

Investigation 3.4

3.4A: Sore Throat

3.4B: Role of Blood

Investigation

3.4A: Sore Throat

1. Introduction:

Sore throats cause almost a quarter million patient visits to their doctors each year. Even doctors come down with a sore throat from time to time. A sore throat is often the first sign of a cold. A virus causes most sore throats and they last about ten days with or without supportive care (bed rest, salt water gargles, antihistamines, cough syrup, and anti-inflammatory medicines). But other illnesses also cause sore throats; so, if your patient has a temperature of 101 F. or higher, you need to see them.

2. Chief Complaint:

Ronald, a thirteen year old boy, is brought to see you by his Mother. Ronald has a sore throat that started four days ago. Ronald reports the right side of his throat hurts more than the left side. He complains of losing his voice, smelling his own bad breath, and not feeling hungry. He also reports experiencing headaches and alternating feelings of chills and fever.

His Mother tells you that he has experienced similar throat infections at least nine times over the past three years. As a result he has missed many days of school, which has caused Ronald great concern because it affected his grades. Mom also states this is the third time this year Ronald has had a similar infection. Mom further reports that Ronald snores loudly only when he has throat infections. Ronald had a physician caring for this condition, but they have moved recently and would like you to take over his care. Ronald enjoys playing soccer and playing video games. He makes good grades in school except when he doesn't feel well from his throat infections.

3. Review of Systems:

Ronald's Mother again says that Ronald has had at least nine throat infections over the past three years. Ronald occasionally has a nosebleed, especially in warm weather months. His Mother denies any episodes of uncontrollable bleeding. Ronald has no surgical history. Ronald has experienced an allergic reaction to sulfa-based antibiotics, but has no other known allergies.

4. Examination:

Ht = 66 in. Wt = 140 lbs. Respirations: 18/min Pulse: 76

Blood Pressure is 98/60. Temperature = 102.4° F.

Head and Neck:

Eyes: erythema and glassy appearance

Ears: erythema of tympanic membrane

Mouth: Enlargement of both **tonsils** and **erythema** of the tonsillar bed and surrounding tissues. A small amount of yellowish **purulent discharge** with an **abscess** is noted on the right **tonsil**. Teeth are aligned normally. The **Uvula** appears swollen and erythematous.

Neck: Enlargement of **lymph nodes** on both sides of the neck

Heart: Heart sounds normal

Lungs: Breath sounds normal all quadrants

Abdomen: Bowel sounds active.

Extremities: Normal appearance. **Reflexes** and **pulses** normal.

5. Differential Diagnosis:

Review of medical records:

Because the patient had a physician treating this condition over the past three years, you want to examine the old records. If you confirm that Ronald has experienced

	Acute/ chronic	Sore throat	Fever	Enlarged Tonsils	Enlarged lymph nodes	Purulent Discharge	Ear Ache	Pos. C&S	Fatigue	Rash Neck & Chest
Bacterial Tonsillitis	A	X	X	X	X	X	X	X	X	
Strept Throat	A	X	X		X			X	X	
Mono- nucleosis	AC	X	X	X	X			X	X	X
Lymphoma	C		X	X	X			X	X	
Tooth Abscess	AC		X		X	X		X	X	
Carcinoma	C			X	X				X	
Diphtheria	A	X	X		X	X		X	X	
Scarlet Fever	A	X	X		X			X	X	X
Viral Tonsillitis	A	X	X	X	X		X		X	

Tonsillitis nine times in three years, you may want to recommend he undergo surgical removal of his tonsils. If not you would recommend a more conservative approach to solving this medical investigation. While waiting for the medical records to arrive you must treat his current condition.

6. Medical Tests

Summary of Available Tests to Consider and how they can help your medical investigation:

Complete Blood Count (CBC)	High WBC count suggests infection; Low WBC count suggests immune response suppression
Culture & Sensitivity (C&S) of throat	Test which germs grow & which antibiotics will control them
Magnetic Resonance Imaging (MRI) of Neck	Provides a layer by layer view of the entire throat area
Prescription for Antibiotic	Kills or blocks reproduction of certain bacteria
Ultrasound of Neck	Uses sound to visualize the structures of the throat
X-Ray of Neck	Shows the boney structures of mouth & neck

Which test(s) would be most appropriate at this time? (check any that apply)

X-rays of the head and neck

MRI of the head and neck

Culture and Sensitivity

CBC blood test

Ultrasound of neck

7. Treatment Options:

Which treatment would be most appropriate while waiting for test results:

Emergency **Surgery** to remove the infected and swollen tonsil.

Radiation therapy to knock out whatever is causing the tonsils to enlarge.

Prescription for a broad spectrum **Antibiotic** that works on several potential causes of infection including your first choice from your differential list.

Prescriptions for all antibiotics that work on the four most common organisms causing infections.

No prescriptions until all tests come back with results on the organism

8. Test results:

After two days your test results come back from the lab and indicate Ronald's tonsillitis is caused by a bacterial infection of the staph aureus organism. The sensitivity report indicates the organism is **sensitive** to the antibiotic you prescribed. This means your treatment should be effective. What would you do if the C&S report indicated the antibiotic you chose was NOT effective?

When Ronald’s medical records arrive from the other physician one week later you find chart notations for at least nine episodes of tonsillitis over the past three years. The American Medical Association criteria for **tonsillectomy**, surgical removal of the tonsils, is as follows:

- A. 7 episodes of tonsillitis in 1 year, or
- B. 5 episodes per year for consecutive 2 years, or
- C. 3 episodes per year for consecutive 3 years

9. Treatment Options: The following chart list some of the treatments used to treat the problems listed in your differential diagnosis.

Pathology	Cause	Treatment
Strept Infection	Streptococcus bacteria	Penicillin, amoxicillin, cephalexin
Mononucleosis	Epstein-Barr virus (EBV)	Virus; no specific treatment
Lymphoma	Helicobacter Pylori	Chemotherapy, radiation
Carcinoma	Genetic mutations	Chemotherapy, radiation
Abscess	Staph aureus bacteria	Cephalexin, Nafcillin, Vancomycin
Diphtheria	Corynebacterium	Antitoxin, Penicillin, Erythromycin
Scarlet Fever	Streptococcus bacteria	Penicillin, Amoxicillin, Cephalexin

Which treatment might you prescript first? _____

Based on Ronald’s history, what else might you recommend for a long term solution for Ronald’s recurring condition? _____

Additional food for thought:

You probably recognized that Ronald had an infection probably from his symptoms of fever and chills. Your body maintains its **internal** temperature remarkably constant, unlike some animals like reptiles that we call “cold blooded.” But why would temperature control prove so important to humans? We mentioned briefly before that the cells in our body carry out all sorts of chemical reactions that allow us to move about, heal ourselves, remember things, think, speak, and grow. These chemical reactions that would require high temperatures if we tried to carry them out in a laboratory test tube, take place inside our bodies at a lower temperature because of the **enzymes** coded in our human genes and manufactured inside our cells. You might think of these enzymes as fingers or molds that can hold other molecules close together in a way that allows them to chemically bond or in other cases break apart to form new molecules at our body’s normal temperature. These chemical reactions constitute the core of what it means to be alive. Our amazing human enzymes have evolved to work most efficiently at 98.7 degrees Fahrenheit, our normal body (core) temperature.

Germs or viruses that invade our body commonly create protein molecules called **pyrogens**. These **pyrogens** mix with our blood and travel about our body in order to disrupt our temperature control system that has its headquarters inside our brain. The control center, when disrupted, mistakenly believes our body has gotten too cold so it orders up chills and shivering to increase our internal temperature, thus we develop a fever. Similarly when we treat the fever or resolve the infection, we often experience sweating as the temperature control system gets back to working correctly and sets about to bring our body temperature back down to 98.7. You might reason that germs and viruses go to the trouble of confusing our temperature controls to gain some advantage for themselves, and physicians would agree with you. The advantages might prove varied and numerous in specific infections. Indeed, we probably do not fully understand all of them. We do believe in general that our ability to defend ourselves against **pathogenic** germs and viruses suffers when the higher temperature of a fever moves our enzymes away from their most efficient, normal zone of operation.

Notice that we used the term **pathogenic** germs and viruses. Pathogenic means the ones that harm us. You may have the impression that all germs and viruses harm us, but science is learning right now more and more about how non-pathogenic germs and viruses actually play vital roles inside our body. We now believe a healthy adult human has more than 5 pounds of germs inside them contributing to their wellbeing in a variety of ways that we are only beginning to fully understand. A whole new branch of medical science is emerging around the role bacteria play inside our intestines, bacteria that clearly help us digest our food, but also may regulate many other human functions even to include our mood. Watch for new information about this fascinating area of medical research in the future that is unraveling the dependence of our body on germs and viruses that help us out.