Instructions and Expectations

Read the following article and answer questions provided. Make sure you scroll all the way to the bottom to ensure you have read and completed all of this assignment. Responses are due on the day of returning back to school in person.

What happens on an eLearning Day?

On eLearning Days, students will not report physically to school but will instead work from home. Students will have regular assigned classwork and their teachers will be available electronically during office hours. Students will be required to complete and submit all assignments as well as communicate with their teachers during the emergency eLearning Day.

How will students and parents know if an eLearning Day will take place?

Hampton County School District (HCSD) will communicate school cancellations and the announcement of an eLearning Day through automated phone calls, the district's notification system, district/school websites, social media, and local media.

How will students be informed about assignments for an eLearning Day?

Teachers will deliver content and post their assignments in Microsoft TEAMS. Students will download their assignments to their devices ahead of time at school as part of teachers' emergency plans.

How will students get help on their assignments on an eLearning Day?

All teachers will be available during designated eLearning office hours to provide assistance to students, give feedback on assignments, collaborate, and answer questions.

When will assignments be due?

As students complete their work, they should upload their assignments if Wi-Fi is available. If an internet connection is not available, they will have up to three school days after the last school cancellation to turn in assigned work.

How will eLearning be monitored and counted for attendance?

Teachers will assess the student's work and determine if the student has met the instructional goals for the day.

Students will be counted present when they:

Complete and submit their digital assignments for the eLearning Day following the eLearning procedures



Not An Old Person's Disease

Part I—"Soaking Up the Sun"

by
Jennifer Miskowski and **Anne Galbraith***
Department of Biology
University of Wisconsin—La Crosse

Judy sat up, took a swig from her water bottle, and wiped the sweat off of her face. She glanced at her watch and frowned. Had they only been out here for half an hour? Man, trying to get a good tan was way too much work. She glanced over at Mariah who was sleeping peacefully in her lounge chair. No wonder she looked like a Greek goddess every summer—she *enjoyed* lying in the sun. Judy decided that her normally pasty-white skin was tan enough, getting a little red again in fact, and she started to gather her things. Anyway, she reasoned, a dark tan might clash with her red hair.

Judy stopped for a second to scratch her calf. It had been itching for several days now, and she figured that the mosquitoes had really gotten her at the barbecue the other night. Since she was on the ground, she bent her neck to look at it and was surprised to see that it wasn't a mosquito bite but a mole. She'd had this mole ever since she could remember, but it had never itched before. She looked a little more closely and noticed that the mole looked kind of different than she remembered. It was a little bigger and the edges were sort of jagged. One edge was a bit darker than the other and in the middle was a raised purplish-black dot that she tried to wipe away but couldn't. As she was staring at her leg, Mariah woke up.

"What are you day dreaming about, your hot date with Tim tomorrow night?" Mariah teased as she rolled on her side, her black hair falling into her eyes.

Judy shook her head, "Ha, ha, I do have more things in my life to ponder. Anyway, I just noticed that a mole on my leg looks kind of weird and it keeps itching."

Mariah sat up with a concerned look on her face. "Let me see it." As she looked at Judy's leg, she said quietly, "Maybe you should go to the clinic." As Judy stared at her, she continued. "My mom sent me a pamphlet on skin cancer last year. You know, trying to convince me to stop lying in the sun so much. I glanced through it before I tossed it into the garbage. I remember some of the pictures of skin cancer and they kind of looked like your mole."

"What are you talking about?" Judy said defensively. "How could I have skin cancer? I'm barely in the sun compared to you."

"Alright, alright. It's not like I'm a doctor or something. I just remember those pictures. Come on, let's just call the clinic so they can check you out. I'm sure they'll tell you I'm crazy."

Questions:

1. What are some differences between Judy and Mariah that might make Judy more "at risk" for skin cancer than Mariah?
2. What observations did Judy make concerning her mole?

*__Note:__ Both authors contributed equally to this case and its teaching notes.

Image Credit: Crushable Sun Hat available from *Plow & Hearth* (http://www.plowhearth.com/product.asp?pcode=4276).
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Not An Old Person's Disease

Part II—"The Basics of Cancer"

by
Jennifer Miskowski and **Anne Galbraith**
Department of Biology
University of Wisconsin—La Crosse

Judy did a little research about skin cancer on the Internet before her doctor's appointment the next morning. She learned that most cases occurred in people who were significantly older than she was. It didn't make sense that it would happen to her—she was only 20 years old!

The articles talked about how UV light from the sun causes mutations in your DNA. Accumulation of DNA mutations over many years can cause certain cell cycle genes called "proto-oncogenes" to become super-active. Judy actually felt thankful for the college biology course she had been forced to take. She knew that DNA was the hereditary material that acted as a "blueprint" for everything our cells make and that a gene is a piece of DNA that contains the instructions for making a single protein. However, she would have to ask the doctor about these proto-oncogenes.

In the examining room, Dr. O'Brien was silent as he looked at the mole on her leg. Finally, he said kindly, "I want to do a biopsy. All that means is we'll remove your mole and look at the cells under a microscope and see if they look abnormal."

Judy could feel the tears welling up in her eyes. "You mean you can tell if I have a tumor by just looking at some cells?"

"Whoa, slow down a minute," Dr. O'Brien replied calmly. "It's very possible that your cells will look completely normal. And to clarify something, a tumor is not necessarily the same thing as cancer." She looked confused, so he continued. "A tumor means that cells have divided and piled up on one another in a single mass. But not all tumors are automatically cancerous and life threatening. A benign tumor is a mass of normal-looking cells. These tumors are not considered cancer and they're usually relatively easy to treat—we just remove them. On the other hand, a malignant tumor is a mass of abnormal cells whose growth cannot be controlled by the regular mechanisms. In addition, malignant tumors often spread to other parts of the body instead of just staying in one spot. We call this process metastasis. Malignant tumors are cancerous and, therefore, a very serious condition. To treat them, we have to remove the cancerous cells that we find and then do chemotherapy treatments to be sure to kill all the cancer cells that we may have missed surgically."

"So, if I have cancer, is it from these proto-oncogenes that I read about on the Internet?"

The doctor smiled and seemed pleased that Judy had been reading about this on her own. "Let's back up for a minute. You see, we have tens of thousands of genes in our cells, but it's not like mutations in just any of them will lead to cancer. The genes that get mutated and can cause cancer are of a specific type called cell cycle genes. *Everyone* has a set of cell cycle genes in each of their cells that code for cell cycle proteins. Cell cycle proteins control if and when cells divide. Sometimes we need to make more cells in our bodies, and some of these cell cycle proteins allow that normal process of cell division to occur. At other times we don't want the cells to divide, so different cell cycle proteins inhibit cell

division then. In normal, healthy cells, the formation of the cell cycle proteins is tightly controlled so the activating proteins are only made when we really need more cells and the inhibitory proteins are only made when we don't need more cells. However, mutations (or alterations) in these genes can eliminate this tight regulation and lead to uncontrolled cell division. This is what happens in many types of cancer: a normal cellular process, cell division, is no longer properly controlled."

Judy thought for a second. "Okay, but you still didn't say what these proto-oncogenes are."

"Oh yes, sorry. The activating class of these cell cycle genes consists of the proto-oncogenes. The normal job of these genes is to code for proteins that promote cell division. Certain mutations in proto-oncogenes result in proteins that are active all the time, causing cells to divide continuously. But let's not get ahead of ourselves—we won't know if your mole is even cancerous until we do the biopsy."

When Judy didn't say anything in response right away, Dr. O'Brien continued, "I know this is all a bit confusing, but it's good that you're asking these questions. We'll make sure that you understand this a little better before you leave today."

Just then a nurse knocked and entered the room. He needed Dr. O'Brien for a minute. At least Judy would have a minute to gather her thoughts.

Questions

1. Considering the differences between a benign tumor and a malignant tumor, why might a benign tumor be easier to treat?
2. Judy learned that every single person has these cell cycle genes so cells in our body can divide when necessary. What are some normal circumstances where our bodies might need to make more cells?
3. Every person has these cell cycle proto-oncogenes, but not every person has cancer. Why might this be the case?

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Not An Old Person's Disease

Part III—"Like Mother, Like Daughter?"

by
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Department of Biology
University of Wisconsin—La Crosse

Dr. O'Brien had handed Judy a pamphlet on melanoma before he left the room. As she started reading it, Judy realized that this is what they were going to test her for. Melanoma is a type of skin cancer that starts in your melanocyte cells, or the pigment cells of your skin. Actually, a mole is just a clump of melanocytes. There were pictures of cancerous moles in the pamphlet and one of them looked a little like hers, only bigger. She was starting to get worried. Below is part of what she saw:

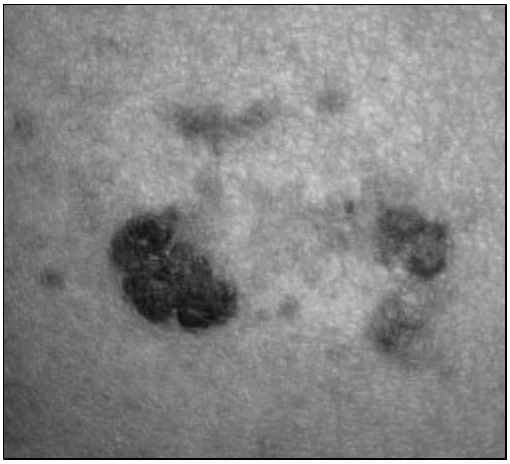


Image courtesy of Arthur C Huntley MD,
University of California Davis
http://www.mpip.org/guide/suspindex.html.

Dr. O'Brien returned just then and apologized for the disruption. "Do you have any more questions?"

"Well, I just don't understand how it's possible for a 20-year-old to get cancer. Isn't cancer an old person's disease?"

"You're right that most cancer patients are older. That's because you accumulate mutations in your genes over time. UV light, cigarette smoke, other chemicals, and even aging itself can cause mutations in genes. The kind of cancer that we're checking your mole for is melanoma. This is the most common cancer in people aged 25 to 29 and is the fastest-growing category of cancer, increasing four percent each year. You are a bit young, but you may be genetically predisposed to melanoma."

"What does that mean?" Judy asked.

"Well, remember the cell cycle genes that we were talking about earlier? I described the proto-oncogenes as being needed for activating cell division. Well, remember that I also mentioned a class of cell cycle genes that prevent cell division. These genes are called tumor suppressors. You usually have two good copies of each of these tumor suppressor genes, but sometimes you inherit one good copy and one mutated copy. Basically it means that, along with inheriting genes for your red hair or blue eyes, you may have inherited a mutated cell cycle gene. You had it when you were born, so it's not the result of lying in the sun too much or anything like that. But for these types of genes to lead to cancer, you need to have both copies of the gene mutated. One good copy is sufficient to prevent your cells from dividing aberrantly. So you can be born with one mutated copy, but not actually get cancer unless the other copy accidentally gets mutated sometime during your life. Mutations in the second copy could be the result of UV light from the sun, like in the case of melanoma. Since you may have been born with one mutated copy already, you are "predisposed" to getting cancer. You are one step closer to getting cancer compared to someone who doesn't have a mutation. We see a genetic, or hereditary, component in about five to 10 percent of melanoma cases. Do you know if anyone in your family has had melanoma?"

Judy shook her head, "I'm pretty sure that my dad hasn't, but my parents split up when I was young and I haven't really talked to my mom in the last 10 years. I thought I heard that she had some mole thing removed a long time ago, but I didn't think that it was cancer."

The doctor said, "You might want to call her. Now, let's get this biopsy done and hopefully prove that all this talk about cancer is unnecessary."

Questions:

1. Now that you know a little more, what are the risk factors that increase a person's chances of having melanoma?
2. How does sunlight contribute to the development of melanoma?
3. What does it mean to be predisposed to getting cancer? If you inherit a mutated cell cycle gene, does that automatically mean that you will get cancer some day? If you inherit a mutated cell cycle gene and participate in risky behaviors such as sunbathing, does that mean that you will automatically get cancer some day?

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THE CASE OF THE CRYING BABY



Surgical vs. Medical Management

by
Kari Mergenhagen
University at Buffalo
State University of New York

Part I

Sara and Matt had a loving relationship and successful careers. With the birth of their daughter Kayle they felt their lives were complete. Kayle was a thriving, beautiful, fair skinned baby with sparkling blue eyes. Within the first few weeks of life she grew at an astonishing rate, developing the gentle, soft curves that make babies so lovable. Then suddenly the fairytale existence of the new family was abruptly ended.

By the time Kayle was six weeks old her eyes were continually filled with tears. She cried throughout the day and most of the night. Kayle began to run intermittent fevers and Sara noticed that she had a lump that would periodically bulge from her groin. Motrin and Tylenol seemed to take care of the problem. Despite the use of cloth diapers and meticulous cleaning, Kayle also developed a raw redness and peculiar rash. Sara repeatedly called the pediatric nurse but she seemed to act as if Sara was just being an overly anxious new mother.

The physician, Dr. James, was not much more concerned. “I think it’s important for you to get back to work, so you have more diversity in your life. Kayle’s crying is most likely the result of colic causing her to experience indigestion. The rash is probably simply from not changing Kayle’s diapers enough. You may want to try some A&D ointment.”

Sara felt totally inadequate as a mother and vowed to do all she could to meet the needs of her daughter. Sara began a bland, but balanced diet and routinely changed Kayle’s diaper every 30 to 60 minutes throughout the day. Sara noticed that her daughter’s diapers were never soaked and often were coated with a thick yellowish discharge. This too was brushed off by one of the group pediatricians as probably due to a normal vaginal discharge caused by the withdrawal of maternal estrogen stimulation. When Kayle continued to cry and the rash worsened, Sara again called the doctor’s office.

“Continue to use the A&D and leave Kayle diaper-less for several hours a day,” the nurse advised.

Again Sara obliged. Kayle’s crying worsened and even her seasoned grandmothers were reluctant to hold or watch her. Sara decided to postpone returning to work for a year so that she could take care of Kayle.

By the time Kayle was three months old both she and Sara looked haggard. The constant crying and sleepless nights had taken a toll on them. Matt insisted that they go into see the doctor. Kayle was no longer gaining weight or growing, and the groin bulge was now prominent enough for the doctor to acknowledge an inguinal hernia. Sara and Matt felt relieved, believing that this was the source of their daughter’s problems and the end to a nightmare existence.

“This type of surgery is routine,” Dr. Broward, the surgeon, said reassuringly. “It’s a simple, uncomplicated repair. When Kayle recovers she will feel much more comfortable.”

The surgery went well and Kayle came home the next day, but the crying continued. In fact, if anything, she seemed worse than before the surgery and now she was hardly taking in any nourishment. Sara found that again Kayle was running a fever. She called the pediatrician, who advised her to call the surgeon. The surgeon felt that Kayle was probably holding her too much and that the fever was unrelated to the surgery. Sara called the pediatrician back, who agreed to see Kayle.

By this time Kayle’s fever was climbing and her once pale skin was now a bright red. In the waiting room, a nurse approached Sara and Kayle, “You must keep your baby protected from the sun.” Sara again felt victimized and began to wonder if she would ever find anyone able to determine the cause of Kayle’s problems.

Questions

1. What symptoms has Kayle exhibited over the first months of her life?

2. What bodily system might a doctor want to focus on in light of these symptoms? Why?

THE CASE OF THE CRYING BABY

Surgical vs. Medical Management

by **Kari Mergenhagen,** University at Buffalo, State University of New York

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Part II

The nurse weighed and measured Kayle, then promptly took her temperature and reviewed her symptoms with Sara. Doctor Hubble was assigned to check Kayle. He had completed an internship and some research in pediatric urology and immediately recognized the symptoms. Kayle's recent hernia operation combined with her current problems was a red flag for potential urology related troubles. He requested a urine sample, which was successfully accomplished with a catheter, a procedure that was decidedly uncomfortable for both Kayle and Sara. The specimen was loaded with pus and blood cells.

"I think that in light of the urinary tract infection, Kayle should immediately begin an antibiotic," said Dr. Hubble. "She also needs a VCUG. This is a voiding cystourethrogram used to determine if the flow of urine is abnormal. I also want Kayle to have an IVP, an intravenous pyelogram, used to detect anatomic abnormalities."

By the end of the week both tests had been completed and Sara, Matt, and Kayle were back at the pediatrician's office for a consultation.

The tests had revealed a diagnosis of bilateral duplicate collection systems (four ureters instead of the usual two), hydronephrosis (urine collecting in the kidney pelvis), and grades four and five reflux (urine doesn't empty normally and backs up into the kidneys). Kayle's kidney function was markedly decreased on the right and partially limited on the left.

"I feel that you need to take Kayle to a specialist," Doctor Hubble advised. "I recommend Dr. Leftt, a surgeon who is an expert in pediatric urology. I also want you to be aware that within the pediatric urology community there is some disagreement on the course of treatment—medical versus surgical management. You may also want to consult with Dr. Wright. He's equally as competent, but will most likely take a medical view of how Kayle should be managed. Perhaps you should meet with both doctors before making a decision. Right now I think Kayle should have a daily antibiotic to prevent further infections and damage to her kidneys."

Questions

3. Do urology reflux problems have a genetic component?

4. Why did Dr. Hubble correlate the hernia surgery with an inherited kidney disorder?

THE CASE OF THE CRYING BABY

Surgical vs. Medical Management

by **Kari Mergenhagen,** University at Buffalo, State University of New York

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Part III

Dr. Leftt asked Sara and Matt to sit down as he pulled out Kayle's x-rays and explained that the four tortuous-looking, bulging tubes attached to odd-shaped, lumpy masses were Kayle's ureters and kidneys. The abnormal number of ureters and unusual shape of the kidneys pointed toward a hereditary component, and Dr. Lett felt certain that this trait had been handed down by a near relative. He advised that the only course of treatment was surgery to taper and reimplant all four ureters higher into the bladder and the creation of a flap valve apparatus to prevent urine from reversing into the kidneys.

"The surgery, of course, is not risk free," Dr. Leftt emphasized, "but without it Kayle's kidneys may suffer irreversible damage. The severity of the reflux will be reduced, but not eliminated. This allows for growth, but leaves a continued risk of infection. For this reason Kayle will need to continue antibiotics, initially be monitored weekly and have periodic tests for several years until her urinary system functions normally. The surgery will prevent scarring and further loss of kidney function."

Dr. Leftt had a kind but firm approach. He reviewed the number of surgeries he had done, the type of research he was involved in, and the devices he had invented to bring about higher surgical success rates. In addition to the usual complications of surgery including ineffectiveness and death, he told Sara and Matt that Kayle's right kidney could remain stunted and minimally functional. The surgery would take four to six hours, and Kayle would be in intensive care for two days followed by up to a week of hospitalization. If Sara and Matt opted out of surgery, Dr. Leftt felt that there was a good chance that Kayle's kidneys would fail within a year or two, necessitating the need for dialysis or a kidney transplant.

Despite having a growing number of patients in the waiting room, Dr. Leftt spent an hour with Matt and Sara. He concluded by saying, "If Kayle were my child, I would seek another opinion. She has a very serious problem that needs careful consideration and needs to be addressed soon."

Questions

5. What is the hereditary risk for a sibling or a future child of Kayle's in developing urological problems?

6. What is the success rate and what are the potential complications with ureteral reimplantation surgery?

7. Could Kayle survive if her right kidney was barely functioning?

THE CASE OF THE CRYING BABY

Surgical vs. Medical Management

by **Kari Mergenhagen,** University at Buffalo, State University of New York

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Part IV

A few days later Sara and Matt met with Dr. Wright. Again the findings and x-rays were reviewed. Dr. Wright felt that there was no urgency to treat Kayle surgically. He explained that Jeanne Smellie, a pediatrician in the United Kingdom, had successfully treated many children with long-term prophylactic use of antibiotics.

"Some children like Kayle," Dr. Wright gently explained, "will outgrow the reflux as their bladder base grows and the ureterovesical tunnel elongates. It's foolish to rush into a surgical procedure with all the inherent complications if the infections can be managed medically."

He reassured Sara and Matt that weekly urinalysis and periodic VCUGs would allow them to closely monitor the functioning of the kidneys. "Many times when an initial VCUG is taken the child may have been ill and dehydrated. This will inevitably show up as a greater reflux than the child actually has."

Dr. Wright ended by saying that if the reflux persisted beyond the age of eight, Kayle would then require surgery.

Sara and Matt felt confused and asked Dr. Wright these additional questions…

Questions

8. Will an antibiotic prophylaxis approach prevent Kayle from getting urinary tract infections?

9. Do we need to worry about the emergence of antibiotic resistant organisms or an overgrowth of other potential pathogens?

10. What is the success rate for managing Kayle using a medical, prophylactic antibiotic approach?

THE CASE OF THE CRYING BABY

Surgical vs. Medical Management

by **Kari Mergenhagen,** University at Buffalo, State University of New York

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Part V

Matt and Sara had several months in which to make their decision on how to best treat their daughter Kayle. Dr. Wright felt that Kayle's infection was under control with the use of antibiotics and advised them to continue this course. Dr. Leftt felt it was best to wait until Kayle was about six months old and infection free before undergoing an operation. This allowed Matt and Sara plenty of time to review their options and make a sound decision.

Over the next few months Kayle developed allergic reactions to Sepra, Cefzil, and Cipro. She also had breakthrough infections while on antibiotics and a significant thrush developed, which is a yeast infection in her mouth.

During this time Matt and Sara researched their own family medical history. Sara found out that a nephew had horseshoe shaped kidneys, which were discovered after a football injury, and that her grandfather, whom she never knew, died at a young age from kidney failure.

Question

11. If you were Matt and Sara would you chose medical or surgical management for treating Kayle? Why?

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A Case of Iron Deficiency Anemia

by
David F. Dean, Department of Biology, Spring Hill College

Case Presentation



Dolores Welborn is a 28-year-old attorney living in Portland, Oregon. Dolores is in the second trimester of pregnancy with her first child, and though her pregnancy had been progressing normally, recently she has noticed that she tires very easily and is short of breath from even the slightest exertion. She also has experienced periods of light-headedness, though not to the point of fainting. Other changes she has noticed are cramping in her legs, a desire to crunch on ice, and the fact that her tongue is sore. She doubts that all of these symptoms are related to one another, but she is concerned, and she makes an appointment to see her physician.

Upon examining Dolores, her physician finds that she has tachycardia, pale gums and nail beds, and her tongue is swollen. Given her history and the findings on her physical exam, the physician suspects that Dolores is anemic and orders a sample of her blood for examination. The results are shown in Table 1.

A diagnosis of anemia due to iron deficiency is made and oral iron supplements prescribed. Dolores' symptoms are eliminated within a couple of weeks and the remainder of her pregnancy progresses without difficulty.

Table 1. Blood Sample Results

Red Blood Cell Count	3.5 million/ mm^3
Hemoglobin (Hb)	7 g/dl
Hematocrit (Hct)	30%
Serum Iron	low
Mean Corpuscular Volume (MCV)	low
Mean Corpuscular Hb Concentration (MCHC)	low
Total Iron Binding Capacity in the Blood (TIBC)	high

Questions

1. Describe the structure of a molecule of hemoglobin and explain the role played by iron in the transport of oxygen.
2. How is iron stored and transported in the body?
3. What is Iron Deficiency Anemia (IDA) and how frequently does it occur?
4. What are the most common causes of IDA?
5. Why are women more prone to IDA than men?
6. What are the red blood cell indices, and what tests are diagnostic for IDA?
7. How is IDA treated and prevented?

Image Credit: *The Doctor and His Patient* by Jan Steen, c. 1665. The Rijksmuseum, Amsterdam.
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Blake's Illness: A Case of "Wild Life" Management

by
Cathy Santanello
Department of Pharmaceutical Sciences
Southern Illinois University Edwardsville

Tuesday Afternoon

"Zach, can you take notes for me in our Wildlife Management class? I'm feeling awful so I'm heading back to the dorm. I really hate missing the first day of class though."

"I have to tell you, Blake, you look terrible. I hope whatever you have isn't contagious because I'm taking a lot of classes this semester and I can't afford to catch it."

Blake's summer had been a busy one, both scholastically and socially. He had thoroughly enjoyed his summer research project involving the tracking of Red-Tailed Hawks because it allowed him to spend a lot of time observing wildlife in the national parks surrounding Crider College. It was also the type of experience that would help him land a job with the park service after he graduated so that he could continue to work in a wildlife-related field. He had also experienced another type of "wild life" over the summer: camping trips involving sex, alcohol, drugs, bad eating habits, and lack of sleep.

The Next Day

By the next day, Blake's condition had gotten worse. He had a headache, low-grade fever, sore throat, and general malaise. Zach urged him to go to the student health center, but Blake thought that he could diagnose himself based on what he had learned in the anatomy and physiology classes he had taken, with a little help from the Internet. Besides, he felt so weak that the thought of trekking across campus to Herndon Hall Health Clinic did not sound appealing.

"My symptoms are so general," Blake discovered as he browsed the Internet. "Is this something I recently picked up or was it something I was exposed to late in the summer? I did have a few tick and mosquito bites. Could one of these vectors be the reason for my illness? I trapped and handled a variety of wildlife species this summer. Could I have picked up a pathogen from one of these animal reservoirs? I also had unprotected sex a couple of times, but I can't imagine that being a contributing factor because I knew my partners so well. Sometimes I ate food that wasn't thoroughly cooked on the campfire, but wouldn't I have had a bad bout of diarrhea?"

Blake decided to take some amoxicillin he still had from a time when he had a middle ear infection. He hadn't finished his prescription because he had started feeling better. The amoxicillin was past the expiration date, but it would be better than nothing, he thought. He read on an Internet site that amoxicillin was a narrow-spectrum antibiotic so he hoped that his condition would improve if what he had was a bacterial infection.

Your Task

Using the symptoms described above, make a list of 10 or more possible infectious diseases that might be plaguing Blake and explain why you have narrowed it down to these disorders.

Part II – A Visit to the Health Clinic

Blake's condition had worsened. Not only did he miss the first week of class, he had also developed a body rash, a higher fever, and his throat hurt even more. He was severely fatigued, but Zach helped him get to the student health clinic. Dr. Rosie Stamper, the attending physician, examined Blake. In a raspy voice, Blake explained some details that had led to his illness.

Here are Dr. Stamper's notes from Blake's physical exam:

- T 39.5° C; BP 128/68 mmHg; P 111/min; R28/min
- Pharyngeal erythema
- Symmetrical cervical lymphadenopathy
- Generalized rash on trunk
- Tonsillar exudates
- Abdominal tenderness
- No coughing or wheezing
- Inability to concentrate
- Loss of appetite
- Severe fatigue

Genitourinary:

- Not assessed

Results of the initial laboratory blood work:

- Hematocrit: 44%
- Platelets: 110,000 µL
- Leukocyte count: 13,200/µL
- Differential leukocytes: 9% PMNs, 26% monocytes, 55% lymphocytes; many (~10%) atypical cells

Differential diagnosis:

- Streptococcus (Group C or G)
- *Streptococcus pyogenes*
- *Neisseria gonorrhea*
- *Treponema pallidum*
- *Borrelia burgdorferi*
- *Rickettsia rickettsiae*
- Herpes simplex virus type I (HSV-1)
- Human immunodeficiency virus (HIV)
- Adenovirus
- Epstein-Barr virus (EBV)
- Cytomegalovirus (CMV)
- *Toxoplasma gondii*

Course of action:

- Admitted to Medon Mercy Hospital for further testing and observation.

Questions

1. Using data for normal blood values, compare Blake's differential blood test results. How, if at all, do Blake's values differ?
2. What diagnostic microbiological tests should be run to rule out potential pathogens?
3. Based on Blake's self-diagnosis, what problems exist with his use of amoxicillin, past or present?
4. Using the given tests and observations, what is your diagnosis?

Part III—Blake's Road to Recovery

Since throat cultures for the suspected bacterial pathogens were negative, Dr. Stamper did not prescribe antibiotics. An abdominal ultrasound revealed hepatosplenomegaly and a positive monospot confirmed the presence of the Epstein-Barr virus (EBV). EBV is a member of the herpesvirus family and the etiological agent of infectious mononucleosis.

After getting the results back, Dr. Stamper gave Blake a call. "Blake, we've gotten your lab results back and you have a confirmed case of infectious mononucleosis. The bad news is that there is no treatment for this viral disease, but it can be managed. I recommend that you get plenty of rest, eat well, and avoid any strenuous physical activity for the next four to five weeks. The good news is that you should gradually feel better within the next few weeks if you follow this advice. I would like you to call the office in about a week to let me know how you are progressing."

As Blake thought about the diseases that it could have been and the risks that he took over the summer, he felt fortunate that his illness wasn't typically life threatening. He was anxious to start feeling better again and vowed to heed Dr. Stamper's advice to prompt a speedy recovery. He also vowed to seek the appropriate medical care much more quickly the next time he felt so weak and to stop trying to diagnose his own disorders!

Questions

1. What is hepatosplenomegaly? What does it indicate and how is it useful for differentially diagnosing a patient with infectious mononucleosis?
2. What is a Monospot test? How does it work and why would it be useful for Blake's diagnosis?
3. What is the nature of the Epstein-Barr virus? Be able to explain the following:
    a. the viral properties of this pathogen;
    b. the epidemiology, pathogenesis, treatment, and preventative measures of this pathogenic disease; and
    c. the potential reactivation of the virus.
4. What is the rationale for suggesting a lack of strenuous physical activity to a patient with an EBV infection?
5. What innate and acquired protective mechanisms should have been elicited in response to Blake's viral infection?
6. Infectious mononucleosis is more common in developed countries than developing countries. How do you explain this?

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