

Reproductive System

Teacher Information



Description

These three activities follow the same four cases. The students start as the fertility specialist for the couples, provide the pregnancy tests to see if the couples have conceived, and follow up by checking on fetal development for the couples that end up pregnant. Each activity can be done alone or as a series to follow each couple.

Activity 16a – Fertility

Students will act as fertility specialists for four couples seeking fertility assistance. They will compare medical backgrounds and hormone test results to normal values to determine what may be causing the couples' infertility. Students follow up with research to create a treatment plan for each couple.

Lab 16b – Pregnancy ELISA Test

The four couples from Activity 16a have returned to see if the treatment plan has been effective. Student groups will provide pregnancy tests for each couple using the ELISA test method. This lab would also be suitable when discussing the immune system and/or antigen-antibody reaction.

Activity 16c – Fetal Development

Students continue as the fertility specialist for the three couples that were able to conceive from Lab 16b. Data on fetal size and development is compared to normal values to determine whether the fetus is developing at a normal rate.

Objectives

1. Summarize common male and/or female causes of infertility.
2. Compare medical records with normal and abnormal test results to develop a diagnosis and treatment plan for infertility.
3. Describe how the ELISA test works to determine pregnancy or diagnose disease.
4. Compare normal values for fetal development with developing fetuses to determine whether they are growing at a healthy rate.
5. Understand the impact of a fetus being small for gestational age (SGA) and large for gestational age (LGA) on mother and fetus.

Time: *Dependent on Activity*

Activity 16a: 45-60 minutes (can be completed outside of class)

Lab 16b: 45-60 minutes

Activity 16c: 45-60 minutes

Materials *Supplies needed for 10 lab groups or 40 students*

Supply	Provided (P) or Needed (N)	Quantity	Company/Item #	Approximate Cost
16a. Fertility				
Computer/Internet	N	20-40	-	-
16b. Pregnancy ELISA Test				
Microtiter strip plates	P	1	Edvotek/666	\$19.00
Tween 20	P	2 ml	Fisher/BP337-500	\$42.41
Liquid soap	P	2 ml	Grocery	\$3.00

STOCK Substrate solution • Mix 0.1 g bromophenol blue sodium salt in 100 ml water to create stock solution; dilute further by adding 5 ml of the stock solution to 45 ml of water	P	5 ml	Carolina/849084	\$17.15
Toothpicks	P	2	Grocery	\$2.50
Plastic Pipettes (rinse & reuse)	P	80	Carolina/736984	\$5.55
Cling Wrap	P	10 strips	Grocery	\$5.00
P1 solution • 50 ml of water	P	30 ml	N/A	N/A
P2 solution • 50 ml of water	P	30 ml	N/A	N/A
P3 solution • 50 ml of water	P	30 ml	N/A	N/A
P4 solution • 50 ml of water	P	30 ml	N/A	N/A
Wash solution • 50 ml of water	P	30 ml	N/A	N/A
hCG solution • 50 ml of water	P	30 ml	N/A	N/A
Color antibody • 50 ml of water	P	30 ml	N/A	N/A
Centrifuge tubes (rinse & reuse)	P	80	Carolina/215230	\$42.50
Sharpie	N	10	-	-
Paper towels	N	As needed	-	-
16c. Fetal Development				
Ruler	N	40	-	-
Colored markers, pen, pencil	N	As needed	-	-

IMPORTANT: Check the MSDS for safety information on unfamiliar chemicals

Company Contact Information:

Carolina www.carolina.com 800.334.5551	Grocery <i>Can be found at local Grocery store</i>	Fisher www.fishersci.com 800.766.7000	Edvotek www.edvotek.com 800.338.6835
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Additional Information

These three activities are linked through the same cases/couples. The cases and outcomes are:

- **Case 1: Jenny & Jason Johnson**
 - 16a: normal female, abnormal male (low sperm count due to Celiac's disease)
 - Recommend improve diet (gluten free)
 - 16b: pregnancy
 - 16c: smaller than normal fetal development
- **Case 2: Tina & Thomas Tinkerson**
 - 16a: abnormal female (polycystic ovary syndrome), normal male
 - Recommend hormone therapy and/or surgery
 - 16b: no pregnancy
 - 16c: this couple is not part of lab 16c since they did not conceive in 16b
- **Case 3: Anna & Arnold Ashton**
 - 16a: normal female, abnormal male (chemotherapy)
 - Estrogen medication and/or ART may be recommended; slight lower levels of estrogen, husband just finished chemotherapy treatment
 - 16b: pregnancy
 - 16c: larger than normal fetal development

- **Case 4: Karen & Kevin Klaus**
 - 16a: abnormal female (PID, endometriosis), abnormal male (low hormone production, low sperm count, varicocele)
 - Recommend surgery for both and IVF
 - 16b: pregnancy
 - 16c: normal fetal development

Activity 16a

- Students are not expected to know the treatment for the reproductive issues, and therefore it will require internet research on the diagnosis and treatment.

Lab 16b

- This is a simulated ELISA using Tween 20 and bromophenol blue for the reaction. Bromophenol blue turns yellow/green in the presence of Tween 20 indicating a positive test.
- All of the patient samples, wash solution, and antibody solutions are simply tap water.
- Pre-lab set-up of microtiter plates should be completed the day before the lab, but can be done all the way up to the start of the lab.

• LAB SET-UP

- Use a Sharpie to label one end of the microtiter strip 1 and the other end 8.
- Using a toothpick, coat the inside and bottom of wells 1, 3, 4, 5, and 8 with the Tween 20 solution. The well needs to be well covered!
- Tween 20 will react with the “substrate” bromophenol blue and is viscous enough that it will not wash off throughout the lab.
- Using a toothpick, coat the inside and bottom of wells 2, 6, and 7 with the liquid soap.
- Wrap each microtiter strip with Cling Wrap and store at room temperature until the lab.



* Prepare these wells with Tween20®

Resources and References

- APA. 2007. Fetal Growth Restriction; Intrauterine Growth Restriction (IUGR); Small for Gestational Age. American Pregnancy Association, www.americanpregnancy.org.
- Cure BioScience Explorations. 2010. Simulated ELISA v.3, A Twist of Lyme v.3. Connecticut's BioBus, Connecticut United for Research Excellence Inc., www.ctbiobus.org.
- Lequin, R. 2005. Enzyme immunoassay/enzyme-linked immunosorbent assay (ELISA). Clin Chem, 51(12): 2415–8.
- Lobo, I. and Zhaurova, K. 2008. Birth defects: causes and statistics. Nature Education 1(1).
- MedLinePlus. 2007. HIV ELISA/western blot. U.S. National Library of Medicine. www.nlm.nih.gov/bsd/pmresources.html.
- Plas E, Berger P, Hermann M, Pflüger H. 2000. “Effects of aging on fertility?” Exp. Gerontol. 35 (5): 543–51.
- Robin, S. 2010. Abnormal Growth of the Fetus. www.livestrong.com.
- WebMD. 2011. Infertility & Reproduction Health Center. WebMD Medical Reference, www.webmd.com.
- Heather Peterson, HASPI Curriculum Coordinator. www.haspi.org
- Edited by Janet Hoff-Kneier, HASPI Program Manager. www.haspi.org

Images (in order of appearance)

- <http://howtogetpregnantfast.us/wp-content/uploads/2012/07/fertility.jpg>
- http://upload.wikimedia.org/wikipedia/commons/7/79/Infertility_causes.png

- <http://www.cartage.org.lb/en/themes/sciences/lifescience/generalbiology/physiology/LymphaticSystem/Antibodymediated/antigenAB.gif>
- http://1.imimg.com/data/X/9/MY-771525/genlisa-elisa-test-kits_10895838_250x250.jpg
- http://4.bp.blogspot.com/_hRBLfRV9pJU/Sa6dXk6BzoI/AAAAAAAAAAc/MP-46LI2hck/s400/hs4.gif
- http://www.elisa-antibody.com/uploads/Clean_Lilaic/ELISA-Home%20Pregnancy%20Test.jpg
- <http://www.chw.org/display/displayFile.asp?filename=/Groups/PediatricHealthInformation/PregnancyAndChildbirth/develop.gif>
- <http://blogs.discovermagazine.com/80beats/files/2009/10/fetus-ultrasound1.jpg>
- <http://www.biomedicalimaging.org/2012/images/5.jpg>
- <http://ars.els-cdn.com/content/image/1-s2.0-S0140673611603644-gr2.jpg>