Three beers a day
c. Any amount is safe
*d. **There is NO known amount of alcohol which is safe to drink during pregnancy.*

$200
Question: What should a woman do if she is planning a pregnancy or is pregnant?
Answer:
a. **Stop drinking alcoholic beverages of any kind*
b. Learn a foreign language
c. Take dance lessons
d. Chew gum

$300
Question: How long can the effects of a mother's alcohol abuse last in her developing baby?
Answer:
a. 12 months
b. 10 years
c. Until high school graduation
d. **An entire lifetime.*

$400
Question: What is the leading KNOWN cause of mental retardation in the U.S.?
Answer:
a. Poor maternal nutrition.
b. German measles in pregnant women.
c. **Maternal alcohol consumption during pregnancy.*
d. Maternal consumption of over-the-counter medication during pregnancy.

$500
Question: When is a safe time for a woman to drink during her pregnancy?
Answer:
a. Between 5 p.m. and 8 p.m. each evening.
*b. *Never.*
c. During her third trimester.
d. Any time is safe.

Category: Just the facts
$100
Question: Alcohol is found in which of the following?
Answer:
a. Beer
b. Wine coolers
c. Hard liquor
*d. *All of the above.*

$200
Question: What types of alcoholic beverages are SAFE to drink during pregnancy?
Answer:
a. Beer.
b. Wine coolers.
c. Hard Liquor.
d. *None of the above. Alcohol consumption, in any form, may harm a developing baby.

$300
Question: What is the cure for Fetal Alcohol Syndrome?
Answer:
*a. *There is no known cure.*
b. Exercise.
c. Diet
d. Medication.

$400
Question: What percentage of cases of alcohol-related birth defects could be prevented?
Answer:
a. 10%
b. 50%
c. 75%
d. **100%*

$500
Question: What types of problems could an individual with FAS experience?
Answer:
a. Difficulties understanding cause and effect relationships
b. Mental retardation
c. Learning disabilities
d. *All of the above.

Category: Having healthy babies
$100
Question: What is the best way to eliminate alcohol-related birth defects? A pregnant woman should…
Answer:
a. take extra vitamins.
*b. *never drink alcoholic beverages of any kind during her entire pregnancy.*
c. sleep with the windows open at night.
d. ask her doctor for the appropriate shot to prevent alcohol-related birth defects.

$200
Question: What can a father do for the health of his developing baby?
Answer:
a. Encourage a pregnant woman to stop drinking alcohol.
b. Encourage a pregnant woman to get prenatal health care.
*c. *a and b are correct.*
d. None of the above. A father can do nothing for the health of his developing baby.

$300
Question: Who should learn about FAS?
Answer:
a. Adults
b. Teachers and Doctors
c. Pre-teens and teens
d. **All of the above*.

$400
Question: If a woman has been drinking alcohol before she realizes she is pregnant, she should
Answer:
a. stop drinking alcohol of any kind, as soon as she finds out.
b. seek professional help if she has trouble quitting drinking.
c. drink only beer and not wine for the rest of her pregnancy.
*d. *a and b are correct.*

$500
Question: What is(are) some resources that can help a person learn more about FAS and other alcohol-related birth defects (ARBD's)?
Answer:
a. National Organization on Fetal Alcohol Syndrome (NOFAS)
b. National Institute of Alcohol Abuse and Alcoholism (NIAAA)
c. March of Dimes
d. **All of the above.*

Final Round Question:

Question: Who is at risk for alcohol-related birth defects?

Answer:

a. Only babies whose biological parents both have FAS.
b. Only babies who have relatives with FAS.
c. Only babies whose parents are in disadvantaged economic conditions.
*d. *Any baby whose mother drinks alcohol while pregnant, regardless of age, race, ethnic, social or economic conditions.*

Interpreting your score

$0	Noble Effort. Knowledge for the sake of knowledge is its own reward!
$1 to 2,499	Ka-chink! Your knowledge pays off.
$2,500 to 4,999	Sooo Smart! Share your knowledge with your friends.
$5,000 to 9,999	A Regular Walking Encyclopedia! When you talk, folks listen!
$10,000 to 15,000	The Ultimate Expert. Your knowledge is in demand!

Glossary*

agenesis: Absence or failure of formation.
anomaly: Deviation from what is normal. Anything structurally unusual or irregular.
alcohol: The colorless, flammable liquid, ethanol, which is the intoxicating agent in whisky, gin, rum, beer, wine coolers and other fermented or distilled liquors.
alcohol-related birth defects/ARBD: A term used to describe the full spectrum of effects attributable to prenatal exposure to alcohol-from subtle to full fetal alcohol syndrome.
binge drinking: The drinking of a lot of alcohol at once, but at infrequent periods of time.
birth defect: An abnormality of body structure or function present at birth.
conceptus: The product of conception.
CNS (central nervous system): Brain and spinal cord.
corpus callosum: The major connection between the left and right halves of the brain.
dysgenesis: Defective embryonic development.
embryo: A conceptus, from the time of implantation to approximately eight weeks (60 days) of human development.
Fetal Alcohol Effects/FAE: The presence of some of the symptoms of FAS, but not enough to be diagnosed as fetal alcohol syndrome (usually the absence of facial characteristics).
Fetal Alcohol Syndrome/FAS: A full spectrum of mental (central nervous system abnormalities) and physical effects (reduced growth and typical facial features) caused by prenatal alcohol exposure.
fetus: In humans, the conceptus from approximately eight weeks after fertilization to the time of birth.
gestation: Prenatal development.
hemisphere: Half of the cerebral cortex of the brain.
mental retardation: Brain damage due to genetic conditions, environmental causes, illness or injury that can affect learning, self-direction and self-care.
miscarriage: The spontaneous aborting of the embryo or early fetus that usually occurs for no known reason.
philtrum: The groove and parallel ridges on the face between the nostrils and upper lip.
placenta: A large organ attached to the uterine lining that allows nutrients and oxygen to pass from mother to fetus via the umbilical cord.
prenatal: Before birth.
stillbirth: Delivery of a dead baby after 20 weeks of gestation.
syndrome: A group of physical signs and symptoms which, when seen together, characterize a single disorder or disease.
teratogen: A substance that adversely affects embryonic or fetal development.
trimester: The time period of three months. Three trimesters occur during pregnancy: the first second and third.
variable: a measurable factor, such as temperature or pressure which can be changed in an experiment.

*Modified from “The Fabulous F.A.S. Quiz Show,” The March of Dimes Birth Defects Foundation and the Washington State Department of Health.

Frequently Asked Questions

Could a person have FAS or FAE and not know it?

Yes. Not even all doctors recognize and diagnose these birth defects. The most obvious symptoms of FAS and FAE are often the behavioral ones, and people don't always consider a prenatal cause. Many people who have gotten the diagnosis say they knew that something was not right, but no one had ever been able to help them figure out what was wrong.

Can babies be born drunk, just like some babies exposed to drugs are born experiencing withdrawal?

If a mother has been drinking heavily just before having her baby, there will be alcohol in the baby's blood just as in the mother's. If the mother is drunk, the fetus will be drunk. Babies of mothers who have been drinking regularly will often go through withdrawal after birth. After birth, a baby can also get alcohol through its mother's breast milk if she is breast-feeding, but not enough to get drunk.

Does hard liquor cause more damage to the fetus than beer or wine?

All types of alcohol can cause the same type of damage. The alcohol in a glass of wine, a beer or a wine cooler is the same as the alcohol in a shot of hard liquor like gin, whiskey or vodka. Typically a can of beer, a glass of wine and a shot of liquor each contain about 0.5 ounces of alcohol.

Does drinking by the father affect the fetus?

There has not been enough research on the effects of alcohol, tobacco and drugs on a man's sperm, so we don't know what the biological affect on the fetus might be. What happens after that, though, is not yet understood. We do know that it is helpful for a man not to drink around a woman who is trying not to drink. By sharing the healthy lifestyle choice, a man is really helping his partner have a healthier baby.

Are children with FAS and FAE more at risk for becoming alcoholics?

Research has shown that people whose parents were alcoholics are at a higher risk of becoming alcoholics than people whose parents were not alcoholics. If a person with FAS or FAE had parents who were alcoholics, then they would be at a greater risk themselves.

How will I know if I am at risk for becoming an alcoholic?

The U.S. Department of Health and Human Services says "When family members (parents, grandparents, aunts/uncle), guardians or other adults in charge of children are alcoholic, there is strong evidence that children in these families are more likely to develop the disease of alcoholism as well. The fact is, alcoholism tends to run in families." There are also other indicators for alcoholism including community, school, individual and peer risk factors.

Can FAS or FAE be passed on from generation to generation?

As far as researchers know at this time, FAS and FAE cannot be genetically passed on from generation to generation. There is some research that shows that alcoholism is more common in some families than others. That may be a factor in more than one generation having FAS or FAE in their families.

How do we know that alcohol caused a person's problems instead of something else?

If a person has FAS, we know that alcohol caused the FAS. For people who don't have all the signs of FAS, it is harder to tell if their problems were caused by prenatal exposure to alcohol or something else. It is common for some problems, like learning disabilities, to have several causes like genetics, poor living environment, and drug or alcohol exposure during pregnancy. Sometimes a doctor has to make the best judgment he or she can, and might say that a person has possible fetal alcohol effects.

Is it OK for a woman to drink only during special occasions when she is pregnant?

Since there is no KNOWN safe amount of alcohol to drink during pregnancy, the best choice is not to drink at all, even during special occasions. Many people use sparkling cider or non-alcoholic wines as a substitute at special occasions where adults are drinking. Remember that it is illegal for people who are under-aged to drink alcohol.

Is there any safe amount of alcohol a pregnant woman can drink?

There is no KNOWN safe amount of alcohol a pregnant woman can drink and not risk damaging her baby.

Can alcohol damage a baby at any stage of its development, including times before a woman might realize that she is pregnant?

Yes.

Should a woman worry if she drank before she knew she was pregnant? What should she do?

Regardless of the stage of pregnancy, a woman improves the chances of having a healthy baby if she stops drinking. Although there may be reason to worry, if drinking was heavy prior to recognizing the dangers, stopping the risky behavior is the best possible advice for the remainder of the pregnancy. If a woman cannot stop drinking, get help. For additional information, see a listing of organizations under "Agencies You May Wish to Contact".

Do the effects of FAS and FAE last a person's entire lifetime?

The brain damage caused by prenatal alcohol exposure **DOES** last a person's lifetime. Sometimes the physical features become less obvious at puberty, as the child becomes a teenager.

Could I know someone with FAS or FAE?

It is possible that you may know someone with FAS or FAE, but without the diagnosis of a doctor it would be very hard to say for certain. For example, the physical features characteristic of children with FAS must be carefully considered by a physician and determined to fall within a designated range. The behavioral problems associated with FAS and FAE are often the most obvious symptoms of the underlying birth defect, yet these can also result from causes other than drinking during pregnancy. Regardless of the diagnosis, it is important to treat **all** of our fellow students with respect, kindness and dignity.

Do I have an alcohol-related birth defect?

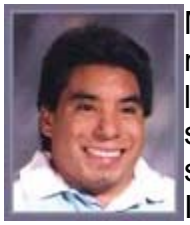
This is an issue that you will need to discuss with your parent or guardian. A diagnosis of an alcohol-related birth defect requires an evaluation by a physician trained to recognize these types of birth defects. A positive diagnosis can result in identifying the special needs of such individuals and the resources available to more effectively teach and train them for productive and successful lives.

Why would a woman drink while she is pregnant?

There can be a variety of reasons why a woman would drink while pregnant ranging from ignorance of the risks of alcohol-related birth defects, to social pressures, to alcohol addiction, itself. What can you do? Tell her why it is important to stop drinking and encourage her to do so. If she has trouble stopping, tell her about the local organizations that can help her quit.

***Modified from "The Fabulous F.A.S. Quiz Show," The March of Dimes Birth Defects Foundation and the Washington State Department of Health.**

Message from Someone with FAS



My name is John Kellerman and I have Fetal Alcohol Syndrome. My mom is writing this for me, because I have a hard time writing letters. Even though my IQ is high enough to make me ineligible for state services (IQ 70 = one point too high to qualify), I can hardly sign my name, and I have been practicing for many years to do that. I also have a hard time with math and money, so I can't even go to the store. I am 21 years old and I cannot drive, because I could not pass the driver's test.

I just graduated from high school, and now I am starting my life in the adult world. But because of my disability, I cannot function as an adult. Even though I have the expressive language skills of an adult, and the body of an adult, I have the emotional development of a child, the conscience of a child, the social skills of a child. If you look at the research, you will realize this is all part of Fetal Alcohol Syndrome, and that I cannot progress in those areas in spite of my Mom and teachers working with me for many years.

Because I have Fetal Alcohol Syndrome, I need constant supervision. This is because the brain damage causes me to have trouble controlling my impulses and inhibitions. I also have short memory problems. With lack of impulse control and poor judgment, I get into trouble easily and often, unless my Mom is nearby. This makes me frustrated and angry. I am afraid that I might get arrested some day, because of my poor impulse control. I'm afraid of what is going to happen to me when my Mom is not around to watch out for me.

Please help raise awareness about Fetal Alcohol Syndrome, so that we can prevent other kids from going through what I go through, and to get more services for people like me.

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Internet Resources in English

Bowles Center for Alcohol Studies, University of North Carolina at Chapel Hill
http://www.med.unc.edu/alcohol/ed/fas/

Centers for Disease Control and Prevention (CDC): Fetal Alcohol Syndrome
http://www.cdc.gov/ncbddd/fas/

Fetal Alcohol Syndrome: Support, Training, Advocacy and Resources (FASSTAR)
http://www.fasstar.com/

Fetal Alcohol Syndrome Family Resource Institute
http://www.fetalalcoholsyndrome.org/

March of Dimes Birth Defects Foundation
http://www.modimes.org/

National Institute on Alcohol Abuse and Alcoholism (NIAAA)
http://www.niaaa.nih.gov/

National Organization on Fetal Alcohol Syndrome (NOFAS)
http://www.nofas.org/

The ARC, formerly The Association for Retarded Citizens
http://www.thearc.org

Internet Resources in Spanish

Centers for Disease Control and Prevention (CDC): Fetal Alcohol Syndrome http://www.cdc.gov/ncbddd/Spanish/default.htm

March of Dimes Birth Defects Foundation
http://www.nacersano.org/centro/9388_9963.asp

National Institute on Alcohol Abuse and Alcoholism (NIAAA)
http://www.niaaa.nih.gov/

Agencies You May Wish to Contact

Alcoholics Anonymous (AA)
Check your local phone book for
Listings in your area
http://www.alcoholics-anonymous.org

National Council on Alcoholism
and Drug Dependence
20 Exchange Place Suite 2902
New York, NY 10005-3201
(800) 622-2255
http://www.ncadd.org

National Institute on Alcohol Abuse
and Alcoholism
6000 Executive Boulevard, Suite 409
Bethesda, MD 20892-7003
(301) 443-3860
http://www.niaaa.nih.gov

March of Dimes Birth Defects Foundation
1275 Mamaroneck Avenue
White Plains, NY 10605
888-MODIMES (663-4637)
http://www.modimes.org/

National Organization on Fetal Alcohol Syndrome
216 G Street, NE, Suite 750
Washington, DC 20002
(800) 66-NOFAS
http://www.nofas.org/

Printed Materials

The Broken Cord (1989) by Michael Dorris, Harper & Row, Publisher. This 300 page book describes an adoptive parent's experience in raising a child with FAS.

Fantastic Antone Succeeds: Experiences in Educating Children with FAS (1993) Edited by Judith Kleinfeld and Siobhan Wescott, University of Alaska Press. 368 pages.

"NOFAS Brochure on Fetal Alcohol Syndrome",
The National Organization on Fetal Alcohol Syndrome
216 G Street, North East
Washington, DC 20002
Phone: (202) 785-4585 Fax: (202) 466-6456
Email: information@nofas.org
http://www.nofas.org/

"The Facts about Alcohol and Pregnancy", (1998)
March of Dimes Birth Defects Foundation
1275 Mamaroneck Avenue
White Plains, NY 10605
888-MODIMES (663-4637)
http://www.modimes.org/

Additional Internet Resources for Teachers & Parents

Internet Resources
National Organization on Fetal Alcohol Syndrome
216 G Street, NE, Suite 750
Washington, DC 20002
(800) 66-NOFAS
http://www.nofas.org/

Fetal Alcohol Syndrome Family Resource Center
Variety of resources for parents and teachers
http://www.come-over.to/FASCRC/

Fetal Alcohol Syndrome Information Service
Canadian Centre on Substance Abuse
Clearinghouse of Information
75 Albert Street, Suite 300
Ottawa, ON Canada K1P 5E7
(800) 559-4514 in Canada
(613) 235-4048 outside Canada
http://www.ccsa.ca/index.asp?ID=18&menu=&page=105&full=yes

Alcohol Related Birth Injury (FAS/E) Resource Site
Includes an "educator's consortium" and extensive education-related links
http://www.arbi.org

Additional Print Resources for Teachers & Parents

Family Empowerment Network: Supporting Families affected by FAS/E.
Free information packets and extensive loan library
610 Langdon Street
Room 523
Madison, WI 53703-1195
(800) 462-5254
Email: fen@mail.dcs.wisc.edu

Fetal Alcohol Education Program (FAEP)
Teaching packages available to parents
Boston University School of Medicine
1975 Main Street
Concord, MA 01742
(978) 369-7713

Fetal Alcohol Syndrome Family Resource Institute (FAS*FRI)
Parent information packet and FAS Times Newsletter to members
P.O. Box 2525
Lynnewood, WA 98036
(253) 531-2878
Email : vicfas@hotmail.com

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