Fertility

HASPI Medical Anatomy & Physiology 16a

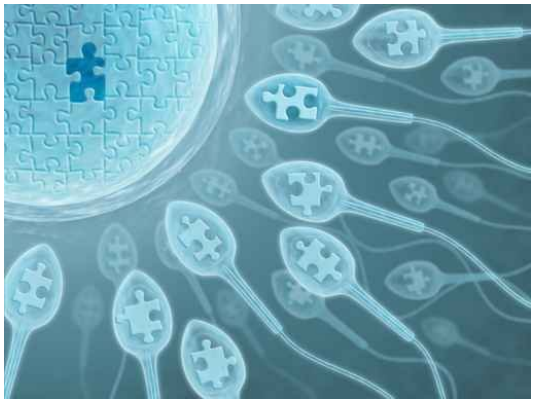
Lab Activity

Name(s): _____

Period: _____ Date: _____

Background

Fertility



http://howtogetpregnantfast.us/wp-content/uploads/2012/07/fertility.jpg

Fertility is the ability of a couple to conceive or produce children. The ability of a couple to be fertile, and therefore produce children, is based on many factors. The female menstrual cycle is approximately 28 days in length and an egg is only released once a month at approximately 14 days during ovulation. A "fertile window" of 2 days before and after ovulation is the optimal time for conception. In addition, men are capable of producing sperm at any time, but sperm count and motion are highest during certain periods that differ between individuals. Hormones are largely responsible for controlling these cycles, and imbalances in reproductive hormones may lead to infertility.

Hormonal influence is the largest factor that can affect a couple's fertility, but there are many other factors that can contribute. Increasing age can reduce fertility, especially for women. Certain drugs or chemicals can influence sperm production in men, and hormone levels in both men and women. In addition, weight, stress, lifestyle choices, trauma to reproductive organs, and a variety of reproductive disorders can also affect a couples' ability to conceive.

Specific Causes of Infertility

Infertility is the inability of an individual to procreate. It may be in reference to a female not being able to conceive or carry a pregnancy to term, or a male who is unable to fertilize an egg. A couple is considered to be experiencing infertility issues if the woman has not been able to conceive through contraceptive-free intercourse for 12 months or more. It is estimated that 12-28% of couples have issues with infertility in the U.S. Many of these couples will be able to pinpoint a specific cause for their infertility, but on average 20% of these cases have no explanation.

Fertility issues can arise at several points in the fertilization process. It could be in the production of sperm or eggs, release of sperm or egg, travel of the sperm through the uterus and fallopian tube, inability of the sperm to reach the egg, failure of fertilization when the sperm reaches the egg, transport of the zygote to the uterus, or failed implantation of the zygote in the uterus.

Causes of Infertility

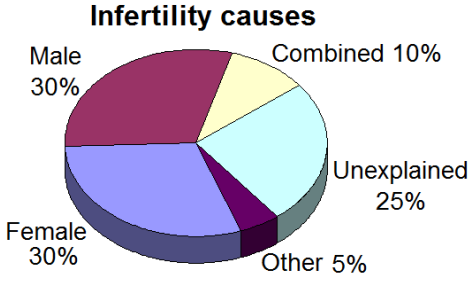
Male Infertility	Female Infertility	Infertility Factors Affecting Both
• Hypogonadism • Varicoceles • Trauma to the testes or penis • Obesity • Drugs & alcohol • Strenuous exercise (heat) • Chemotherapy or radiation • Smoking • Age – fertility declines after age 50 • Defect causing sperm to not penetrate the egg	• Lack of ovulation • Endometriosis • Fallopian tube damage • Pelvic inflammatory disease • STDs • Weight (over & under) • Age – fertility declines rapidly after age 35 • Trauma to the reproductive organs	• Genetic abnormalities • Environmental exposure to toxins (pesticides, smoking, etc.) • Past or present illness • Diabetes • Adrenal diseases • Thyroid disorders • Hypothalamic-pituitary issues

Diagnosis and Treatment

Many infertility issues are treatable, but treatments are expensive and health insurance does not always cover the expenses. The first step in diagnosing infertility is to identify the cause. This starts with a physical examination and review of medical history. Based on the physical exam and history, the physician will normally order tests to determine if any structural or hormonal issues are the cause. A pelvic ultrasound is commonly ordered to view the reproductive organs for women. A semen analysis is commonly requested for the men. In addition, a blood sample is taken from both members of the couple to determine whether hormone levels are normal.

Depending on the cause, the following is a list of options for fertility treatments commonly used to assist a couple in conception and pregnancy:

- Fertility drugs to increase ovulation
- Hormone injections
- Insemination
- Tubal surgery to open up fallopian tubes
- Laproscopic surgery to remove endometriosis
- Surgery to remove testicular varicoceles
- Assisted reproductive technology (ART)



http://upload.wikimedia.org/wikipedia/commons/7/79/Infertility_causes.png

Plas E, Berger P, Hermann M, Pflüger H. 2000. "Effects of aging on fertility?" *Exp. Gerontol.* **35** (5): 543–51.

WebMD. 2011. Infertility & Reproduction Health Center. WebMD Medical Reference, www.webmd.com.

Procedure

You are a fertility specialist at HASPI Fertility Center. Four couples have been referred to you. Read each couple's case scenario and test results. Compare the test results to the normal values in Tables 1 and 2. Each scenario and/or the test results contain information that will allow you to pinpoint why the couple may be experiencing fertility problems. The problem may be only male, only female, both, or neither. Complete the case plan for each couple to diagnose and develop a treatment plan. You may need to do some internet research to get a better idea of what is going on with each couple.

Table 1. Normal Hormone Levels

Hormone	Female Hormone Levels	Male Hormone Levels
Progesterone	2-25 ng/ml	< 1.0 ng/ml
Luteinizing hormone	5 – 25 IU/L	2 – 4 IU/L
Prolactin	2 – 29 ng/ml	2 – 18 ng/ml
Testosterone	15 – 70 ng/dl	300 – 1000 ng/dl
Estradiol	15 – 350 pg/ml	10 – 40 pg/ml
Follicle stimulating hormone	4.7 – 21.4 mIU/ml	1.5 – 12.5 mIU/ml

Table 2. Normal Semen Analysis

Total Volume	2.0 ml
Sperm Concentration	20 million/ml
Motility	50% +
Forward Progression (0-4)	3 or 4
Normal Morphology	30% +
Total Sperm Count	40 million +
Total Motile Sperm	20 million +
Total Functional Sperm	6 million +

A Note on the Measurement Units

Hormones are measured by the amount of that hormone found in the blood. Therefore the units for hormone amount are written in grams per liter, or g/L. Since the quantities are very small, smaller weight measurements are often used, for example mg/ml. A few of the measurements used include:

1 liter(L) = 10 deciliters(dl) = 1,000 milliliters(ml)

1 gram(g) = 1,000 milligrams(mg) = 1 billion nanograms(ng) = 1 trillion picograms(pg)

1 International unit(IU) = 1,000 milli-international units(mIU)

**IU and mIU are only used in medicine and are standard medical measurements of that hormone*

Case 1 – Jenny & Jason Johnson

Jenny Johnson is 26 years old and Jason Johnson is 29 years old. The couple has been trying to conceive for a year with no success. Jenny and Jason already have one healthy child that is now 4 years old. Jason was recently diagnosed with Celiac's disease.

Hormone Levels

Hormone	Jenny Hormone Levels	Jason Hormone Levels
Progesterone	15.5 ng/ml	0.8 ng/ml
Luteinizing hormone	19.0 IU/L	1.1 IU/L
Prolactin	5.1 ng/ml	11.0 ng/ml
Testosterone	42.2 ng/dl	2800 ng/dl
Estradiol	247.8 pg/ml	31.9 pg/ml
Follicle stimulating hormone	13.9 mIU/ml	12.0 mIU/ml

Jason Semen Analysis

Total Volume	1.3 ml
Sperm Concentration	5.2 million/ml
Motility	29%
Forward Progression (0-4)	1
Normal Morphology	12%
Total Sperm Count	10.7 million
Total Motile Sperm	1.3 million
Total Functional Sperm	700,000

Case Plan

List any issues in the case background that could impact the couple's fertility. Research these issues and explain if/how/why they impact fertility.

List any abnormal test results. Research these abnormal results to determine how/why they impact fertility.

After researching the background and abnormal test results, what could be causing infertility for this couple? What is your treatment plan for this couple (you may need to research treatment options)?

Case 2 – Tina & Thomas Tinkerson

Tina Tinkerson is 33 years old and Thomas Tinkerson is 29 years old. The couple has been trying to conceive for three years. Tina has had two miscarriages within that 3-year period. Tina has tried acupuncture and natural fertility supplements for the past year. She recently had a pelvic ultrasound that showed enlarged ovaries and several cysts on each ovary. Thomas noted past anabolic steroid use in his background information.

Hormone Levels

Hormone	Tina Hormone Levels	Thomas Hormone Levels
Progesterone	5.0 ng/ml	0.5 ng/ml
Luteinizing hormone	42.6 IU/L	2.2 IU/L
Prolactin	2.1 ng/ml	17.2 ng/ml
Testosterone	246.8 ng/dl	840.1 ng/dl
Estradiol	352.0 pg/ml	15.7 pg/ml
Follicle stimulating hormone	20.9 mIU/ml	3.6 mIU/ml

Thomas Semen Analysis

Total Volume	2.6 ml
Sperm Concentration	21 million/ml
Motility	51%
Forward Progression (0-4)	3
Normal Morphology	41%
Total Sperm Count	39.8 million
Total Motile Sperm	22.6 million
Total Functional Sperm	6.7 million

Case Plan

List any issues in the case background that could impact the couple's fertility. Research these issues and explain if/how/why they impact fertility.

List any abnormal test results. Research these abnormal results to determine how/why they impact fertility.

After researching the background and abnormal test results, what could be causing infertility for this couple? What is your treatment plan for this couple (you may need to research treatment options)?

Case 3 – Anna & Arnold Ashton

Anna Ashton is 41 years old and Arnold Ashton is 49 years old. Neither Anna nor Arnold have attempted to conceive in the past. They have been referred to your clinic due to their age, and Arnold completed chemotherapy treatments within the last month for lung cancer. Arnold has been given a clean bill of health and is now cancer-free. Arnold noted in his background information that he was a smoker for 26 years and has only quit within the last year.

Hormone Levels

Hormone	Anna Hormone Levels	Arnold Hormone Levels
Progesterone	2.2 ng/ml	0.6 ng/ml
Luteinizing hormone	5.1 IU/L	3.3 IU/L
Prolactin	2.1 ng/ml	17.0 ng/ml
Testosterone	28.2 ng/dl	560 ng/dl
Estradiol	14.1 pg/ml	12.5 pg/ml
Follicle stimulating hormone	4.7 mIU/ml	3.7 mIU/ml

Arnold Semen Analysis

Total Volume	0.9 ml
Sperm Concentration	8 million/ml
Motility	65%
Forward Progression (0-4)	4
Normal Morphology	68%
Total Sperm Count	16 million
Total Motile Sperm	13 million
Total Functional Sperm	5 million

Case Plan

List any issues in the case background that could impact the couple's fertility. Research these issues and explain if/how/why they impact fertility.

List any abnormal test results. Research these abnormal results to determine how/why they impact fertility.

After researching the background and abnormal test results, what could be causing infertility for this couple? What is your treatment plan for this couple (you may need to research treatment options)?

Case 4 – Karen & Kevin Klaus

Karen Klaus is 38 years old and Kevin Klaus is 38 years old. They have only been trying to conceive for the past 6 months, but because of Karen's age they are seeking fertility assistance now. Kevin Klaus has two children from a previous marriage. Karen has had one ectopic pregnancy that required surgical removal 2 years ago. During surgery the presence of endometrial tissue on the ovaries and outer surface of the uterus was noted. She has recently begun to experience some pelvic pain and heavy menstruation. Kevin recently saw a physician for erectile dysfunction and the physician noted the presence of varicoceles on his testicles during his last physical examination.

Hormone Levels

Hormone	Karen Hormone Levels	Kevin Hormone Levels
Progesterone	19.8 ng/ml	3.6 ng/ml
Luteinizing hormone	24.2 IU/L	3.1 IU/L
Prolactin	17.9 ng/ml	12.8 ng/ml
Testosterone	34.1 ng/dl	246 ng/dl
Estradiol	1350.7 pg/ml	56.6 pg/ml
Follicle stimulating hormone	21.3 mIU/ml	13.1 mIU/ml

Kevin Semen Analysis

Total Volume	0.2 ml
Sperm Concentration	1.0 million/ml
Motility	76%
Forward Progression (0-4)	3
Normal Morphology	54%
Total Sperm Count	2.6 million
Total Motile Sperm	1.8 million
Total Functional Sperm	650,000

Case Plan

List any issues in the case background that could impact the couple's fertility. Research these issues and explain if/how/why they impact fertility.

List any abnormal test results. Research these abnormal results to determine how/why they impact fertility.

After researching the background and abnormal test results, what could be causing infertility for this couple? What is your treatment plan for this couple (you may need to research treatment options)?