Essex County Health Laboratory Testing

Laboratory Service
Patient Name: _____________________________________
Patient Age: ____________________  Sex: ____________
Date Collected: __________________________
Symptoms:
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
Suspected diagnosis:
________________________________________________________________________________________

Tests Requested:

<table>
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<tr>
<th>Tests</th>
<th>Observation</th>
<th>Diagnosis</th>
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<td>Blood Glucose</td>
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<td>Hematocrit</td>
<td>Red Blood Cells are what % of the blood?</td>
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Diagnosis:

Possible Causes:

Recommended Course of Treatment:
Patient Information:

Nicole is a 14 year old girl who is very involved in school sports. Her volleyball team won OFSSAA and she has now started track and field. Usually Nicole gets up at 5 am so she can get run 6 km before school. However, lately she has been having a difficult time waking up in the morning as she is always tired and runs out of breath when jogging. When her father insisted she see a doctor Nicole was angry and started to yell as she didn’t want to miss school.

Joe is a 18 year old high school student who is looking forward to graduating high school and attending St. Clair next year for dental hygienist. He has been studying hard for his exams and has been quite tired, understandably since he has been studying late at night. He’s been nervous and going to the bathroom a lot. Because he’s lost 10 lbs he thought he should go to the doctor.

Anna is a grade 9 student who was anxious because she was in a new school and didn’t know many students. Often when she went to classes she felt her heart race and was short of breath. Unfortunately she was missing classes because she often ended up in the guidance office until she felt well enough to get back in class.

Amy is a first year college student who is living on her own for the first time in her life. She has been having difficulty because she is has been having night sweats. This has made her feel tired and she was concerned with the pains in her stomach. She was worried that she ate something that made her sick because she wasn’t eating proper meals.
Disease Descriptions

Anemia

Anemia is a medical condition in which the red blood cell count or hemoglobin is less than normal. For males, normal red blood count is typically defined as 42-52% RBC and in females as 37-47% RBC in a hematocrit. Anemia is caused by either a decrease in production of red blood cells or hemoglobin, or an increase in loss (usually due to bleeding) or destruction of red blood cells.

Some patients with anemia have no symptoms. Those that do have symptoms may:

- feel tired,
- become easily fatigued,
- appear pale,
- have a feeling of a heart racing,
- feel short of breath, and/or
- have worsening heart problems.

Diabetes

Diabetes is a medical condition in which the body is unable to regulate the level of blood sugar (glucose). Normal blood sugar ranges from 82 mg/dl to 110 mg/dl blood. Low blood sugar (hypoglycemia) and high blood sugar (diabetes) can be determined by testing the sugar level in the blood. Signs and symptoms of diabetes can include the following:

- Unusual thirst
- Frequent urination
- Weight change (gain or loss)
- Extreme fatigue or lack of energy
- Blurred vision
- Frequent or recurring infections
- Cuts and bruises that are slow to heal
- Tingling or numbness in the hands or feet

Infection

Infection is a medical condition where the body has been invaded by another organisms such as bacteria, virus or fungi. A normal value for WBC : RBC is about 1:1000. Elevated WBC is a sure sign of infection. Some symptoms of infection include:

- Fever (this is sometimes the only sign of an infection).
- Chills and sweats.
- Change in cough or a new cough.
- Sore throat or new mouth sore.
- Shortness of breath.
- Nasal congestion.
- Redness, soreness, or swelling in any area, including surgical wounds and ports.
- Diarrhea and/ or Vomiting.
- Pain in the abdomen or rectum.
- New onset of pain.

Hemophilia

Hemophilia is a disorder in which blood doesn’t clot normally because it lacks sufficient blood-clotting proteins (platelets). Symptoms include:

- Unexplained and excessive bleeding from cuts or injuries
- Many large or deep bruises
- Pain, swelling or tightness in joints
- Blood in your urine or stool
- Nosebleeds without a known cause
- Extreme fatigue
- Double vision

Sickle Cell Anemia

Sickle cell anemia is a form of anemia where there aren’t enough healthy red blood cells to carry adequate oxygen throughout the body. With sickle cell anemia the red blood cells are misshapen and look like a ‘sickle’. Symptoms may include:

- unexplained episodes of severe pain
- swelling in the hands or feet; abdomen
- pale skin or nail beds
- frequent infections
Teachers Prep:

Lab Materials:
- blood slides (normal & high wbc)
- microscopes
- synthetic blood samples (make-your-own; made with sugar or without depending upon whether the person is diabetic; replace sugar with corn starch but add less [http://www.stevespanglerscience.com/lab/experiments/fake-blood-recipes/](http://www.stevespanglerscience.com/lab/experiments/fake-blood-recipes/))
- eyepiece with grids for counting wbc's
- blood glucose test strips (obtained from a Drug store)
- sample hematocrits (make-your-own with red sugar crystals & vegetable oil; [http://www.americasblood.org/media/43213/mbyb_hs_tg.pdf](http://www.americasblood.org/media/43213/mbyb_hs_tg.pdf))

Handouts:
- copy Page of Disease Descriptions
- make station cards (preferably on different colour cardstock)
- copy patient descriptions

Answer Key:
Nicole - anemic (normal blood cell count; low rbc hematocrit; normal blood sugar)
Joe - diabetic (normal blood cell count; normal hematocrit; high blood sugar)
Anna - normal (normal blood cell count normal hematocrit; normal blood sugar)
Amy - infection (blood slide with high wbc count; normal hematocrit; normal blood sugar)
Hematocrit
Examine the patient’s hematocrit (blood that has been centrifuged).
- What percent of the blood is red blood cells?
- Is the amount normal, lower or high? What does this mean?
Blood Cell Count

Normally, in a healthy individual there are approximately 700:1 rbc:wbc. When there is an infection, the white blood cells count increases.

Use the grid in the eye piece and calculate the ratio of red blood cells to white blood cells for three quadrants. Calculate the average. Observe the blood on the highest magnification possible.

Note: See below to know what each type of blood cell looks like.
Blood Sugar Test

Dip the blood sugar test strip into the sample and compare with the chart provided on the box.

normal blood sugar = below 11.1 mmol/l
Diabetes = 11.1 or more mmol/l