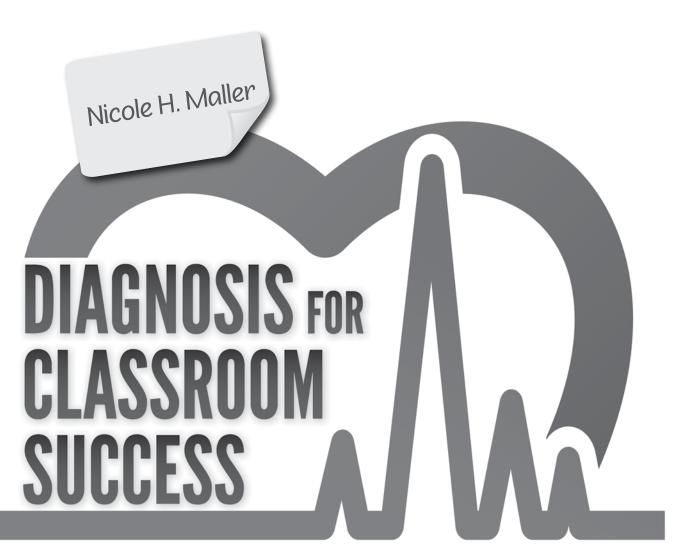


Making Anatomy

○ Physiology Come Alive







Making Anatomy • Physiology Come Alive





Arlington, Virginia



Claire Reinburg, Director Jennifer Horak, Managing Editor Andrew Cooke, Senior Editor Wendy Rubin, Associate Editor Amy America, Book Acquisitions Coordinator

ART AND DESIGN

Will Thomas Jr., Director Joe Butera, Senior Graphic Designer, cover and interior design Images courtesy of ThinkStock.

PRINTING AND PRODUCTION

Catherine Lorrain, Director

NATIONAL SCIENCE TEACHERS ASSOCIATION

David L. Evans, Executive Director
David Beacom, Publisher
1840 Wilson Blvd., Arlington, VA 22201
www.nsta.org/store
For customer service inquiries, please call 800-277-5300.

Copyright © 2013 by the National Science Teachers Association. All rights reserved. Printed in the United States of America.

16 15 14 13 4 3 2 1

NSTA is committed to publishing material that promotes the best in inquiry-based science education. However, conditions of actual use may vary, and the safety procedures and practices described in this book are intended to serve only as a guide. Additional precautionary measures may be required. NSTA and the authors do not warrant or represent that the procedures and practices in this book meet any safety code or standard of federal, state, or local regulations. NSTA and the authors disclaim any liability for personal injury or damage to property arising out of or relating to the use of this book, including any of the recommendations, instructions, or materials contained therein.

PERMISSIONS

Book purchasers may photocopy, print, or e-mail up to five copies of an NSTA book chapter for personal use only; this does not include display or promotional use. Elementary, middle, and high school teachers may reproduce forms, sample documents, and single NSTA book chapters needed for classroom or noncommercial, professional-development use only. E-book buyers may download files to multiple personal devices but are prohibited from posting the files to third-party servers or websites, or from passing files to non-buyers. For additional permission to photocopy or use material electronically from this NSTA Press book, please contact the Copyright Clearance Center (CCC) (www. copyright.com; 978-750-8400). Please access www.nsta.org/permissions for further information about NSTA's rights and permissions policies.

Library of Congress Cataloging-in-Publication Data

Maller, Nicole H.

Diagnosis for classroom success: making anatomy and physiology come alive/by Nicole H. Maller.—Student edition.

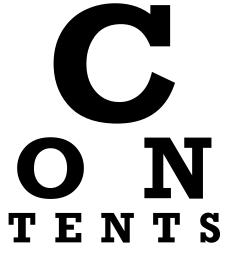
pages cm Includes index.

ISBN 978-1-936959-50-1

1. Diagnosis—Study and teaching. 2. Human anatomy—Study and teaching. 3. Human physiology—Study and teaching. 4. Diagnosis. I. Title.

RC71.3.M273 2013b 612.0076—dc23

2013009444



About the A	Author	vii
Acknowledg	gments	ix
Chapter 1:	Earning Your White Coats: Medical School Research	1
Chapter 2:	What's Wrong With Me, Doc? Analyzing Medical Records	11
Chapter 3:	Let's Diagnose Them, Lab 1 Urinalysis	25
Chapter 4:	Let's Diagnose Them, Lab 2 Digestive By-Products and Body Mass Index Analysis	33
Chapter 5:	Let's Diagnose Them, Lab 3 Blood Smears	43
Chapter 6:	Let's Diagnose Them, Lab 4 HIV Test	49
Chapter 7:	Let's Diagnose Them, Lab 5 Lung Capacity	57
Chapter 8:	Let's Diagnose Them, Lab 6 Hormone Test	65
Chapter 9:	Emergency! Lab 7 Performing Surgery	71
Chapter 10:	: The Ominous Phone Call	79
Chapter 11:	: Evaluating the Docs	81
Index		93



About the Author

New York University in 2006 and an M.A. in Science Education from New York University in 2010. Her career in education began in Williamsburg, Brooklyn at The Green School: An Academy for Environmental Careers. A year later, she relocated to Manhattan and worked at Vanguard High School, where she continues to teach Living Environment to tenth graders and a Biopsychology course she developed specifically for 11th and 12th graders. During her summers, Nicole teaches Introductory Chemistry and Introductory Forensics at Columbia University's six-week, Upward Bound program to first-generation college-bound students. She also tutors middle school and high school students in Manhattan.



Acknowledgments

Vanguard High School

for providing teachers the freedom to teach students the best way they know how

Catherine Bell

for helping me make this vision come to life in the classroom

NYU Professors

Dr. Pamela Fraser-Abder, Catherine Milne, Jason Blonstein, and Bob Wallace for your guidance and professional insight

Tal Savariego

for your continuous support and editing skills

Jaimie Glick, M.D.

for evaluating my 'Docs' at round tables

Adam Handler, M.D.

for providing feedback and editing for medical accuracy

Family and Friends

for listening to and believing in my ideas



Chapter 1 Earning Your White Coats

Medical School Research

Task Overview

To successfully complete the Anatomy and Physiology unit, you and your classmates will be required to:

- 1. Attend and graduate medical school: In order to graduate medical school, all students must complete the research portion of this project. All medical school students will be required to investigate, as thoroughly as possible, the causes of, symptoms of, and potential treatments for four health conditions. Since there will be limited time to complete this task, working efficiently as a group will be critical. Once the research portion is approved, permission to graduate will be granted by the medical school president (your teacher).
- 2. *Sign the Hippocratic oath*: Graduating medical students will be required to read and sign the Hippocratic oath before accepting and treating patients, ensuring all soon-to-be doctors understand the role of ethics in medicine.
- 3. *Meet your patients*: Based on both the knowledge obtained from medical school and the medical records provided by the four patients, doctors (you the students) will develop an initial hypothesis.
- 4. Run diagnostic tests on patients: Doctors will conduct six labs to help diagnose the four patients. Lab 7 will not assist in the diagnosis of *your* four primary patients.
 - Lab 1: Urinalysis
 - Lab 2: Digestive By-Product and BMI Analysis
 - Lab 3: Blood Smears
 - Lab 4: HIV Test
 - Lab 5: Lung Capacity

- Lab 6: Hormone Test
- Lab 7: Performing Surgery
- 5. Diagnose patients and develop a prognosis: Once the group reaches a consensus regarding each patient's appropriate diagnosis, the medical chart must be completed so that (a) all patients can thoroughly understand their prognosis and (b) a prescribed treatment can be filled by a pharmacist.
- 6. Develop a written, visual, and/or oral report: All doctors will be evaluated on their ability to collect and analyze evidence, their ability to make connections between the biology content and the various laboratories used to diagnose patients, and on their understanding of the topics discussed.
- 7. Receive feedback from your evaluators. Evaluators will determine whether or not a doctor may continue practicing medicine (and has therefore passed) or if a doctor is at risk of losing his or her license (and is therefore not familiar enough with the content).

Welcome to Medical School!

Greetings! Your professor has assigned you and a team of medical students to conduct research on the following four health conditions: sickle cell anemia, the human immunodeficiency virus (HIV), pregnancy, and diabetes. Within your team's research, be sure to include the causes of, symptoms of, and treatments of (if any exist) the aforementioned conditions. Your professor (classroom teacher) will determine the time allotted to complete this task. Remember, medical school requires dedication, hard work, and great attention to detail. Stay focused and good luck!

Study Group at the Library

You and your team have headed straight to the medical school library. As a group, you decide it is best to split up research tasks and share your findings afterward. Before starting, each group member selects one of the four health conditions to study. Everyone in the group promises to complete the table (Tables 1.1, 1.2, 1.3, and 1.4) that corresponds with the assigned condition. When everyone has finished, be sure to communicate your findings to others so that they, too, learn about the condition.

Study Group Assignments (Student Name)

- will study sickle cell anemia and complete Table 1.1.
 will study human immunodeficiency virus and complete Table 1.2.
 will study pregnancy and complete Table 1.3.
- 4. _____ will study diabetes and complete Table 1.4.

TABLE 1.1. INFORMATION COLLECTED ON SICKLE CELL ANEMIA

Sic	kle Cell Anemia	
Cat 1.	uses How does one get sickle cell anemia?	
2.	How does one get the sickle cell trait?	
Svi	nptoms	
1.	What are the symptoms of sickle cell anemia?	
2.	What cells are affected by sickle cell?	
3.	What shape do these cells turn into?	
4.	What protein is mutated on these cells? Explain how this is related to symptoms of sickle cell anemia.	
Tre	atment/cures	
1.	What cures exist?	
2.	What treatments exist?	

TABLE 1.2. INFORMATION COLLECTED ON HUMAN IMMUNODEFICIENCY VIRUS (HIV)

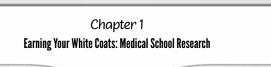
Human Immunodeficiency Virus (HIV)									
Causes 1. How is HIV contracted?									
Is HIV caused by a virus or bacteria?									
What type of cell does HIV attack in the immune system?									
Symptoms 1. List the symptoms at different stages of an HIV infection.	(a) Directly after infection:								
	(b) 3–6 months after infection:								
	(c) Years after the infection:								
Treatment/cures 1. What cures exist?									
What treatments exist?									

TABLE 1.3. INFORMATION COLLECTED ON PREGNANCY

Pre	gnancy	
Cau 1.	ises What is fertilization?	
2.	How does fertilization take place?	
3.	Where in the female does the egg get fertilized?	
4.	Where does the female egg travel upon fertilization?	
Syr 1.	nptoms What are the symptoms of pregnancy?	(a) What hormone is released by the placenta and detected by a pregnancy test?
		What are the symptoms of the
		(b) first trimester?
		(c) second trimester?
		(d) third trimester?
Tre : 1.	atment/cures What methods of birth control exist? Describe them.	
2.	What preventative health measures are recommended for an expecting mother?	

TABLE 1.4. INFORMATION COLLECTED ON DIABETES

Dia	abetes
Ca 1.	uses What is diabetes?
2.	What organ does not function properly in a diabetic?
•	
3.	What is insulin?
4.	
	type 1 diabetes?
_	U
5.	How might someone develop type 2 diabetes?
Sy ı 1.	mptoms What symptoms will a diabetic experience?
	diabetic experience:
Tre 1.	atment/cures How does a person manage
	type 1 diabetes?
2.	How does a person manage type 2 diabetes?



Medical School President's Signature of Approval:

Graduation

Congratulations! You may *officially* graduate medical school! As a graduating medical school class, you must read and sign the modernized version of the Hippocratic oath. According to the Public Broadcasting Station's website, the Hippocratic oath originated in fifth century BC as a means of protecting patients with a code of ethics to be followed by health care professionals and physicians. Due to the outdated nature of the original Hippocratic oath, with its references to gods, goddesses, and slavery, it was revised in 1964.

As you read the modernized version of the Hippocratic oath aloud, annotate the text. Place a question mark next to sentences that puzzle you, a "W" next to sentences that worry or concern you, and an "E" next to sentences that excite or seem beneficial to you.

The Hippocratic Oath (The Modern Version)

I swear to fulfill, to the best of my ability and judgment, this covenant:

I will respect the hard-won scientific gains of those physicians in whose steps I walk, and gladly share such knowledge as is mine with those who are to follow.

I will apply, for the benefit of the sick, all measures [that] are required, avoiding those twin traps of over treatment and therapeutic nihilism.

I will remember that there is art to medicine as well as science, and that warmth, sympathy, and understanding may outweigh the surgeon's knife or the chemist's drug.

I will not be ashamed to say "I know not," nor will I fail to call in my colleagues when the skills of another are needed for a patient's recovery.

I will respect the privacy of my patients, for their problems are not disclosed to me that the world may know. Most especially must I tread with care in matters of life and death.

If it is given me to save a life, all thanks. But it may also be within my power to take a life; this awesome responsibility must be faced with great humbleness and awareness of my own frailty. Above all, I must not play at God.

I will remember that I do not treat a fever chart, a cancerous growth, but a sick human being, whose illness may affect the person's family and economic stability. My responsibility includes these related problems, if I am to care adequately for the sick.

I will prevent disease whenever I can, for prevention is preferable to cure.

I will remember that I remain a member of society, with special obligations to all my fellow human beings, those sound of mind and body as well as the infirm.

If I do not violate this oath, may I enjoy life and art, respected while I live and remembered with affection thereafter. May I always act so as to preserve the finest traditions of my calling and may I long experience the joy of healing those who seek my help.

medical schools today.			
Your Signature:			

-Written in 1964 by Louis Lasagna, Academic Dean of the School of Medicine at Tufts University, and used in many

TABLE 1.5. HIPPOCRATIC OATH DISCUSSION QUESTIONS

As you read through the Hippocratic oath, which state	ments or terms puzzled you?
What concerns you about the Hippocratic oath? (Cons)	What seems promising about the Hipocratic oath? (Pros)
What is your stance on the Hippocratic oath?	
What suggestions might you recommend if the Hippoc	eratic oath were revised again?

Chapter 2 What's Wrong With Me, Doc?

Analyzing Medical Records

Task Overview

Congratulations! After applying to several residency programs, you finally found a job at Vanguard Hospital. Vanguard Hospital requires that you collaborate with your colleagues when treating patients. Your first day at work is extremely busy! Four celebrity patients have been rushed into your hospital with very alarming symptoms. Using your knowledge from medical school regarding the risk factors and symptoms of sickle cell anemia, HIV, pregnancy, and diabetes, hypothesize the condition afflicting each patient.

Medical Records

On the following eight pages are your four patients' medical records. Included in these records are their symptoms, lifestyle habits, and family medical histories. As a team, analyze these medical records. Remember, these medical records contain confidential information and the Hippocratic oath signed in medical school states that you "will respect the privacy of [your] patients, for their problems are not disclosed to [you, so] that the world may know." Therefore, it remains essential that you discuss your patients' health solely with your team. When your team has developed a hypothesis for each patient, record it on his or her designated medical chart under the section Medical Record. Medical charts for Patients #1, #2, #3 and #4 can be found in Tables 2.1, 2.2, 2.3, and 2.4 (pp. 20–23) respectively. Be sure to cite evidence as to why you believe each patient has the health condition you suggest. These medical charts will play a vital role in your final diagnosis, so be as detailed as possible.

VANGUARD HOSPITAL Medical Record

Medical Record
Patient's Name: <u>Jane Smith</u> Date of Birth: <u>3/18/1954</u> Sex: <u>F</u> Height: <u>5'6''</u> Weight: <u>200 lbs</u>
Why are you here? Had a dizzy spell and fainted. My vision seems blurry.
Current Medications (prescription and non-prescription, vitamins, home remedies, birth control pills, herbs): $\underline{\texttt{None!}}$
Personal Medical History (please indicate whether you have had any of the following medical problems):
Congenital Heart DiseaseDepression/suicide attemptMyocardial Infarction (heart attack)Alcoholism X_Hypertension (high blood pressure)If you ever had a blood transfusionDiabetes (trouble regulating blood sugar)Abnormal pap smear (at gynecologist)High cholesterol (fat in blood)Other problems (specify)
Women's Gynecological History: # of pregnancies 1 # of deliveries 0 # of abortions 1 # of miscarriages 0 Do you have any concerns about your periods? No Do you have any concerns about menopause? No

Family History: Indicate with a check mark which family members have had any of the following:

Condition	M	D	S	В	Other	Condition	M	D	S	В	Other
	o	a	i	r	relative		0	a	i	r	relative
	m	d	S	0			m	d	S	0	
Alcoholism						Hearing problems					
Anemia						Heart Attack		X			
						(coronary artery					
						disease)					
Arthritis (joint						Hypertension (high	X	X			
problems)						blood pressure)					
Asthma						High cholesterol		X			
Bleeding Problems						Kidney disease					
Cancer	X					Migraine headaches					
Depression						Osteoporosis (weak					
_						bones)					
Diabetes, Type 1						Stroke		X			
(childhood onset)											
Diabetes, Type II			X		X	Thyroid disorders	X		X		
(adult onset)						-					
Eczema (itchy skin)						Tuberculosis					
Epilepsy (seizures)						Neural disorders					
Genetic diseases											
Glaucoma (vision											
problem)											

Social History:	
Tobacco use: Quit: Date	Alcohol Use
Never)	Do you drink? yes
Current smoker: packs/day #	
Carrent smoker. packs/day	11 yes, "drinks/wk <u>1</u> / wk
Do you use any recreational drugs? no	
Have you ever used needles? no	
Do you exercise regularly? no	
Do you excluse regularly: 110	
Sexuality:	
Are you sexually active? yes Current sex p	partner(s) is/arc: Male Female
Birth control method: I'm on birth co	\
·	committed relationship, so not always.
	e (STDs)? no If yes, please list:
	ally transmitted disease? Since I'm here, yes.
Are you interested in being screened for a sexua	my transmitted disease: Since i m neie, yes.
Current Symptoms:	
Constitutional	Genitourinary
Fevers/chills/sweats	Nighttime urination
<u>X</u> Unexplained weight loss/gain	leaking urine
X Fatigue Weakness	Unusual vaginal bleeding
X Excessive thirst of urination	Discharge: penis or vagina
Eyes	Sexual function problems
X Change of vision	Musculo-skeletal
Ears/Nose/Throat/Mouth	Muscle/joint pain
Difficult hearing/ringing in ears	Skin
Problems with teeth/gums	Rash or mole change
Allergies	Neurological
Cardiovascular	X Headaches
Chest pain/discomfort	X Dizziness/light-headedness
Leg pain with exercise	<u>X</u> Numbness
Palpitations	Memory loss
Chest (breast)	Loss of coordination
Lump or discharge	Psychiatric
Respiratory	Anxiety/stress
Cough/Wheeze X Difficulty breathing	X Problems with sleep Depression
Gastrointestinal (digestive)	Blood/Lymphatic (immune)
Abdominal pain	Unexplained lumps
Blood in bowl movement	Easy bruising/bleeding
Nausea/vomiting/diarrhea	Other:
Socio-economic:	
Occupation: Actress/Host/Editor	
Education completed: High School	

Marital Status: Not married

Who lives at home with you: My boyfriend

Children: 0

VANGUARD HOSPITAL Medical Record

Patient's Name: Cindy Jones
Date of Birth: 12/8/69 Sex: F Height: 5'2'' Weight: 120 lbs
Why are you here? Been feeling nauseous.
$\frac{\text{Current Medications (prescription and non-prescription, vitamins, home remedies, birth control pills, herbs):}{\text{birth control pills}}$
Personal Medical History (please indicate whether you have had any of the following medical problems):
Congenital Heart Disease Depression/suicide attempt
Myocardial Infarction (heart attack) Alcoholism
Hypertension (high blood pressure)If you ever had a blood transfusion
Diabetes (trouble regulating blood sugar) \overline{X} Abnormal pap smear (at gynecologist)
High cholesterol (fat in blood) Other problems (specify)
Stroke (clogged artery to brain) Cancer
Coagulation (bleeding/clotting) disorder Thyroid problem
Women's Gynecological History:
of pregnancies $\underline{3}$ # of deliveries $\underline{2}$ # of abortions $\underline{1}$ # of miscarriages $\underline{0}$
Do you have any concerns about your periods? Yes
Do you have any concerns about menopause? No

Family History: Indicate with a check mark which family members have had any of the following:

Condition	M	D	S	В	Other	Condition	M	D	S	В	Other
	0	a	i	r	relative		o	a	i	r	relative
	m	d	S	0			m	d	S	0	
Alcoholism						Hearing problems					
Anemia	X			X		Heart Attack					
						(coronary artery					
						disease)					
Arthritis (joint						Hypertension (high					
problems)						blood pressure)					
Asthma						High cholesterol					
Bleeding Problems						Kidney disease					
Cancer	X					Migraine headaches	X			X	
Depression		X		X		Osteoporosis (weak					
						bones)					
Diabetes, Type 1						Stroke					
(childhood onset)											
Diabetes, Type II						Thyroid disorders					
(adult onset)											
Eczema (itchy skin)						Tuberculosis					
Epilepsy (seizures)						Neural disorders					
Genetic diseases											
Glaucoma (vision											
problem)											

Social History:

Tobacco use: Quit: Date 2 years a Never Current smoker: packs/day _	Do you drink? yes
Do you use any recreational drugs? <u>no</u> Have you ever used needles? <u>no</u> Do you exercise regularly? yes	
Sexuality: Are you sexually active? yes Curren Birth control method: I'm on birt Do you practice safe sex? Since I'n	n on the pill, I don't always use condoms. disease (STDs)? yes If yes, please list: H.P.V.
Current Symptoms: Constitutional Fevers/chills/sweats X Unexplained weight lost/gain X Fatigue Weakness X Excessive thirst or urination Eyes Change of vision Ears/Nose/Throat/Mouth Difficult hearing/ringing in ears Problems with teeth/gums Allergies Cardiovascular Chest pain/discomfort Leg pain with exercise Palpitations Chest (breast) Lump or discharge Respiratory Cough/Wheeze X Difficulty breathing Gastrointestinal (digestive) Abdominal pain Blood in bowl movement Nausea/vomiting/diarrhea	Seminary Nighttime urination Leaking urine Unusual vaginal bleeding Discharge: penis or vagina Sexual function problems Muscular-skeletal Muscle/joint pain Skin Rash or mole change Neurological X Headaches He
Socio-economic: Occupation: Singer/Actress	

Occupation: Singer/Actress
Education completed: High School

Marital Status: Single

Children: 2

Who lives at home with you: My two kids

VANGUARD HOSPITAL Medical Record

Patient's Name: John Thomas Date of Birth: 3/1/1989 Sex: M F	Height: <u>6′2′′</u> Weigh	t: <u>140 lbs</u>
Why are you here? Strange rash, ch	ills, and fever	
Current Medications (prescription and non-pronone	escription, vitamins, home	remedies, birth control pills, herbs):
Personal Medical History (please indicate whe Congenital Heart Disease Myocardial Infarction (heart attack) Hypertension (high blood pressure) Diabetes (trouble regulating blood sugar) High cholesterol (fat in blood) Stroke (clogged artery to brain)	Depression/suicide attem Alcoholism	ransfusion gynecologist)
Coagulation (bleeding/clotting) disorder Women's Gynecological History:	Thyroid problem	
# of pregnancies # of deliveries Do you have any concerns about your periods? Do you have any concerns about menopause?		# of miscarriages
Family History: Indicate with a check mark whi	ich family members have ha	d any of the following:

Condition	M	D	S	В	Other	Condition	M	D	S	В	Other
	o	a	i	r	relative		o	a	i	r	relative
	m	d	S	0			m	d	S	0	
Alcoholism		X				Hearing problems					
Anemia						Heart Attack (coronary					
						artery disease)					
Arthritis (joint						Hypertension (high blood	X				
problems)						pressure)		X			
Asthma						High cholesterol					
Bleeding Problems						Kidney disease					
Cancer:	X					Migraine headaches	X			X	
Depression		X				Osteoporosis (weak					
						bones)					
Diabetes, Type 1						Stroke					X
(childhood onset)											
Diabetes, Type II						Thyroid disorders					
(adult onset)											
Eczema (itchy skin)						Tuberculosis					
Epilepsy (seizures)						Neural disorders					
Genetic diseases											
Glaucoma (vision		X									
problem)											

Social History:	
Tobacco use: Quit: Date	Alcohol Use:
Never	Do you drink? yes
Current smoker: $\underline{1}$ packs/day # of y	
Do you use any recreational drugs? <u>no</u> Have you ever used needles? <u>no</u> Do you exercise regularly? <u>yes</u>	
Sexuality:	
Are you sexually active? <u>yes</u> Current sex particles Birth control method: <u>condoms</u>	partner(s) is/are: Male (Female)
Do you practice safe sex? sometimes	
	e (STDs)? yes If yes, please list: gonorrhea
Are you interested in being screened for a sexual	lly transmitted disease? <u>yes</u>
Current Symptoms: Constitutional X Fever/chills/sweats X Unexplained weight loss/gain X Fatigue Weakness Excessive thirst or urination Eyes X Change of vision Ears/Nose/Throat/Mouth Difficult hearing/ringing in ears Problems with teeth/gums Allergies Cardiovascular Chest pain/discomfort Leg pain with exercise Palpitations Chest (breast) Lump or discharge Respiratory Cough/Wheeze Difficulty breathing Gastrointestinal (digestive) Abdominal pain Blood in bowl movement X Nausea/vomiting/diarrhea	Genitourinary Nighttime urinationleaking urineUnusual vaginal bleeding XDischarge: penis or vaginaSexual function problems Musculo-skeletalMuscle/joint painSkin XRash or mole change NeurologicalHeadaches XDizziness/light-headednessNumbnessMemory lossLoss of coordination PsychiatricAnxiety/stressProblems with sleepDepression Blood/Lymphatic (immune) XUnexplained lumpsEasy bruising/bleeding Other:
Occupation: Singer/Dancer	
Education completed: High School	
Marital Status: Single	

Who lives at home with you: My mom, sometimes

Children: Don't think so

VANGUARD HOSPITAL Medical Record

Patient's Name: Robert Smith Date of Birth: 10/14/82 Sex: M	Height: <u>5'8''</u> Weight: <u>155 lbs</u>
	ficulty breathing, been weak after
recent concerts	
Current Medications (prescription and non-pane) $\underline{\texttt{none}}$	prescription, vitamins, home remedies, birth control pills, herbs):
Personal Medical History (please indicate wh	ether you have had any of the following medical problems):
Congenital Heart Disease	Depression/suicide attempt
Myocardial Infarction (heart attack)	Alcoholism
Hypertension (high blood pressure)	If you ever had a blood transfusion
Diabetes (trouble regulating blood sugar)	Abnormal pap smear (at gynecologist)
High cholesterol (fat in blood)	Other problems (specify)
Stroke (clogged artery to brain)	Cancer
Coagulation (bleeding/clotting) disorder	Thyroid problem
Women's Gynecological History:	
# of pregnancies # of deliveries	# of abortions # of miscarriages
Do you have any concerns about your periods?	<u> </u>
Do you have any concerns about menopause?	
Family History: Indicate with a check mark w	hich family members have had any of the following:
Condition M D S R Other	Condition M D S R Other

Condition	M	D	S	В	Other	Condition	M	D	S	В	Other
	o	a	i	r	relative		o	a	i	r	relative
	m	d	S	0			m	d	S	0	
Alcoholism						Hearing problems					X
											(grandpa)
Anemia	X			X		Heart Attack (coronary artery disease)					
Arthritis (joint						Hypertension (high blood					
problems)						pressure)					
Asthma						High cholesterol					
Bleeding Problems	X			X	X	Kidney disease					
Cancer:						Migraine headaches					
Depression			X			Osteoporosis (weak bones)					
Diabetes, Type 1						Stroke					
(childhood onset)											
Diabetes, Type II						Thyroid disorders					
(adult onset)											
Eczema (itchy skin)						Tuberculosis					
Epilepsy (seizures)						Neural disorders					
Genetic diseases											
Glaucoma (vision problem)		X									

Social History:

Tobacco use: Quit: Date two months	ago Alcohol Use:
Never	Do you drink? yes
Current smoker: pac	cks/day # of yrs If yes, #drinks/wk 5/wk
Do you use any recreational drugs? Used	to
Have you ever used needles? no	
Do you exercise regularly? <u>yes</u>	
Sexuality:	
Are you sexually active? yes Current s	sex partner(s) is/are: Male (Female)
Birth control method: condoms	
Do you practice safe sex? every so o	ften
	sease (STDs)? yes If yes, please list: Chlamydia
Are you interested in being screened for a se	
Are you interested in being screened for a se	exually transmitted disease? <u>yes</u>
Current Symptoms:	
Constitutional	Genitourinary
Fevers/chills/sweats	Nighttime urination
Unexplained weight loss/gain	Leaking urine
$\overline{\underline{X}}$ Fatigue Weakness	Unusual vaginal bleeding
Excessive thirst or urination	Discharge: penis or vagina
Eyes	Sexual function problems
Change of vision	Musculo-skeletal
Ears/Nose/Throat/Mouth	X_Muscle/joint pain
Difficult hearing/ringing in ears	Skin
Problems with teeth/gums	Rash or mole change
Allergies	Neurological
Cardiovascular	Headaches
X Chest pain/discomfort	Dizziness/light-headedness
X_Leg pain with exercise	Numbness
Palpitations	Memory loss
Chest (breast)	Loss of coordination
Lump or discharge	Psychiatric
Respiratory	Anxiety/stress
Cough/Wheeze	Problems with sleep
X_Difficulty breathing	Depression
Gastrointestinal (digestive)	Blood/Lymphatic (immune)
X Abdominal pain	Unexplained lumps
Blood in bowl movement	Easy bruising/bleeding
Nausea/vomiting/diarrhea	Other: My eyes and skin seem to have a yellowish color
Socio-economic:	10110111011 00101

Who lives at home with you: Self

Occupation: Rapper

Education completed: G.E.D.

Marital Status: Single
Children: ??????

TABLE 2.1. PATIENT #1'S MEDICAL CHART

Dr Patient #1:
Medical Records I think they might be suffering from because
•
Lab 1—Urinalysis □ Normal □ Sugar □ Protein □ Bacteria
Lab 2—Digestive By-Products and BMI Analysis ☐ No issues ☐ Thirst ☐ Vomit ☐ Diarrhea ☐ Constipation ☐ BMI. # is ☐ Healthy ☐ Underweight ☐ Overweight ☐ Obese
Lab 3—Blood Smears □ Normal Red Blood Cells □ Sickle Cell □ # of Red Blood Cells: million/µL/cu mm □ RBC count normal □ RBC too high □ RBC too low □ # of White Blood Cells: /µL/cu mm □ WBC count normal □ WBC too high □ WBC too low
Lab 4—HIV Test □ + test □ - test
Lab 5—Lung Capacity Lung Volume #: cc □ Capacity is normal □ Capacity is too high □ Capacity is too low
Lab 6—Hormone Test ☐ + for hCG o - for hCG ☐ No test necessary ☐ Sugar levels above 200 (low insulin) ☐ Sugar levels between 145 and 200 (borderline) ☐ Sugar levels below 145 (normal insulin)
Diagnosis:
Treatments (research this!): •
•
Prognosis (research this!): •

TABLE 2.2. PATIENT #2'S MEDICAL CHART

Dr	Patient #2:
Medical Records I think they might be suffering from • •	because
Lab 1—Urinalysis ☐ Normal ☐ Sugar ☐ Protein ☐ Bacteria	
Lab 2—By-Products and BMI Analysis ☐ No issues ☐ Thirst ☐ Vomit ☐ Diarrhea ☐ ☐ BMI. # is ☐ Healthy ☐ Underweight	•
Lab 3—Blood Smears □ Normal Red Blood Cells □ Sickle Cell □ # of Red Blood Cells: million/µL/c □ RBC count normal □ RBC too high □ RBC □ # of White Blood Cells: /µL/cu mn □ WBC count normal □ WBC too high □ WBC	too low n
Lab 4—HIV Test □ + test □ - test	
Lab 5—Lung Capacity Lung Volume #: cc □ Capacity is normal □ Capacity is too high □	Capacity is too low
Lab 6—Hormone Test □ + for hCG o – for hCG □ No test necessary □ Sugar levels above 200 (low insulin) □ Sugar □ Sugar levels below 145 (normal insulin)	levels between 145 & 200 (borderline)
Diagnosis:	
Treatments (research this!): Prognosis (research this!):	

TABLE 2.3. PATIENT #3'S MEDICAL CHART

Dr	Patient #3:
Medical Records I think they <i>might</i> be suffering from •	because
•	
Lab 1—Urinalysis ☐ Normal ☐ Sugar ☐ Protein ☐ Bacteria	
Lab 2—Digestive By-Products and BMI Analysis ☐ No issues ☐ Thirst ☐ Vomit ☐ Diarrhea ☐ Co ☐ BMI. # is ☐ Healthy ☐ Underweight ☐ Co	
Lab 3—Blood Smears □ Normal Red Blood Cells □ Sickle Cell □ # of Red Blood Cells: million/µL/cu mr □ RBC count normal □ RBC too high □ RBC too lo □ # of White Blood Cells: /µL/cu mm □ WBC count normal □ WBC too high □ WBC too	WC
Lab 4—HIV Test □ + test □ - test	
Lab 5—Lung Capacity Lung Volume #: cc □ Capacity is normal □ Capacity is too high □ Capacity	pacity is too low
Lab 6—Hormone Test □ + for hCG o − for hCG □ No test necessary □ Sugar levels above 200 (low insulin) □ Sugar level □ Sugar levels below 145 (normal insulin)	s between 145 & 200 (borderline)
Diagnosis:	
Treatments (research this!): Prognosis (research this!):	

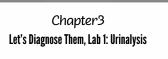
TABLE 2.4. PATIENT #4'S MEDICAL CHART

Dr	Patient #4:
Medical Records I think they <i>might</i> be suffering from • •	because
Lab 1—Urinalysis ☐ Normal ☐ Sugar ☐ Protein ☐ Bacteria	
Lab 2—Digestive By-Products and BMI Analysis ☐ No issues ☐ Thirst ☐ Vomit ☐ Diarrhea ☐ ☐ BMI. # is ☐ Healthy ☐ Underweight ☐	·
Lab 3—Blood Smears □ Normal Red Blood Cells □ Sickle Cell □ # of Red Blood Cells: million/µL/cu □ RBC count normal □ RBC too high □ RBC to □ # of White Blood Cells: /µL/cu mm □ WBC count normal □ WBC too high □ WBC to	o low
Lab 4—HIV Test □ + test □ - test	
Lab 5—Lung Capacity Lung Volume #: cc □ Capacity is normal □ Capacity is too high □ C	Capacity is too low
Lab 6—Hormone Test ☐ + for hCG o – for hCG ☐ No test necessary ☐ Sugar levels above 200 (low insulin) ☐ Sugar let ☐ Sugar levels below 145 (normal insulin)	vels between 145 & 200 (borderline)
Diagnosis:	
Treatments (research this!): Prognosis (research this!):	



Chapter 3 Let's Diagnose Them, Lab 1 Urinalysis

n medical school, you learned about the excretory system and its urinary track. Following proper procedure, you have asked each of your patients to submit urine samples. Nurses have informed you that both patient #1 and patient #2 are experiencing an abnormal increase in urination. Thankfully, a urinalysis can determine the state of one's health by examining physical and chemical properties of urine. Use the next few minutes to review your medical school notes (Table 3.1, p. 26) regarding the interpretation of urinalysis results. Once completed, examine your patients' urine samples.



Lab Roles (Fill in Names of Team Members)

1.	is the task manager (reads procedure and ensures everyone is follow-
	ing proper protocol).
2.	is the materials manager (retrieves and returns materials; cleans materi-
	als and table).
3.	are the doctors (completes lab work, such as adding chemicals, heating
	chemicals, and so on; to be completed by more than one group member).
4.	is the recorder (ensures the group's data is properly recorded).

TABLE 3.1. MEDICAL SCHOOL NOTES REGARDING URINALYSIS RESULTS

Color	If the urine is	What it could indicate is
	Dark yellow	dehydration or fever
	Pale light yellow	patient drank a lot of liquids priordiabetes
	Red with blood	damage to kidneys
Odor	Fruity	the presence of ketones (breakdown of fat), which is a product of diabetes or starvation
	Foul	the presence of bacteria
Transparency	Clear	normal urine samples appear clear/transparent
	Cloudy	 old samples could appear cloudy if bacteria has had time to grow on it fresh samples could appear cloudy if a urinary tract infection (UTI) is present (bacteria in the urethra) fresh samples could appear cloudy if there are blood cells or pus
Sugar	Present	 patient ate a meal rich in carbohydrates prior to visit a period of stress diabetes
Protein	Present	an abnormal condition called protein urea, that results from damage to kidneys

Chapter3 Let's Diagnose Them, Lab 1: Urinalysis

Materials

- 8 test tubes (two labeled Patient #1, two labeled Patient #2, two labeled Patient #3, and two labeled Patient #4)
- 1 test tube rack
- 1 test tube clamp
- 10 ml graduated cylinder
- 1 cup containing 20 ml of Benedict's solution
- 1 cup containing 20 ml of Biuret reagent
- 2 droppers (one for Benedict, one for Biuret)
- 1 hot plate
- 1 250 ml beaker of water
- 1 set of goggles for EACH member of the team
- 6 ml urine samples from all four patients (retrieve from your teacher)

Procedure

Setup

- 1. Label two test tubes Patient #1, two test tubes Patient #2, two test tubes Patient #3, and two test tubes Patient #4.
- 2. Place 6 ml of each patient's urine sample into his or her designated test
- 3. Add 150 ml of water to your 250 ml beaker and preheat it on a hot plate (needed later for the sugar test).

Physical Observations

- 1. Observe and describe the color, odor, and transparency of the four urine samples. Record physical descriptions in Table 3.2.
- 2. Get approval from teacher before advancing to Chemical Observations.

Chapter3
Let's Diagnose Them, Lab 1: Urinalysis

Chemical Observations

- 1. To test for sugar content, add approximately 6 ml of the TURQUOISE BLUE Benedict's solution to *one* test tube of *each* of the four patients' urine samples.
- 2. Place each patient's urine sample with the Benedict's solution into your hot water bath. Let sit for approximately five minutes.
- 3. If the TURQUOISE BLUE turns to ORANGE, as indicated by Data Table 3.3, sugar is present in the urine. Record whether or not sugar is present in Data Table 3.2.
- 4. To test for protein content, add approximately 2 ml of the BRIGHT BLUE biuret reagent into remaining test tubes for each of the urine samples. YOU DO NOT HEAT THESE TEST TUBES.
- 5. If the BRIGHT BLUE turns to a VIOLET PURPLE color, as indicated by Table 3.3, protein is present in the urine. Record whether or not protein is present in Table 3.2.

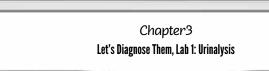
Chapter3 Let's Diagnose Them, Lab 1: Urinalysis

TABLE 3.2. RESULTS OF EACH PATIENT'S URINALYSIS

	Patient #1	Patient #2	Patient #3	Patient #4
Urination Habits			N/A	N/A
Color				
Dark yellow?				
Pale yellow?				
Red with blood?				
Odor				
• Fruity?				
• Foul?				
Normal?				
Transparency				
Cloudy?				
Clear?				
Is sugar present?				
Yes: Turned orange (with heat)				
No:Did <u>not</u> turn orange (with heat)				
Is protein present?				
Yes: Turned purple (with no heat)				
No: Did <u>not</u> turn purple (with no heat)				

TABLE 3.3. MEANING OF NUTRIENT INDICATOR TEST RESULTS

Nutrient	If nutrient is not present, color will remain	If nutrient is present, color will turn
Glucose (sugar)	Turquoise Blue	(with heat) Orange
Protein	Bright Blue	(no heat) Violet Purple

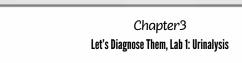


Recall Questions

- 1. What is the role of the excretory system?
- 2. What is the function of the kidneys?
- 3. Why should a patient avoid eating a large meal before a urinalysis?
- 4. Why should a patient provide a fresh sample of urine opposed to a sample that has sat out for several days?

Critical Thinking Question

1. Dialysis is a medical device used to filter a patient's blood, when his or her kidneys can no longer function on their own, effectively. Dialysis is an expensive treatment and can cost as much as \$500 per treatment. Medicare, the United States' medical insurance company for citizens ages 65 and older and for those with certain disabilities or kidney failure, covers most of the costs. However, under federal law, states are required to give emergency medical care to illegal immigrants, some of whom may require dialysis. As a result, taxpayers end up covering the cost. Considering your knowledge of the Hippocratic oath and the excretory system, determine whether you would support or oppose this federal law. Justify your position.



Conclusion

1. Look back at your medical notes in Table 3.1, and your lab results in Table 3.2. What could these results indicate about your patients?

2. Return to your patients' medical charts (Tables 2.1, 2.2, 2.3, and 2.4, pp. 20–23 in Chapter 2) and complete the section labeled "Lab 1—Urinalysis" for each of the four patients. Check off evidence collected from each patient and consider whether or not your original hypothesis is still supported or refuted by evidence.



Chapter 4 Let's Diagnose Them, Lab 2

Digestive By-Products and Body Mass Index Analysis

our patients have already spent one night at Vanguard Hospital and nurses on the nightshift had a very busy evening. The nurses just informed you that Patient #1 complained of excessive thirst, requesting water nearly every hour or so and Patient #2 was vomiting all morning and experiencing constipation. Additionally, Patient #3 experienced chronic episodes of diarrhea. The only patient with no major digestive issues was Patient #4; however, he did complain of abdominal pain. Nurses are concerned that Patients #2 and #3 are losing vital nutrients such as glucose, starch, protein, lipids, vitamins, minerals, and water. It will be essential to replace whatever nutrients are missing with intravenous fluids.

Today your team of doctors will run tests on the digestive by-products of Patient #2 (vomit) and Patient #3 (diarrhea). Since there was no by-product from Patient #1 or #4 you will not be performing any tests for them. However, you will be expected to formulate an even deeper hypothesis about the conditions of Patient #1 and #4 based on their symptoms.

Lab Roles (Fill in Names of Team Members)

1.	is the task manager (reads procedure and ensures everyone is follow-
	ing proper protocol).
2.	is the materials manager (retrieves and returns materials; cleans materi-
	als and table).
3.	are the doctors (completes lab work, such as adding chemicals, heating
	chemicals, and so on; to be completed by more than one group member).
4.	is the recorder (ensures the group's data is properly recorded).

Materials

- 6 test tubes (3 labeled Patient #2 and 3 labeled Patient #3)
- 1 test tube rack
- 1 test tube clamp
- 10 ml graduated cylinder
- 1 cup containing 20 ml of Benedict's solution
- 1 cup containing 20 ml of biuret reagent
- 1 cup containing 20 ml of Lugol's solution (iodine)
- 3 droppers (one for Benedict, one for biuret, one for Lugol's)
- 1 hot plate
- 250 ml beaker of water
- 1 set of goggles (for EACH team member)
- 6 ml samples of digestive by-products from Patients #2 and #3 (retrieve from your teacher)

Procedure

Setup

- 1. Label three test tubes Patient #2 and three test tubes Patient #3.
- 2. Place 6 ml of each patient's by-product into his or her designated test tubes.
- 3. Add 150 ml of water to your 250 ml beaker and preheat it on a hot plate (needed later for the sugar test).

Physical Observations

- 1. Observe and describe the color and texture of the two patients' digestive by-products.
- 2. Record physical observations in Table 4.1.
- 3. Get approval from teacher before advancing to Chemical Observations.

Chemical Observations

- 1. To test for sugar content, add 6 ml of the TURQUOISE BLUE Benedict's solution to one test tube for each of the patient's digestive by-products.
- 2. Place each patient's digestive by-product with the Benedict's solution into your hot water bath. Let sit for approximately five minutes.
- 3. If the TURQUOISE BLUE turns to ORANGE, as indicated by Table 4.2, sugar is present in the digestive by-product. Record whether or not sugar is present in Table 4.1.
- 4. To test for protein content, add approximately 2 ml of the BRIGHT BLUE biuret reagent remaining in the test tubes for each of the patients' digestive by-product samples. YOU DO NOT HEAT THESE TEST TUBES.
- 5. If the BRIGHT BLUE turns to a VIOLET PURPLE color, as indicated by Table 4.2, protein is present in the digestive by-product. Record whether or not protein is present in Table 4.1.
- To test for starch content, add approximately five drops of the AMBER BROWN Lugol's solution into the leftover test tubes for each of the patients' digestive by-product. Mix solution. YOU DO NOT HEAT THESE TEST TUBES.
- If the AMBER BROWN turns to a PURPLE/BLACK color, as indicated by Table 4.2, starch is present in the digestive by-product. Record whether or not starch is present in Table 4.1.

 ${\it Chapter~4} \\ {\it Let's~Diagnose~Them,~Lab~2:~Digestive~By-Products~and~Body~Mass~Index~Analysis} \\$

TABLE 4.1. NUTRITION CONTENT FOUND IN PATIENT #2 AND #3'S DIGESTIVE BY-PRODUCTS

	Patient #1	Patient #2	Patient #3	Patient #4
Physical observations of by-products	Given: thirsty all night no vomit or diarrhea			Given: • abdominal pain • no digestive problems
Glucose • Present or not present?	N/A			N/A
Protein • Present or not Present?	N/A			N/A
Starch • Present or not Present?	N/A			N/A

TABLE 4.2. MEANING OF NUTRIENT INDICATOR RESULTS

Nutrient	If nutrient is not present, color will remain	If nutrient is present, color will turn
Glucose (sugar)	Turquoise Blue	(with heat) Orange
Protein	Bright Blue	(no heat) Violet Purple
Starch	Amber/Brown	(no heat) Purple/Black

Chapter 4
Let's Diagnose Them, Lab 2: Digestive By-Products and Body Mass Index Analysis

FIGURE 4.1. BODY MASS INDEX (BMI) CHART FOR ADULTS

	Q	6		C	ın	ιΩ	6	OI.	_	_	6	φ	φ	_	ഗ	2
	200	39	37	36	35	35	33	32	31	31	29	28	28	27	26	25
	195	38	98	35	34	34	32	32	30	30	28	28	27	27	25	25
	190	37	98	34	33	33	31	31	29	29	28	27	26	26	25	24
	185	36	32	33	32	32	30	30	59	28	27	26	25	25	24	23
	180	35	34	33	32	31	30	29	28	28	26	25	25	25	23	23
	175	34	33	32	31	31	29	29	27	27	25	25	24	24	23	22
	170	33	32	31	30	30	28	78	26	26	25	24	23	23	22	21
	165	32	31	30	29	29	27	27	25	25	24	24	23	23	21	21
	160	31	30	29	28	28	26	26	25	25	23	23	22	22	21	20
lbs)	155	30	59	28	27	27	25	25	24	24	22	22	21	21	20	19
Weight in Pounds (Ibs)	150	59	28	27	56	56	25	24	23	23	22	21	21	21	19	19
Poul	145	28	27	26	25	25	24	23	22	22	21	20	20	20	19	18
ht in	140	27	56	25	24	24	23	22	22	22	20	20	19	19	18	18
Weig	135	56	25	24	24	23	22	21	21	21	20	19	18	18	17	17
	130	25	24	23	23	22	21	21	20	20	19	18	18	17	17	16
	125	24	23	22	22	21	20	20	19	19	18	18	17	17	16	16
	120	23	22	22	21	20	20	19	18	19	17	17	16	16	15	15
	115	22	21	21	20	19	19	8	18	18	17	16	16	15	15	14
	110	21	20	20	19	18	18	17	17	17	16	15	15	14	14	14
	105	20	19	19	18	81	17	17	16	16	15	15	14	14	13	13
	100	19	18	18	17	17	16	16	15	15	14	14	14	13	13	12
		2,	5,1,,	5'2"	5'3"	5'4"	2,2,,	5'6"	2.2	2,8,,	5'9"	5,10,,	5'11"	6,	6,1,,	6,5,,
							("	դ) ի	lgiə	Н						

TABLE 4.3. BMI RANGES

ō	Opese	>30
	Overweight	25–29.9
=	Healthy	19–24.9
	Underweight	<18.9

Nurses also mentioned they are concerned about the weight loss and gain the patients are experiencing. Some appear to have lost a significant amount of weight over a short period of time and some appear to be severely overweight or gaining weight at a rapid rate.

Body Mass Index (BMI)

- 1. Locate your patient's height (in feet and inches) and weight (in pounds) provided on each medical record (pages 12–19 in Chapter 2).
- 2. Using Figure 4.1, determine the BMI number for each of your patients.
- 3. Similarly, determine if your patients are underweight, overweight, obese, or healthy for their height using Table 4.3.
- 4. Record your findings in Table 4.4.

TABLE 4.4. THE BMI VALUE FOR EACH PATIENT

	Patient #1	Patient #2	Patient #3	Patient #4
Height				
Weight				
BMI#				
Are they Healthy? Underweight? Overweight? Obese?				

Recall Questions

- 1. What is the role of the digestive system?
- 2. What is the difference between simple carbohydrates and complex carbohydrates?

3.	What is the glycemic index (GI)?
4.	What foods are considered high on the glycemic index? What foods are considered low?
5.	Why is a high BMI value considered worrisome for doctors?

Critical Thinking Question

- 1. During summer 2012, in an attempt to curb childhood obesity, the U.S. Department of Food and Agriculture mandated schools to offer nutritious meals at breakfast and lunch. Some of the guidelines drafted include:
 - offering vegetables, fruit, whole-grains, meat, meat alternatives, and fat-free unflavored milk daily and at each meal time
 - reducing the sodium content of meals over a 10-year period
 - preparing meals that contain 0 grams of trans fats, and
 - designing meals that target the specific caloric needs of varying age groups

Suppose you were selected to advise the Department of Food and Agriculture; using your knowledge of nutrition and its effects on a person's health, construct a five-day meal plan, for *either* breakfast or lunch, that would be considered acceptable under these new regulations. Be sure to include the nutrition information in the meal plan (amounts of sodium, trans fats, carbohydrates, and fiber; total calories; and so on).

${\it Chapter~4} \\ {\it Let's~Diagnose~Them,~Lab~2:~Digestive~By-Products~and~Body~Mass~Index~Analysis} \\$

Conclusion

1. Look back at your lab results in Table 4.1 and Table 4.4. What could these results indicate about your patients?

2. Return to your patients' medical charts (Tables 2.1, 2.2, 2.3, and 2.4, pp. 20–23 in Chapter 2) and complete the section labeled "Lab 2—Digestive By-Products and BMI Analysis" for each of the four patients. Check off evidence collected from each patient and consider whether or not your original hypothesis is still supported or refuted by evidence.



Chapter 5 Let's Diagnose Them, Lab 3

Blood Smears

ome doctors on your team are beginning to think that some of your patients' symptoms may be caused by either a pathogen or a genetic disorder. A pathogen causes harm or disease in another living organism. Examples include viruses, bacteria, and fungi. Genetic disorders are diseases inherited from one's parents.

Today your team of doctors will analyze the red blood cells (RBCs) of patients under a microscope. Nurses have also provided you with your patients' red blood cell and white blood cell counts. Use your medical school notes (Table 5.1) as a reference for diagnosing your patients.

TABLE 5.1. MEDICAL SCHOOL NOTES REGARDING RED AND WHITE BLOOD CELLS

	Function	Healthy if	Unhealthy if
Red blood cells (RBC)	Uses the protein, hemoglobin, to carry oxygen around the body	Shaped like a donut Female RBC count = 4.2–5.4 million/µL/cu mm Male RBC count = 4.7–6.1 million/µL/cu mm	Shaped like a sickle, indicating a genetic disorder called sickle cell anemia. If <i>lower</i> than normal, could indicate anemia, such as sickle cell anemia. However, anemia is also common during the first six months of pregnancy If <i>higher</i> than normal, could indicate polycythaemia, a disorder of the bone marrow.
White blood cells (WBC)	Help fight infections by (A) Phagocytosis of foreign agents (B) Producing antibodies against foreign agents	WBC count = 4,300– 10,800 cells/μL/cu mm	If lower than normal, could indicate viral infections like HIV, low immunity and bone marrow failure If higher than normal, could indicate infection, systemic illness, inflammation, allergy, leukemia, and tissue injury caused by burns, or pregnancy.

Chapter 5 Let's Diagnose Them, Lab 3: Blood Smears

Lab Roles (Fill in Names of Team Members)

1.	is the task manager (reads procedure and ensures everyone is follow-
	ing proper protocol).
2.	is the materials manager (retrieves and returns materials; cleans materi-
	als and table).
3.	are the doctors (completes lab work, such as adding chemicals, heating chemicals, and so on; to be completed by more than one group member).
4.	is the recorder (ensures the group's data is properly recorded).

Materials

- 1–2 compound light microscopes
- Blood smears from your four patients, provided by your teacher

Procedure

- 1. Start with the microscope stage as far away from the lens as possible.
- 2. Place Patient #1's blood smear on the stage and secure it with the stage clips.
- 3. Place the objective lens to low power $(4\times)$.
- 4. Using the coarse adjustment (big knob), begin to focus the slide.
- 5. Once focused, change the objective lens to medium power $(10\times)$.
- 6. Using the coarse adjustment (big knob), begin to focus the slide.
- 7. Once focused, change the objective lens to high power $(40\times)$.
- 8. Using the fine adjustment (small knob), begin to focus the slide.
- 9. Sketch your observation of red blood cells at the power most easily observable in Table 5.2.
- 10. Repeat steps 1–9 for patients #2, #3, and #4.

Chapter 5 Let's Diagnose Them, Lab 3: Blood Smears

TABLE 5.2. THE BLOOD SMEAR RESULTS FOR EACH PATIENT

	Patient #1	Patient #2	Patient #3	Patient #4
Sketch a detailed picture of what you observe here:				
RBC shape: Normal or sickle?				
# of RBCs million/µL/cu mm Normal, high, or low?	4.4	3.0	5.1	3.2
# of WBCs /µL/cu mm Normal, High, or low?	7,004	11,300	2,029	9,001

Recall Questions

- 1. What is the role of the circulatory system?
- 2. How do arteries differ from veins?
- 3. What problems could arise in the circulatory system from poor nutrition and lack of exercise?
- 4. What is the role of a red blood cell?

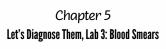
Chapter 5 Let's Diagnose Them, Lab 3: Blood Smears

5. How does sickle cell anemia differ from sickle cell trait?

6. What happens to the hemoglobin protein on a red blood cell if someone has sickle cell anemia?

Critical Thinking Question

1. In early 2012, coaches instructed a Pittsburgh professional football player, with the sickle cell *trait*, to sit out a game in the high-altitude city, of Denver, Colorado. Doctors claimed that the trait, in combination with extreme physical activity and a high altitude, was the primary reason he needed to have his spleen and gallbladder removed after a previous game in the city. However, it has been estimated that at least 90 other NFL players carry the sickle cell trait, and of those who have played in Denver, they have never experienced such issues before. In fact, a study performed by Howard University in 2000, showed no complications in athletes carrying sickle cell trait during the Mexico City Olympics, another high-altitude location. Suppose you were a coach of a high school, college, or professional sports team. Knowing what you know about sickle cell anemia and the trait, how would you handle a situation similar to this one, in which one of your players has sickle cell trait or the disease? Justify your position.



Conclusion

1. Look back at your medical notes in Table 5.1, and your lab results in Table 5.2. What could these results indicate about your patients?

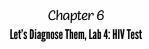
2. Return to your patients' medical charts (Tables 2.1, 2.2, 2.3, and 2.4, pp. 20–23 in Chapter 2) and complete the section labeled "Lab 3—Blood Smears" for each of the four patients. Check off evidence collected from each patient and consider whether or not your original hypothesis is still supported or refuted by evidence.



Chapter 6 Let's Diagnose Them, Lab 4 HIV Test

ased on blood samples recently analyzed, one of your patients, Patient #3, had a very low white blood cell (WBC) count. This is very alarming to you and your team of doctors since it might indicate the patient is suffering from a viral infection. Since all of your patients have requested an STD test on their medical records, you will specifically check for antibodies produced against the Human Immunodeficiency Virus (HIV).

Before you test your patients, it is essential that you discuss the importance of safe sex. As you have already noticed, all patients indicated on their medical records that they are currently sexually active, yet none of them reported the regular use of condoms as a method of protection. In order to emphasize the importance of safe sex, you and the other doctors in the hospital will demonstrate a simulation of how fast an STD can travel within a population of multiple sex partners who are engaging in unsafe sex. Upon completing this "sex-talk"/demonstration, you will then test your patients.



Lab Roles (Fill in Names of Team Members)

1.	is the task manager (reads procedure and ensures everyone is follow-
	ing proper protocol).
2.	is the materials manager (retrieves and returns materials; cleans materi-
	als and table).
3.	are the doctors (completes lab work, such as adding chemicals, heating chemicals, and so on; to be completed by more than one group member).
4.	is the recorder (ensures the group's data is properly recorded).

Materials

Part I

- 4 cups per doctor (one filled with NaOH ("virus") and three with H₂O ("no virus") designated by the teacher
- Phenolphthalein (the "HIV indicator")
- 1 dropper
- Distilled water
- 1 set of goggles

Part II

- 4 test tubes (labeled Patient #1, Patient #2, Patient #3, and Patient #4, respectively)
- 1 cup with phenolphthalein (the "HIV indicator")
- 1 dropper
- Bodily fluid samples from all four patients

Chapter 6 Let's Diagnose Them, Lab 4: HIV Test

Procedure

Part I: Done as a Class

ROUND 1: Multiple Sexual Partners

- 1. Obtain two cups labeled "Control 1" and "Round 1" from your teacher. The fluids inside the two cups are the same, and represent vaginal fluid and/or semen. Everyone in the class will have H_2O ("no virus") in their two cups except for *one* person who will have NaOH ("virus").
- 2. When your teacher says "Go!" find *five* different people to have "unprotected sex" with, represented by the exchange of fluids in your "Round 1" cup. Make sure your Control 1 cup is off to the side and remains uncontaminated.
- 3. Return to your seat after changing fluids with five different people.
- 4. Upon completion, the head doctor (your teacher) will give each of you an HIV test. The head doctor will place 1 drop of phenolphthalein (the "HIV indicator") into your Round 1 cups.
- 5. If fluid in your Round 1 cup remains clear, you did *not* contract HIV. If the fluid turns pink, you did contract HIV. Record your observations in Table 6.1.
- 6. Who initiated the infection? The head doctor will place 1 drop of phenolphthalein (the "HIV indicator") into your Control cup. Record your observations in Table 6.1.
- 7. Dispose of your cups.

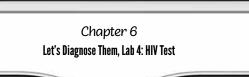


TABLE 6.1. RESULTS FROM MULTIPLE SEX PARTNER DEMONSTRATION

Color of the fluid in my Round 1 cup after HIV test:	
Total number of "doctors" with HIV after exchanging fluids with five different partners:	
The person who initially transmitted the HIV infection to everyone in the room was:	

ROUND 2: Limited Sexual Partners

- 1. Obtain two new cups (labeled "Control 2" and "Round 2") from your teacher. Again, the fluids inside the two cups are the same, and represent vaginal fluid and/or semen. Everyone in the class will have H₂O ("no virus") in their two cups except for *one* person who will have NaOH ("virus").
- 2. When your teacher says "Go!" find *two* different people to have "unprotected sex" with, represented by the exchange of fluids in your Round 2 cups. Make sure your Control 2 cup is off to the side and remains uncontaminated.
- 3. Return to your seat after exchanging fluids with two different people.
- 4. Upon completion, the head doctor (your teacher), will give each doctor an HIV test. The head doctor will place 1 drop of phenolphthalein (the "HIV indicator") into your Round 2 cup.
- 5. If the fluid in your Round 2 cup remains clear, you did *not* contract HIV. If the fluid turns pink, you did contract HIV. Record your observations in Table 6.2.
- 6. Who initiated the infection? The head doctor will place 1 drop of phenolphthalein (the "HIV indicator") into your Control cup. Record your observations in Table 6.2.
- 7. Dispose of your cups.

TABLE 6.2. RESULTS FROM LIMITED SEX PARTNER DEMONSTRATION

Color of the fluid in my Round 2 cup after test:	
Total number of "doctors" with HIV after exchanging fluids with two partners?	
The person who initially transmitted the HIV infection to everyone in the room was:	

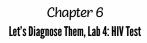
Chapter 6 Let's Diagnose Them, Lab 4: HIV Test

Part II: Done as a Team of Doctors

- 1. Label four test tubes *Patient #1, Patient #2, Patient #3,* and *Patient #4,* respectively.
- 2. Obtain bodily fluids from each patient and place the samples in their designated test tubes.
- 3. Perform the HIV test on each of them by adding 1 drop of phenolphthalein (the "HIV indicator") to their semen or vaginal fluid sample.
- 4. Record the color in Table 6.3 and determine whether or not they have HIV.

TABLE 6.3. RESULTS FROM EACH PATIENT'S HIV TEST

	Patient #1	Patient #2	Patient #3	Patient #4
Color • Clear or Pink?				
HIV status • HIV + or -?				



HU	can questions
1.	What is the role of the immune system?
2.	What is the role of a white blood cell?
3.	At what point does HIV become AIDS?
4.	Why does someone with AIDS become more susceptible to other infections?
5.	What are some ways a person can prevent the spread of HIV to others?
6.	List one difference between a bacterial infection and a viral infection.
7.	Approximately how long after the initial infection will HIV antibodies show up in an HIV test?
8.	What is a vaccine and how does it work?



Critical Thinking Question

1.	At the moment, HIV tests are not included in a routine doctor check-up and must be requested by
	the patient. Should HIV tests become routine and mandated for all sexually active individuals and/
	or individuals 18 and older? Explain your position.

Conclusion

1. Look back at your lab results in Table 6.1 and Table 6.2. What can you conclude about the relationship between the number of sexual partners (without protection) and the risk of receiving a sexually transmitted disease?

- 2. Look back at your lab results in Table 6.3. What do these results indicate about your patients?
- 3. Return to your patients' medical charts (Tables 2.1, 2.2, 2.3, and 2.4. pp. 20–23 in Chapter 2) and complete the section labeled "Lab 4—HIV Test" for each of the four patients. Check off evidence collected from each patient and consider whether or not your original hypothesis is still supported or refuted by evidence.



Chapter 7 Let's Diagnose Them, Lab 5

Lung Capacity

ll four patients have been at Vanguard Hospital for the last two days. Nurses report that all of them are experiencing difficulty breathing. In medical school, you learned the average pair of human lungs can hold about 5 liters or 5,000 cubic centimeters (cc) of air, but only a small amount of this capacity is used during normal breathing (roughly 1,000 cc). Today you will determine the lung capacity of each of your patients. Lung capacity is the maximum amount of air the lungs can hold. Normally, doctors use a spirometer to determine a patient's lung capacity. A spirometer requires the patient to exhale deeply in order to determine if diseases such as asthma, pneumonia, and bronchitis are compromising the patient's respiratory system.

To refresh your memory of lung capacity, let's take a peek at your class notes (Table 7.1) from medical school:

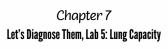
TABLE 7.1. FACTORS THAT MAY INCREASE OR DECREASE LUNG CAPACITY

People With Larger Volumes and Unrestricted Breathing	People With Smaller Volumes and Compromised Breathing
Males	Females
Taller people	Shorter people
Nonsmokers	Smokers
Athletes	Non-athletes
People living at high altitudes	People living at low altitudes
Nonpregnant women	Pregnant women
Healthy weight	Obesity
Normal red blood cells	Sickle cell anemia
Healthy respiratory tracts	Restricted respiratory tracts

Chapter 7 Let's Diagnose Them, Lab 5: Lung Capacity

As can be seen from the medical school notes, a variety of factors may impact one's lung capacity. Women who are pregnant, for instance, often experience smaller lung volumes since the growing baby pushes up on the diaphragm from the uterus. Similarly, individuals with sickle cell anemia struggle with their breathing since the hemoglobin protein on their RBCs are mutated and only carry half the number of oxygen molecules as a normal RBC. Diabetics also exhibit compromised lung volumes due to high blood sugar levels stiffening the lung tissue and fatty tissue in the abdominal area. And as mentioned previously, those with HIV tend to suffer from opportunistic infections such as pneumonia, which causes the lungs to fill up with mucous.

Today you will compare each of your patients' lung capacities (from balloon blowing) to the expected lung capacity of someone with the same height, age, and gender. Under normal circumstances, doctors might ask their patients to exhale into a spirometer.



Lab Roles (Fill in Names of Team Members)

1.	is the task manager (reads procedure and ensures everyone is follow-
	ing proper protocol).
2.	is the materials manager (retrieves and returns materials; cleans materi-
	als and table).
3.	are the doctors (completes lab work, such as adding chemicals, heating chemicals, and so on; to be completed by more than one group member).
4.	is the recorder (ensures the group's data is properly recorded).

Materials

- 4 inflated balloons of different diameters
- 1 wind-up measuring tape
- 1–2 scientific calculators

Procedure

Part I: Patient's Lung Capacity

- 1. Find the circumference for Patient #1's balloon by wrapping your roll-up ruler around the widest portion of the balloon. Measure the length in centimeters. Record this value in Table 7.2.
- 2. Repeat step 1 for Patient #2, Patient #3, and Patient #4.
- 3. Using the formula for circumference, find the radius (r) of the balloon. Plug in the value for C and solve for r. Remember: The value of π is 3.14. Record the value of r in Table 7.2.

Circumference Equation $C = 2\pi r$ $r = C/2\pi$

4. Using the radius you just solved for, determine the diameter of the balloon. Plug in the value for *r* and solve for *d*. Record the value of *d* in Table 7.2.

Diameter Equation d = 2r

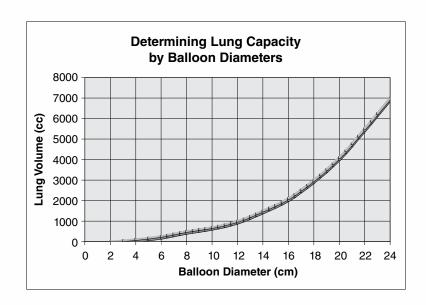
- 5. On the *x*-axis of Figure 7.1, locate the diameter of the balloon in centimeters and follow the number up until it meets the curved line. Then move across, in a straight line, to the vertical *y*-axis. Approximate the lung volume for your patient. Record the lung volume in Table 7.2.
- 6. Repeat steps 3–5 for patients #2, #3 and #4.

Chapter 7 Let's Diagnose Them, Lab 5: Lung Capacity

TABLE 7.2. CALCULATIONS FOR DETERMINING YOUR PATIENTS' LUNG CAPACITIES

	Patient #1	Patient #2	Patient #3	Patient #4
Measure the circumference in centimeters (cm)				
Calculate the radius in centimeters (cm) $r = C/2\pi$				
Calculate the diameter in centimeters (cm) $d = 2r$				
Determine your patient's lung capacity (cc) using the graph				

FIGURE 7.1. DETERMINING LUNG CAPACITY BY A BALLOON'S DIAMETER



Chapter 7 Let's Diagnose Them, Lab 5: Lung Capacity

Part II: Acceptable Lung Capacity for Height, Weight, and Gender

Research has shown the capacity of a person's lungs *should* be proportional to the surface area of his or her body. To find the surface area of your patients, you will need to know the height, weight, and gender of each, which are listed in their medical records. There are a couple of different ways to calculate mathematically a person's body surface area and estimate their *acceptable* lung capacity, mathematically.

1. To determine the acceptable lung capacity of your patients, enter their heights, weights, and gender values into the Body Surface Area equation below. Record this value in Table 7.3. *Note: Height must be in centimeters and weight must be in kilograms. Your head doctor (the teacher) has completed these conversions for you already. Use the **bold** values for your calculations.

Body Surface Area = $\sqrt{\frac{\text{height in cm} \times \text{weight in kg}}{3600}}$

If $Female = Body Surface Area Value \times 2000$

If $Male = Body Surface Area Value \times 2500$

TABLE 7.3. DETERMINING PATIENTS' ACCEPTABLE LUNG CAPACITIES

	Sex	Height (ft → cm)	Weight (lbs → kg)	Acceptable Lung Capacity (cc) (Show math!)
Patient #1	F	5′6″ → 167.7 cm	200 lbs → 90.7 kg	
Patient #2	F	5'2" → 157.5 cm	120 lbs → 54.5 kg	
Patient #3	М	6'2" → 188.0 cm	140 lbs → 63.5 kg	
Patient #4	М	5'8" → 172.7 cm	155 lbs → 70.3 kg	

2. Compare the results you obtained in Tables 7.2 and 7.3 and complete Table 7.4.

Chapter 7 Let's Diagnose Them, Lab 5: Lung Capacity

TABLE 7.4. COMPARISON OF EACH PATIENT'S ACTUAL LUNG CAPACITY TO HIS OR HER ACCEPTABLE LUNG CAPACITY

	Patient #1	Patient #2	Patient #3	Patient #4
How does your patient's lung capacity compare to the acceptable lung capacity of someone with the same height, weight, and gender (higher, lower, or similar)?				

Recall Questions

2.	When a person	exhales, what	happens to tl	ne diaphragm?	What happens	during an inhale?
	, , ricit di p ciocii	0,11101100, 111101	, 1101 b b c 110 to to	ic direct principality	, , Trest Trest P P CT 10	or our in in the court of

1. What is the role of the respiratory system?

4. Why would a pregnant person have a lower lung capacity?

5. Why might a person with sickle cell anemia have difficulty breathing?

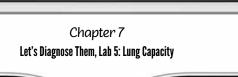
Chapter 7 Let's Diagnose Them, Lab 5: Lung Capacity

6. Why would someone who has diabetes have difficulty breathing?

7. Why would someone who has HIV have difficulty breathing?

Critical Thinking Question

1. Asthma is a respiratory disease characterized by restricted airflow, resulting in difficulty breathing and a variety of other chest-related symptoms. Asthma attacks can be brought on by allergies, but are often brought on by poor air quality. In 2012 the U.S. Centers for Disease Control and Prevention stated that asthma cases rose from 7.3% in 2001 to 8.4% in 2010 and were higher among children, than adults, and among multiple-race, black, and American Indian or Alaska Native persons than white persons. In particular, low-income urban areas tended to have higher asthmatic cases. Considering your knowledge of respiratory health, is it the government's responsibility to make asthma prevention a priority or should business and factories be held accountable for improving outdoor air quality? Create a proposal that would satisfy the needs of urban residents, government officials, and big businesses.



Conclusion

1. Look back at your lab results in Table 6.3. What could these results indicate about your patients?

2. Return to your patients' medical charts (Tables 2.1, 2.2, 2.3, and 2.4. pp. 20–23 in Chapter 2) and complete the section labeled "Lab 5—Lung Capacity" for each of the four patients. Check off evidence collected from each patient and consider whether or not your original hypothesis is still supported or refuted by evidence.

Chapter 8 Let's Diagnose Them, Lab 6 Hormone Test

our patients have been in this hospital for three days. By now, you have most likely verified a diagnosis for your male patients, Patients #3 and #4. You also might suspect that one of your female patients is pregnant and that the other is diabetic.

Every doctor knows the endocrine system produces hormones that help regulate the body's internal organs. Hormones are chemical messengers sent throughout the bloodstream. When too little or too much of a hormone is produced, it is often an indication that something is wrong.

In medical school (Table 8.1), you learned the following about two hormones produced in the body:

TABLE 8.1. MEDICAL SCHOOL NOTES REGARDING TWO HORMONES: HCG AND INSULIN

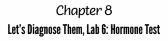
	Increased levels could indicate	Decreased levels could indicate
Human Chorionic Gonadotrophin (hCG)	Pregnancy only	Not pregnant
Insulin	Drugs such as corticosteroids, levodopa, and oral contraceptives Fructose or galactose intolerance Excessive exercising	Diabetes Pancreatic diseases such as chronic pancreatitis and pancreatic cancer

To determine if someone is diabetic, a doctor must provide patients with a glucose tolerance test. This test records how quickly sugar is cleared from

Chapter 8 Let's Diagnose Them, Lab 6: Hormone Test

the blood stream. The test is most frequently used to determine if a person is diabetic. The patient in question is required to fast 8 to 14 hours before they take the test. Only water is allowed. The patient is then given a glucose solution to drink. Blood is drawn at different intervals, and glucose levels are measured each hour. The glucose levels following the 2-hour mark are the most critical in determining if a person is diabetic. Glucose levels above 200 mg/dl show that insulin levels are low, suggesting diabetes.

Now that you have reviewed your medical school knowledge, let's diagnose these patients!



Lab Roles (Fill in Names of Team Members)

1.	is the task manager (reads procedure and ensures everyone is following
	proper protocol).
2.	is the materials manager (retrieves and returns materials; cleans materials and table).
3.	are the doctors (completes lab work, such as adding chemicals, heating chemicals, and so on; to be completed by more than one group member).
4	is the recorder (ensures the group's data is properly recorded)

Materials

- 2 test tubes
- 1 test tube rack
- blue litmus paper ("pregnancy" test)
- 3 ml urine samples from Patients #1 and #2 (retrieve from your teacher)

Procedure

Part I: Pregnancy Test

- 1. Label two test tubes Patient #1 and Patient #2.
- 2. Obtain a 3 ml urine sample from both patients. Be sure to place them into their designated test tubes.
- 3. Dip the BLUE litmus paper ("pregnancy test") into the urine sample of Patient #1. If the pregnancy test does not change colors, as indicated in Table 8.2, the patient has normal levels of hCG in their urine and is not pregnant. If the pregnancy test changes to a PINK color, the patient has high levels of hCG in their urine and is therefore pregnant.
- 4. Record data for Patient #1 in Table 8.3.
- 5. Repeat steps 3–4 for Patient #2.

TABLE 8.2. MEANING OF HCG INDICATOR RESULTS

If color does not change, it indicates	If color changes, it indicates
No pregnancy	Pregnancy

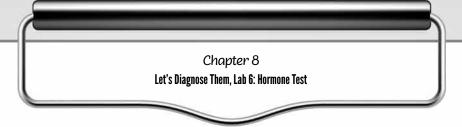


TABLE 8.3. RESULTS OF PATIENT #1'S AND #2'S PREGNANCY TESTS

	Patient #1	Patient #2	Patient #3	Patient #4
Pregnancy test • hCG Present?			male (no pregnancy test done)	male (no pregnancy test done)

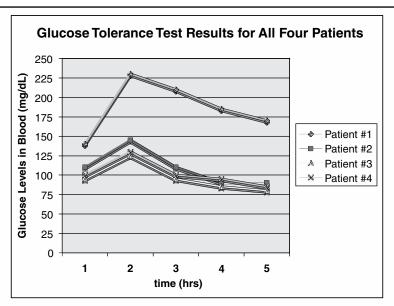
Part II: Glucose Tolerance Test

- 1. Interpret the Glucose Tolerance Test results (Figure 8.1) for all four patients.
- 2. Use your medical school notes (Table 8.4) to determine which patients are normal or diabetic.
- 3. Record results in Table 8.5.

TABLE 8.4. MEDICAL SCHOOL NOTES REGARDING NORMAL AND DIABETIC TEST RESULTS FOR A GLUCOSE TOLERANCE TEST

Glucose levels	Normal		Diabetic	
Venous Blood Plasma	Fasting	2 hrs	Fasting	2 hrs
(mg/dl)	<110	<140	>126	>200

FIGURE 8.1. RESULTS FOR EACH PATIENT'S GLUCOSE TOLERANCE TEST



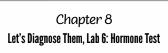


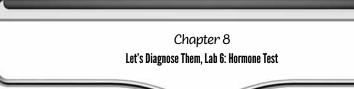
TABLE 8.5. RESULTS FOR EACH PATIENT'S GLUCOSE TOLERANCE TEST

	Patient #1	Patient #2	Patient #3	Patient #4
Glucose level after two hours: Above 200 mg/dl? Between 145–200 mg/dl? Below 145 mg/dl?				
Insulin level must be: Low? Borderline? Normal?				

Recall Questions

- 1. What is the role of the reproductive system?
- 2. What is the role of the endocrine system?
- 3. Why is hCG only found in pregnant women?
- 4. What is the role of insulin?
- 5. What organ produces insulin?
- 6. Explain how insulin and glycogen are examples of a feedback loop. In other words, how do they help maintain homeostasis in one's body?

7. What is the difference between type 1 and type 2 diabetes?



Critical Thinking Question

1. According to Guttmacher Institute's "State Policies in Brief" (2012), "37 states require parental involvement in a minor's decision to have an abortion" (p. 1). The term *parental involvement* however, ranges in definition. For some states, it refers to parental consent or others' notification, and for some, a notarized document. Additionally, the need for parental involvement varies case by case (i.e., medical emergency, abuse/assault/incest/neglect, and so on). Suppose you were the doctor of a 16-year-old pregnant patient in a state that did *not* mandate parental involvement, what medical advice might you provide to your patient to help her make an informed decision moving forward?

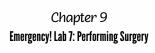
Conclusion

1. Look back at your lab results in Table 8.3 and Table 8.5. What could these results indicate about your patients?

2. Return to your patients' medical charts (Tables 2.1, 2.2, 2.3, and 2.4. pp. 20–23 in Chapter 2) and complete the section labeled "Lab 6—Hormone test" for each of the four patients. Check off evidence collected from each patient and consider whether or not your original hypothesis is still supported or refuted by evidence.

Chapter 9 Emergency! Lab 7 Performing Surgery

ortunately, you have been taking great care of your patients. However, a fifth patient (represented by the rat) has just been rushed into the emergency room at Vanguard Hospital. Doctors have been working on this patient, tirelessly, but were unsuccessful reviving him/her. The patient has indicated that he/she is an organ donor. Doctors in the operating room have called upon you to perform the donation surgery. Given your knowledge of anatomy and physiology from medical school and your work at Vanguard Hospital, it will be your job to identify and remove various organs from the patient's body.



Lab Roles (Fill in Names of Team Members)

1.	is the task manager (reads procedure and ensures everyone is follow-
	ing proper protocol).
2.	is the materials manager (retrieves and returns materials; cleans materi-
	als and table).
3.	are the doctors (completes lab work, such as adding chemicals, heating
	chemicals, and so on; to be completed by more than one group member).
4	is the recorder (ensures the group's data is properly recorded)

Materials (Per Groups of Four)

- 1 rat
- 1 dissection tray
- 1 scalpel/dissection scissor
- several dissection pins
- 1 dropper
- gloves for each person handling the rat
- goggles for each team member
- 1 biology textbook for reference

Procedure

- 1. Make sure all doctors (students) are wearing proper safety gear (gloves, goggles)
- 2. Lay the rat on its back.
- 3. Pierce the rat's abdomen with the scalpel/dissection scissor. Cut vertically (Figure 9.1) from the top of the abdomen area to the pelvic region.
- 4. At the top of the abdomen and at the bottom of the abdomen, cut horizontally. There should now be two flaps that open like a book. Pin these flaps back with the dissection pins.

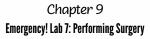
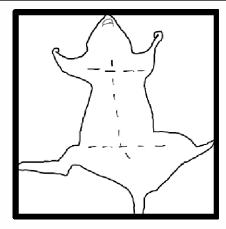
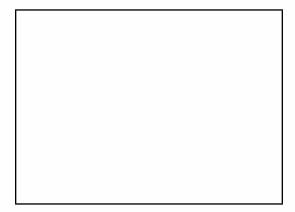


FIGURE 9.1. PREPARING FOR RAT DISSECTION



- 5. Right now you are looking inside the rat's abdomen area.
 - Question 1: What organ takes up most of the space in the rat's abdomen?
 - Question 2: Identify the stomach. Sketch it below.



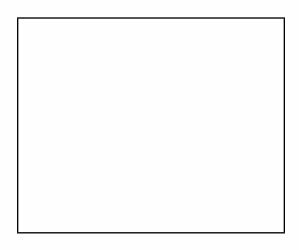
- Question 3: What tube is leading toward the stomach?
- **Question 4:** What tube is connected to the bottom of the stomach?

Chapter 9 Emergency! Lab 7: Performing Surgery

- 6. Cut out the stomach. Open it up.
 - Question 5: What does the stomach look like inside? Describe it.
- 7. Gently pull out the small intestine.
 - **Question 6:** How long is the small intestine? Measure its length in centimeters.
 - **Question 7:** What is the job of the small intestine?
- 8. Gently pull out the large intestine.
 - **Question 8:** How long is the large intestine? Measure its length in centimeter.
 - Question 9: What is the job of the large intestine?
- 9. Open the large intestine.
 - Question 10: What is inside of it?
- 10. At this point, you have already removed a large portion of the organs in the abdominal cavity of the rat. Located toward the back of the rat are two bean like structures, called the kidneys. See if you can find them.
 - Question 11: What is the function of the kidneys?
- 11. Open up one of the kidneys.
 - Question 12: What does the kidney look like inside?
- 12. The kidneys are attached to two tubes called the ureter. The ureter connects to the bladder.
 - **Question 13:** What is the role of the bladder?
- 13. Since you are now in the pelvic region of the rat, see if you can determine the gender of your rat.
 - **Question 14:** What gender is your rat? How do you know? What did you find—or not find—that may support your answer?

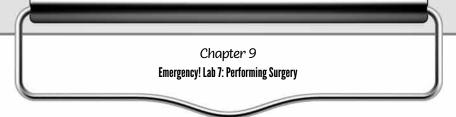


- 14. Now change gears. Let's concentrate on the upper region of the rat that hasn't been exposed. At the very top there should be a membrane-like muscle separating the upper abdomen from the chest region of the rat.
 - **Question 15:** What is the name of this muscle that is located below the ribs that spans the width of the rat?
- 15. Make a vertical cut through the chest of the rat. You will probably need to use a little bit more force to break through the ribs. Once cut, open up the chest cavity. Here you should see the lungs and the heart.
 - Question 16: Sketch the structure of the lungs and heart below.



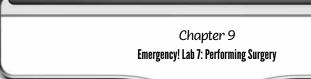
• **Question 17:** Explain how the heart and lungs work together to help your body function properly.

- 16. If you glance around the rat, you probably notice hot pink blood vessels and blue blood vessels. The rats have been injected with a serum to help identify the arteries and veins.
 - Question 18: What is the job of the arteries?
 - **Question 19**: What is the job of the veins?



• **Question 20:** Use your knowledge of the circulatory system to explain why the hot pink and blue blood vessels are misleading.

- 17. Try to identify the pipe leading from the mouth to the lungs.
 - **Question 21:** What is the name of this pipe?
- 18. Job well done! Make sure you clean up and wipe down your area. Nurses were able to preserve Patient #5's organs in an ice-cold preservative solution and have already packed them into sterile containers. These containers contain an icy slush mixture that will help prevent cell deterioration.



Recall Questions

- 1. Why are dissections useful?
- 2. Why do you think rats were selected as Patient #5, opposed to frogs?
- 3. What did you find challenging during this lab?
- 4. What did you like most about this lab?

Critical Thinking Question

1. Although there have been several advancements in technology and medicine, the demand for organs far surpasses the number of organ donors. In order to identify oneself as an organ donor in the United States, a person needs to "opt-in," meaning he or she is not considered an organ donor until he or she takes concrete action to be one. In several European countries, however, a person is considered an organ donor until he or she "opts out" and illustrates an unwillingness to donate. Given what you have learned about the body systems and how easily homeostasis can be disrupted, suppose the United States considered an "opt out" program, would you vote for or against it? Justify your position.

Conclusion

Time to get back to your four original patients!



Chapter 10 The Ominous Phone Call

Filling Out a Prescription

After several days of testing, you have finally developed a diagnosis for each of your four patients. Before releasing them from the hospital you *must* complete the medical charts (Tables 2.1, 2.2, 2.3, and 2.4 on pages 20–23 in Chapter 2) and provide the pharmacist with the following pieces of information under the sections "Diagnosis," "Treatments," and "Prognosis":

- 1. Results from each of the six tests and a final **diagnosis** of your patient's condition.
- 2. Treatments available for your patient's condition, and
- 3. A **prognosis**. A prognosis is a medical report dictating a physician's view on a case. It often denotes the chance of a patient's recovery and the doctor's prediction of how that patient will progress. For instance, one might note if the condition is short-term, long-term, fatal, and so on.



Chapter 11 Evaluating the Docs

he head doctor (your teacher) would like your team to present your findings for evaluation and to develop a presentation that encompasses the following information. Be sure to include appropriate data tables and graphs to explain their conditions. When developing your PowerPoint or Public Service Announcement, be sure to collaborate with your fellow doctors. Programs you might want to consider are:

- Google Docs
- Wikispaces
- Prezi

Part I: Oral/Visual Assessment Options

Option 1: PowerPoint (for all four patient cases)

Slide 1: Introduction

- a) Introduce yourselves
- b) The goal of the project
- c) An overview of the four diseases

Slide 2: Lab 1—Urinalysis

- a) What was the purpose of this lab?
- b) What system of the body is it associated with?
- c) How was it done?
- d) What could results indicate?

Chapter 11 Evaluating the Docs

Slide 3: Lab 2—Digestive By-Products and BMI Analysis

- a) What was the purpose of this lab?
- b) What system of the body is it associated with?
- c) How was it done?
- d) What could results indicate?

Slide 4: Lab 3—Blood Smears

- a) What was the purpose of this lab?
- b) What system of the body is it associated with?
- c) How was it done?
- d) What could results indicate?

Slide 5: Lab 4—HIV Test

- a) What was the purpose of this lab?
- b) What system of the body is it associated with?
- c) How was it done?
- d) What could results indicate?

Slide 6: Lab 5—Lung Capacity

- a) What was the purpose of this lab?
- b) What system of the body is it associated with?
- c) How was it done?
- d) What could results indicate?

Slide 7: Lab 6—Hormone Test

- a) What was the purpose of this lab?
- b) What system of the body is it associated with?
- c) How was it done?
- d) What could results indicate?

Slide 8: Patient #1 Diagnosis

- a) Describe her medical records symptoms.
- b) What was your original hypothesis and why?
- c) Diagnosis: What health condition do you think she has now and why? *Use prescription pad for help.

Slide 9: Patient #1 Health Condition

- a) What could have caused her condition?
- b) What are the symptoms of this health condition?
- c) What are potential treatments?
- d) What is the prognosis?

 *Use prescription pad and medical school notes for help.

Slide 10: Patient #2 Diagnosis

- a) Describe her medical records symptoms.
- b) What was your original hypothesis and why?
- c) Diagnosis: What health condition do you think she has now and why? *Use prescription pad for help.

Slide 11: Patient #2 Health Condition

- a) What could have caused her condition?
- b) What are the symptoms of this health condition?
- c) What are potential treatments?
- d) What is the prognosis?

 *Use prescription pad and medical school notes for help.

Slide 12: Patient #3 Diagnosis

- a) Describe his medical records symptoms.
- b) What was your original hypothesis and why?
- c) Diagnosis: What health condition do you think he has now and why? *Use prescription pad for help.

Chapter 11 Evaluating the Docs

Slide 13: Patient #3 Health Condition

- a) What could have caused his condition?
- b) What are the symptoms of this health condition?
- c) What are potential treatments?
- d) What is the prognosis?

 *Use prescription pad and medical school notes for help.

Slide 14: Patient #4 Diagnosis

- a) Describe his medical records symptoms.
- b) What was your original hypothesis and why?
- c) Diagnosis: What health condition do you think he has now and why? *Use prescription pad for help

Slide 15: Patient #4 Health Condition

- a) What could have caused his condition?
- b) What are the symptoms of this health condition?
- c) What are potential treatments?
- d) What is the prognosis?

 *Use prescription pad and medical school notes for help.

Slide 16: Conclusion

Each doctor should have a closing statement that entails one or more of the following:

- a) What have you learned from doing this project?
- b) How does the subject matter relate to your life or community at large?
- c) What advice might you give others regarding their health?
- d) What did you find most interesting?
- e) What questions did this project raise for you?

Option 2: Public Service Announcement (PSA)—(for one patient case)

Create a public service announcement for one of your patients' health conditions that addresses the questions listed below. Be sure to include evidence to support your claims.

- 1. What condition is the PSA for?
- 2. How does one get this condition?
- 3. What are some of the earlier symptoms?
- 4. Who should get tested for this health condition, and at what point?
- 5. How is one diagnosed with this health condition? For instance, what lab tests will they have to do to verify their condition?
- 6. What are the later symptoms and why? How is the body affected by this condition?
- 7. Can this condition be treated, cured, or managed? If so, what treatments, cures, or management tips are available?
- 8. What is the prognosis for a patient who is treated (versus untreated) for your condition?

Part II: Written Assessment Options

To renew your license, you must submit a written portion summarizing your work. Select *one of the two* questions below and write a 1–2 page paper using evidence from your patients' symptoms, the labs performed, and your medical school knowledge to support your ideas.

Option 1

The human body is made up of several different systems. Each system has a separate function, but as you've learned, many of them work together. Below is a list of systems we have discussed in class. Select *two* systems from the list below. Explain how they interact with one another to help keep a living organism healthy and alive. Be sure to cite examples from this project.

- Excretory System
- Digestive System

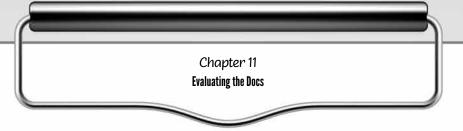
Chapter 11 Evaluating the Docs

- Circulatory System
- Immune System
- Respiratory System
- Reproductive System
- Endocrine System
- Nervous System (Note: The nervous system was not covered in this project)
- Musculoskeletal System (Note: The musculoskeletal system was not covered in this project)

Option 2

One's genes and/or lifestyle choices can disrupt homeostasis. Give concrete examples for each of the *two* factors listed above (genes and lifestyle choices), and explain how they may interfere with the health of a human being. Be sure to cite specific examples from this project.

- a) Who was affected?
- b) What condition did he/she suffer from?
- c) How did this condition come about in him/her?
- d) What symptoms did he or she experience?
- e) What lab tests helped diagnose this condition? Explain how the results were determined.
- f) Are any treatments or cures available? If so, what can the patient do to monitor or control his or her condition?



Mystery Diagnosis Rubric for Evaluating the Docs

Doctors are constantly being evaluated on their performance. Great ones may renew their license and are often recommended by patients through referrals, while poor-performing doctors, may lose their license to practice. Today, the head doctor (your teacher) is going to evaluate your performance as a doctor. He or she will determine if you are performing competently or whether or not you may need to be re-evaluated. Below is the rubric for your evaluation.

Using Evidence: The "doctor" can explain the purpose and the methods of the tests he or she performed to make a diagnosis. He/she incorporates all the data to draw valid conclusions.

>
>
>
>

Novice	Competent	Expert
The "doctor" cannot explain the lab in a way that the evaluator can understand the purpose, procedures, nor the results.	The "doctor" appears more confident about the purpose, procedure, and results of some labs over others.	The evaluator has a clear understanding of the lab's purpose, procedure, and results based on the "doctor's" explanation.



Making Connections: The "doctor" is able to make connections between the knowledge of the body systems, research on the health conditions, and evidence gathered from each lab.

Student			
	: <		
	: <		
	: <		
	: <		
	: < Novice	Competent	Expert

Seeking Significance: The "doctor" understands the importance of these topics and how it affects his or herself, people within his or her community, and those worldwide. He or she can provide recommendations on how to prevent, treat, or manage the conditions diagnosed.

sometimes struggled with

the questions presented by

the evaluator. Most of the

information is accurate.

or diseases; information

is inaccurate and/or has

presented by evaluator.

difficulty answering questions

Student	
	: <
	: <
	: <
	: <

Novice	Competent	Expert
The "doctor" does not clearly indicate ways in which this topic is relevant. Lacks suggestions for others on how to prevent, treat, or manage the condition.	The "doctor" is limited in his/ her understanding of how this topic is relevant and is limited in his/her suggestions on how to prevent, treat, or manage the condition.	The "doctor" clearly indicates ways in which this topic is relevant and makes suggestions for others to prevent, treat, or manage the disease or condition.

information is accurate, and

questions posed by the

evaluator.

therefore it is easy to address



Presentation Skills: The "doctor's" presentation style is ...

Student	
	<u>:</u> <>
	:<>
	_: <>
	_: <>

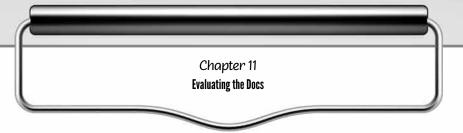
Novice	Competent	Expert
The "doctor" does not act professionally when he/she speaks. The presentation is not revised and the "doctor" seems unprepared to present. Additionally, the "doctor" lacks eye contact and mispronounces many key terms.	The "doctor" could make improvements in one or two areas of presentation; however, these errors do not distract from the presentation itself.	The "doctor" acts professionally when he/she speaks. The presentation contains little to no mistakes. The "doctor" is prepared to present and has great eye contact. He/she has clearly practiced pronouncing key terms.

Written Evaluation: The "doctor's" written assessment is ...

5	τu	a	е	n	l

:	: <>
:	: <>
:	: <>
:	: <>

Novice	Competent	Expert
The "doctor" does not complete the assignment and/or explanations are unclear. There are major flaws in concept mastery and incorrect use of scientific terminology.	The "doctor" completes the assignment but explanations may be slightly ambiguous or unclear. May contain some incompleteness or a cloudy understanding.	The "doctor" shows clarity of thought and assignment fufills all requirements. The "doctor" shows thorough understanding of scientific content. Statements are supported by evidence.



Final Evaluation: The evaluator will determine if the "doctor" can renew his or her license (which indicates a passing grade) or have his/her license revoked (which indicates more practice in this subject area is needed).

Student	
	: Renew or Revoke
	: Renew or Revoke
	: Renew or Revoke
	· Ronow or Royaka

Thank you for using this book!

Your opinion is very important.



Please visit

www.StylishSchooling.com

and complete a five-minute

student survey¹ for Diagnosis for

Classroom Success: Making Anatomy

& Physiology Come Alive.

^{1.} To complete the survey, please make sure you have set up an account. Once logged in, the student survey can be found under "Contact Us → Student Survey." Remember to select "Mystery Diagnoses" from our dropdown menu.



Index

Page numbers printed in **boldface** type refer to tables or figures.

```
Abortion by minor, parental involvement and, 70
                                                       Carbohydrates, simple and complex, 38
Alveoli, 62
                                                       Circulatory system, 45, 75-76, 86
Arteries, 45, 75
                                                       Code of ethics, 8
Asthma, 63
                                                       Condom use, 49
В
Bacterial infections, 43, 54
                                                       Diabetes, 2, 3
Birth control, 6
                                                         glucose tolerance test for, 65-66, 68, 68,
Blood smears (Lab 3), 1, 43-47
                                                                68-69, 69
                                                         information collected on causes, symptoms,
  conclusion of, 47
  critical thinking question related to, 46
                                                                and treatments for, 7
  lab roles for team members, 44
                                                         lung capacity and breathing difficulty in, 58, 63
                                                         type 1 and type 2, 7, 69
  materials for, 44
  medical school notes regarding red and white
                                                       Diagnosis, 1, 2, 11
        blood cells, 43
                                                         evaluating doctors' performance, 2, 81-90
  PowerPoint slide on, 82
                                                         final, 79
  procedure for, 44
                                                         mystery diagnosis rubric, 87-90
                                                         PowerPoint slides on, 83-84
  recall questions related to, 45
  recording results for each patient, 45, 47
                                                       Diagnostic tests, 1-2
Body mass index (BMI), 38
                                                         blood smears (Lab 3), 43-47
  chart for adults, 37
                                                         digestive by-products and body mass index
  ranges for, 37, 38
                                                                analysis (Lab 2), 33-41
  recording value for each patient, 38
                                                         HIV test (Lab 4), 49-55
  relation to health status, 39
                                                         hormone test (Lab 6), 65-70
  significance of high BMI, 39
                                                         lung capacity (Lab 5), 57-64
Body systems, 85-86
                                                         urinalysis (Lab 1), 25-31
                                                       Dialysis, 30
```

Index

Digestive by-products and body mass index	F
analysis (Lab 2), 1, 33–41	Feedback, 2
body mass index, 38	Fertilization, 6
chart for adults, 37	Filling out a prescription, 79
ranges for, 37	Fungal infections, 43
recording value for each patient, 38	•
chemical observations for, 35, 38	G
conclusion of, 41	Genetic disorders, 43, 86
critical thinking question related to, 40	Glucose tolerance test, 65–66, 68
lab roles of team members, 34	graphing results of each patient's test, 68
materials for, 34	medical school notes regarding normal and
meaning of nutrient indicator results, 36	diabetic test results, 68
nutrition content found in patients' digestive by-	recording results of each patient's test, 69
products, 36	Glycemic index (GI), 39
physical observations for, 35	Glycogen, 69
PowerPoint slide on, 82	
procedure for, 35	Н
recall questions related to, 38–39	Hemoglobin protein on red blood cells, in sickle
recording results for each patient, 41	cell anemia, 43 , 46, 58
setup for, 35	Hippocratic oath, 1, 8, 11, 30
Digestive system, 38, 73–74, 85	discussion questions related to, 10
Dissection lab. See Organ donation surgery	modernized version of, 8–9
3 ,	Homeostasis, 69, 77, 86
E	Hormone test (Lab 6), 2, 65–70
Earning your white coats, 1–10	critical thinking question related to, 70
Hippocratic oath, 1, 8–9	lab roles for team members, 67
discussion questions related to, 10	materials for, 67
information collected on diabetes, 7	medical school notes regarding human
information collected on HIV infection, 5	chorionic gonadotropin and insulin, 65
information collected on pregnancy, 6	PowerPoint slide on, 82
information collected on sickle cell anemia, 4	procedure for glucose tolerance test, 68
medical school attendance and graduation, 1,	graphing results of each patient's test, 68
2, 8	medical school notes regarding normal and
study group assignments, 3	diabetic test results, 68
study group at the library, 2	recording results of each patient's test, 69
task overview, 1–2	procedure for pregnancy test, 67
Endocrine system, 65, 69, 86	meaning of hCG indicator results, 67
Evaluating doctors' performance, 2, 81–90	recording results of patients' tests, 68
filling out a prescription, 79	recall questions related to, 69
mystery diagnosis rubric for, 87–90	Human chorionic gonadotropin (hCG), 65 , 69
oral/visual assessment options for, 81-85	meaning of hCG indicator results, 67
resources for, 81	recording results of patients' pregnancy tests,
written assessment options for, 85-86	68
Excretory system, 30, 74, 85	Human immunodeficiency virus (HIV) infection,
Exhalation, 62	2, 3, 43

information collected on causes, symptoms,	factors that may cause increase or decrease
and treatments for, 5	in, 57 , 58
lung capacity and breathing difficulty in, 58, 63	lab roles of team members, 59
preventing transmission of, 54	materials for, 59
progression to AIDS, 54	PowerPoint slide on, 82
susceptibility to other infections in, 54, 58	procedure for, 59–61
Human immunodeficiency virus (HIV) test (Lab 4), 1, 49–55	recall questions related to, 62-63
conclusion of, 55	M
critical thinking question related to, 55	Medical records, analysis of, 11-19
lab roles of team members, 50	for patient #1, 12–13, 20
materials for, 50	for patient #2, 14–15, 21
PowerPoint slide on, 82	for patient #3, 16–17, 22
procedure for, 51–53	for patient #4, 18–19, 23
recall questions related to, 54	task overview for, 11
recording results for each patient, 53 , 55	Medical school attendance and graduation, 1, 2
results from limited sexual partner	8
demonstration, 52	Medicare, 30
results from multiple sexual partner	Musculoskeletal system, 86
demonstration, 52	Mystery diagnosis rubric, 87–90
time after initial infection before HIV antibodies	, ,
show up on, 54	N
Hypothesis generation, 1, 11	Nervous system, 86
Trypourosis generation, 1, 11	Nutritional guidelines for school meals, 40
I	
Immune system, 54, 86	0
Infectious diseases, 43, 49, 54	Obesity and overweight, 37, 38, 38, 40
Inhalation, 62	Oral/visual assessment options, 81-85
Insulin, 7, 65, 66, 69	PowerPoint presentation, 81–84
	public service announcement, 85
	Organ donation surgery (Lab 7), 2, 71–77
K	conclusion of, 77
Kidney dialysis, 30	critical thinking question related to, 77
Kidney function, 30, 74	lab roles for team members, 72
	materials for, 72
L	procedure for, 72–76
Lifestyle choices, 86	organ preservation, 76
Lung capacity (Lab 5), 1, 57–64	preparing for rat dissection, 73
acceptable value for height, weight, and	recall questions related to, 77
gender, 61, 61	Organ donor programs, 77
recording each patient's actual lung	Outdoor air quality, 63
capacity compared to, 62 , 64	n
calculations for determination of, 59, 60	P
conclusion of, 64	Pathogens, 43
critical thinking question related to, 63	PowerPoint presentation, 81–84
determining by a halloon's diameter 60	Pregnancy, 2, 3

Index

information collected on causes, symptoms, and treatments related to, 6 lung capacity and breathing difficulty in, 58, 62 Pregnancy test, 67 meaning of hCG indicator results, 67 recording results for each patient, 68 Privacy of patients, 9, 11	T Treatments, 79 for diabetes, 7 for HIV infection, 5 in pregnancy, 6 for sickle cell anemia, 4
Prognosis, 2, 79	U
Public service announcement (PSA), 85	Urinalysis (Lab 1), 1, 25–31 chemical observations for, 28 conclusion of, 31
Red blood cells (RBCs), 43, 43, 45, 45 in sickle cell anemia, 43, 46, 58	critical thinking question related to, 30 lab roles of team members, 26
Reproductive system, 69, 86	materials for, 27
Research task, 1–2 evaluating doctors' performance on, 2, 81–90 study group assignments for, 3, 4–7	meaning of nutrient indicator test results, 29 medical school notes regarding results of, 26 physical observations for, 27
Residency programs, 11	PowerPoint slide on, 81
Respiratory system, 62, 86	procedure for, 27–28
Rubric for evaluating doctors' performance, 87–90	recall questions related to, 30 recording results for each patient, 29 , 31 setup for, 27
S	Setup IOI, 21
Safe sex, 49	V
School meals, nutritional guidelines for, 40	Vaccines, 54
Sexually transmitted diseases (STDs), 49, 55	Veins, 45, 75
Sickle cell anemia, 2, 3, 43	Viral infections, 43, 54
hemoglobin protein on red blood cells in, 43,	W
46, 58 information collected on causes, symptoms,	White blood cells (WBCs), 43, 43 , 49, 54
and treatments for, 4	in HIV infection, 43 , 49
lung capacity and breathing difficulty in, 58, 62	Written assessment options, 85–86
Sickle cell trait, 46	body systems, 85–86
sports participation at high altitude and, 46	how genes and lifestyle choices affect
Spirometer, 57	homeostasis, 86
Study groups in library, 2 assignment of, 3	
Surgery. See Organ donation surgery	
Systems of the body, 85–86	

DIAGNOSIS FOR CLASSROOM SUCCESS

Making Anatomy • Physiology Come Alive

Student Edition

"When I entered the teaching profession, I was stunned by the lack of interest my high school students had in science education. The traditional model of teaching science, often referred to as 'chalk-and-talk' with the occasional laboratory mixed in, was not working. The vast majority of my students were not going home and reading the textbooks. I knew I had to make the most of our face-to-face time."

-Author Nicole Maller

To make the most of classroom time—and make students sit up and take notice of science—author Nicole Maller turned to a combination of narrative and role-playing. Among the results is the attention-getting curriculum in *Diagnosis for Classroom Success*.

The story setup works this way: After conducting research at a rigorous medical school, your students arrive for their first day of hospital duty only to be confronted with four sick patients, each with a different mystery ailment. How can teams of student-physicians come up with the correct diagnoses? By getting deeply involved in inquiry-based science as they learn about major body systems plus sickle cell anemia, HIV, pregnancy, and diabetes.

This Student Edition guides students while they examine medical records, form hypotheses, and conduct simulated lab tests. By blending the power of story with engaging investigations, *Diagnosis for Classroom Success* will cure what ails your lecture-weary biology classes.

Grades 9-12



PB338XS ISBN: 978-1-936959-50-1

