Answer Key

PART A: QUESTIONS

1. inhalant
2. renal failure
3. shunt infection
4. sodium bicarbonate
5. monitoring
6. 207 pounds
7. antibodies
8. substances
9. medications
10. further usage
11. allergic reaction
12. evaluation

PART A: QUESTIONS 13-24

13. teeth removed
14. left side
15. three days
16. knee pain
17. respiration
18. oxygen saturation
19. tooth 21
20. gum
21. swelling
22. floor
23. odontalgia
24. dilaudid of 4 mg

PART B: QUESTIONS 25-30

25. B
26. C
27. C
28. B
29. C
30. C

PART C: QUESTIONS 31-36

31. A
32. B
33. C
34. A
35. A
36. C

PART C: QUESTIONS 37-42

37. C
38. A
39. B
40. C
41. B
42. C

Transcript

Part A Extact1

Patient: Hello, doctor. Good morning.

Doctor: Good morning. What's your problem?

Patient: Well, doctor, I have intolerance to allergies and inhalant and environment allergies.

Doctor: What's your age?

Patient: 36.

Doctor: Okay. Do you get any kind of reactions like an itchy rash, throat or tongue swelling, shortness of breath, vomiting, lightheadedness and low blood pressure? Clinically these symptoms show the presence of anaphylaxis.

Patient: No, doctor.

Doctor: Or else do you get itchy, red welts called angioedema that develop on your skin?

Patient: No, doctor.

Doctor: Are you taking any medication for allergies?

Patient: No, doctor.

Doctor: May I know your past medical history?

Patient: Six months back when I was under dialysis due to renal failure. I had an acute event of perioral swelling, etiology uncertain. The diagnosis results showed that the allergic reaction was due to Keflex that was used to treat a cellulitis dialysis shunt infection.

Doctor: What medications are you taking now?

Patient: I am taking atenolol for controlling my blood pressure, sodium bicarbonate, Lovaza and Dolomite. I did not have any other issues upon my treatment and discharge that included corticosteroid therapy and antihistamine therapy monitoring.

Doctor: What were the surgeries performed?

Patient: Permacath insertion three times in peritoneal dialysis.

Doctor: Are you allergic to any medications?

Patient: Yes, heparin causes thrombocytopenia.

Doctor: You drink or smoke?

Patient: No doctor.

Doctor: May I know your family history of diseases?

Patient: My family members have severe heart disease, carcinoma and food allergies.

Doctor: Well your test report shows your blood pressure is 128/78, pulse 70, temperature is 97.8, weight is 207 pounds and height is 5 feet 7 inches. I suspect you have developed acute anaphylaxis. I would suggest you should go for a radioallergosorbent test, a blood test using radioimmunoassay test to investigate specific Ig antibodies to determine the substances the subject is allergic to. I shall recommend further treatment and medications upon the test results. If the test report shows any specific food or inhaled allergen that is found to be quite high on the sensitivity scale, I would likely recommend that you avoid the offending agent. Right now I would recommend you to stop further usage of cephalosporin antibiotics which may be the cause of your allergic reaction, and I would consider your case as an allergy. Being anaphylactic, it would be very difficult to treat acute anaphylaxis. I am prescribing an EpiPen in the event of acute angioedema or allergic reaction or sensation of impeding allergic reaction, and you have to proceed directly to the emergency room for further evaluation and treatment recommendations after the administration of EpiPen.

Part A Extract2

Patient: Hello, doctor. Good morning.

Doctor: Good morning. Please be seated. May I know your problem?

Patient: Well, doctor. I have multiple issues with my teeth, due to severe dental disease. I have had many of my teeth removed. Now I have severe tooth pain both lower and upper teeth on my left side that have been troubling me for the past three days.

Doctor: Well, what's your age?

Patient: 29, doctor.

Doctor: What medications are you taking?

Patient: I'm taking OxyContin and Vicodin for my knee pain. I need more pain medications, because I do not want to use that medicine for my toothache.

Doctor: Are you allergic to any medicine?

Patient: Yes, penicillin and Cody.

Doctor: Do you drink or smoke?

Patient: I do not drink, but I do smoke regularly.

Doctor: Well, your test reports show temperature 97.9, blood pressure is 146/83, pulse is 74, respiration 16, oxygen saturation 98% on room air and interpreted as normal. Mouth and oropharynx shows multiple dentures and multiple dental caries. You have tenderness to tooth 12 as well as tooth 21. Your gums are normal. There is no erythema or swelling. There is no purulent or other discharge noted. The floor of your mouth is normal without any abscess, suggestion of Ludwig syndrome. You have developed odontalgia and multiple dental caries. Well I am prescribing Dilaudid 4 milligrams intramuscular and I would suggest you go for a filling. In this treatment the affected area of the teeth will be drilled and the indicated

substance will be removed and the empty space will be packed with an appropriate dental filling material.

Patient: Okay, doctor. Thank you.

Part B

Question25

Doctor A: Hello, doctor. Can you explain what a Nipah virus is?

Doctor B: Well, Nipah virus is a member of the Paramyxoviridae, genus Henipavirus. This Nipah virus was initially identified and isolated in 1999 during an outbreak of encephalitis and respiratory problems among pig farmers and other people with close contact with pigs in Singapore and Malaysia. The name of the virus originated from Sungai Nipah, a village in Malaysia where pig farmers became sick with encephalitis. Initially the disease was linked with Hendra virus emerged from bats, but was quickly singled out for investigation, and flying foxes of the genus were subsequently identified as the reservoir for the Nipah virus.

Question26

Physician: Thimerosal is a mercury based preservative that has been used for many decades in the US and multi dose vials of medicines and vaccines. There is no significant evidence of side effects caused by the mild doses of thimerosal in vaccines except for minor reactions such as redness and swelling at the injected site. However, during 1999, the public health service agencies, the American Academy of Pediatrics and vaccine manufacturers agreed to reduce or eliminate thimerosal usage in vaccines as a precautionary measure. Methylmercury is obtained from certain kinds of fish. A high exposure to methylmercury can be toxic to people. However, over a lifetime, everybody is exposed to some methylmercury. Thimerosal contains ethylmercury, which is the most widely used form of organic mercury that is cleared from our body more quickly than methylmercury and is likely to cause any harm to the individuals.

Question27

Doctor A: Doctor, what is an adjuvant and why are adjuvants added to vaccines?

Doctor B: Well, an adjuvant is used in vaccines to create a stronger immune response in patients. Certain vaccines made from dead or weakened germs contain naturally obtained adjuvants and help the human body produce a strong protective immune response. These vaccines often must be made with adjuvants to ensure the body produces an immune response strong enough to protect the patient from the germ he or she is being vaccinated against. In the US, monophosphoryl lipid A in aluminum are used as adjuvants in the vaccines. Monophosphoryl lipid A has been used as an ingredient since 2009 in the vaccine called Cervarix. Aluminum salts or gels are used as ingredients in vaccines since 1930. However, most vaccines developed today include just small components of germs such as their proteins rather than the entire virus for bacteria.

Question28

Physician: Typhus fevers are a group of diseases caused by bacteria spread to humans by chiggers, lice and fleas. Typhus fevers include murine typhus, scrub typhus and epidemic typhus. While the chiggers spread scrub typhus, body lice spread epidemic typhus and fleas spread in murine typhus. Typhus fevers include murine typhus, scrub typhus and epidemic typhus. Well, the chiggers spread these scrub typhus, body lice spread epidemic typhus and fleas spread murine typhus. Fever, headaches and sometimes rash are the most common symptoms of the typhus fevers. Epidemic typhus also known as louse borne typhus is an uncommon disease caused by a bacteria called Rickettsia prowazekii spread through contact with an infected body lice. Though epidemic typhus was responsible for millions of deaths during earlier centuries, today it is considered the rare disease. Epidemic typhus is called sylvatic typhus in the US. It occurs very rarely. Scrub typhus or bush typhus is a disease caused by a bacteria called Orientia tsutsugamushi.

Question29

Doctor A: Hello doctor, what is VX and how is it obtained?

Doctor B : VX is a man made chemical warfare agent classified as a nerve agent, which are the most toxic and rapidly acting of the known chemical warfare agents, which are similar to pesticides called organophosphates. Symptoms will start appearing within a few seconds of exposure to the vapor form of VX while the appearance of symptoms may take from a few minutes to 18 hours of exposure to liquid form of VX. Compared with a nerve agent called Sarin, VX is much more toxic by entry through the skin and much more toxic by inhalation. Since VX is the least volatile nerve agent with the slowest evaporation level from liquid to vapor, it can be a long term threat as well as a short term threat.

Question30

Doctor: Rubella is a contagious disease caused by a virus which is also known as German measles. However, the disease is caused by a different virus and measles. With MMR vaccine rubella disease can be prevented. This vaccine protects against three diseases: mumps, rubella and measles. Rubella was a common disease in the US before the invention of vaccines. The last major epidemic occurred between 1964 to 1965 when there was an estimated 12.5 million rubella cases in the country. However, rubella was completely eradicated due to successful vaccination programs in the country since 2004.

Part C Extract1

Speaker: Amyotrophic lateral sclerosis is a kind of motor neuron disease referring to a group of progressive neurological diseases that cause this function in the nerves that control muscle movement, resulting in muscle weaknesses and changes in our body functioning.

The advanced stages of amyotrophic lateral sclerosis affects the nerves that control breathing, resulting in mortality. Amyotrophic lateral sclerosis is sometimes called Lou Gehrig's disease after the famous baseball player who was diagnosed with this condition. Upper motor neuron symptoms include resistance to movement in the muscles and brisk reflexes and stiffness. Lower motor neuron symptoms include muscle atrophy, weakness, and twitching. The lifespan of the patients with amyotrophic lateral sclerosis is about 3 to 5 years after the appearance of the symptoms. Presently, there is no cure to amyotrophic lateral sclerosis and treatment is aimed to relieve symptoms to provide emotional and social support, and to slow down the progression of the disease.

Amyotrophic lateral sclerosis attacks the nerve cells used in voluntary muscle actions called motor neurons. Motor neurons are found in the spinal cord and in the brain. As amyotrophic lateral sclerosis progresses, motor neuron cells degenerate and die. Therefore, they stop sending messages to muscles for performing actions. At this stage, the brain can no longer control voluntary movement and the muscles gradually weaken and waste away. As amyotrophic lateral sclerosis progresses, it affects all the voluntary muscles where the patient can no longer control their face, arms and legs. At this stage inability to breathe results in respiratory failure.

50% of the patients with amyotrophic lateral sclerosis will live for 3 years or more after the diagnosis. However, some patients live for longer. About 20% of patients will live five years or more after diagnosis, while just 10% of the patients will live for 10 years or more, and 5% of patients will live for 20 years.

There are different types of amyotrophic lateral sclerosis classified based on their signs and symptoms and with a genetic association. Amyotrophic lateral sclerosis can be sporadic or familial. Sporadic amyotrophic lateral sclerosis occurs randomly, and it accounts for 90 to 95% of patients.

There is no clear risk factor or cause. About five to 10% of patients are with inherited amyotrophic lateral sclerosis. The offspring of a patient with amyotrophic lateral sclerosis will have a 50% chance of developing a similar condition. Disorganized immune response is also a cause for amyotrophic lateral sclerosis. The immune system may attack some of the cells of the body, possibly killing nerve cells.

Chemical imbalance is another cause for amyotrophic lateral sclerosis, for the patients often have higher levels of glutamate secretion, a chemical messenger in the brain near the motor neurons. Higher levels of glutamate is known to be toxic to nerve cells. Mishandling of proteins can also cause amyotrophic lateral sclerosis, when body proteins are not processed appropriately by the nerve cells. Hence, abnormal proteins potentially accumulate and cause nerve cells to die.

The symptoms of amyotrophic lateral sclerosis usually start appearing in late 50s or early 60s, however, symptoms can appear at other ages as well. Progression of the disease will vary between patients.

Common symptoms include difficulty carrying out daily activities including walking, increased clumsiness, weakness and feet, hands, legs and ankles cramping and twitching in the arms, shoulders or tongue, difficulty maintaining good posture and holding the head up, uncontrolled outbursts of laughing or crying known as emotional lability, cognitive changes, slurring of speech and difficulty with voice projection, pain, fatigue, problems with saliva and mucus, and difficulty breathing and swallowing in the later stages. Early symptoms of the disease often include abnormal limb, fatigue, clumsiness, slurred speech and muscle cramps and twitches. Symptoms will spread all over the body as the disease advances.

No single test can diagnose amyotrophic lateral sclerosis, so diagnosis is based on test results in symptoms to rule out other possible conditions with similar symptoms. The diagnosis of amyotrophic lateral sclerosis are made through electromyography to detect electrical energy in the muscles and nerve conduction studies to test the significance of the nerve signals. These diagnosis methods can help rule out peripheral nerve damage or peripheral neuropathy and muscle disease called myopathy.

Certain medical conditions that produce similar symptoms to amyotrophic lateral sclerosis include Lyme disease, multiple sclerosis, HIV West Nile virus and the polio virus. Amyotrophic lateral sclerosis is confirmed in case there are symptoms in both the lower and upper motor neurons. Upper motor neuron symptoms include resistance to movement in the muscles and brisk reflexes and stiffness. Lower motor neuron symptoms include muscle atrophy, weakness and twitching.

Part C Extract2

Speaker: Usually the grade and type of a cancer is clear when the cells are observed under a microscope after routine processing and staining. However, this is not always the case. At times the pathologist requires to use other procedures, also to diagnose the cancer.

Histochemical stain tests use various chemical dyes that are attracted to certain substances in some types of cancer cells. For instance, the mucicarmine stain is attracted to mucus. Droplets of mucus inside a cell exposed to this stain will look pink red under a microscope. This stain is useful if the cancer cell is suspected for an adenocarcinoma in a lung biopsy. Adenocarcinoma can produce mucus so by detecting pink red spots and lung cancer cells, pathologists will decide if the diagnosis is adenocarcinoma.

Besides being helpful in sorting out different kinds of cancer tumors, other types of special stains are used in the lab to identify microorganisms such as fungi and bacteria in tissues. This is significant, because the cancer patients may develop infections as a side effect of treatment, or even due to the cancer itself. It is also essential in cancer diagnosis, because some infectious diseases cause lumps to form that can be confused with the cancer tumor until histochemical stains prove that the patient has an infection and not cancer.

Immunohistochemical stains or immunoperoxidase stains are another significant category of diagnosis. The basic principle of this procedure is that an immune protein called an antibody will attach itself to antigens, which are on or in the cell. Each type of antibody identifies and attaches to antigens that fit it exactly. To find out whether the antibodies have been attracted to the cells, chemicals are added that made the cells change color only if a certain antibody is present.

Immunohistochemical stains are very useful in diagnosing certain types of cancers. For instance, a routine biopsy of the lymph node may contain cells similar to cancer. However, the pathologist may not be able to distinguish whether the cancer originated in the lymph node, or elsewhere in the body, and has spread to the lymph nodes. In case the cancer originated in the lymph node, the diagnosis would be lymphoma, or else if the cancer originated in another part and spread to the lymph node, it could be metastatic cancer. This distinction is very essential, because treatment depends on the type of cancer.

Often flow cytometry is used to diagnose the cells from lymph nodes, bone marrow and blood samples. It is very precise in diagnosing the exact type of lymphoma or leukemia. It also helps distinguish lymphoma from non cancer diseases in the lymph nodes.

Flow cytometry is also used to measure the amount of DNA in cancer cells called ploidy. Instead of using antibodies to diagnose protein antigens, cells are treated with special dyes that react with DNA. If the DNA amount is normal, then the cells are set to be deployed. If the DNA amount is abnormal, the cells are categorized as aneuploidy. Aneuploid cancers of most organs tend to grow and spread faster than deployed once.

Another significant purpose of flow cytometry is to measure the S phase fraction, which is the percentage of cells in the sample that are in a certain stage of cell division called the

synthesis, or S phase. The more cells in the S phase, the faster the tissue is growing and the more aggressive the cancer will be. Like flow cytometry, image cytometry tests use dyes that react with DNA. However, instead of suspending the cells in a stream of liquid and analyzing them with the laser, this method uses a digital camera and a computer system to measure the amount of DNA in cells on a microscope slide. Image cytometry can also determine the ploidy of cancer cells like flow cytometry.