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On the cover:
This photomicrograph depicted leukemia cells that contained Epstein-Barr virus (EBV), using a fluorescent antibody (FA) staining technique, which caused the affected cells to glow green under ultraviolet light. EBV is a member of the Herpesvirus family, and is one of the most common human viruses.

Photo courtesy of:
CDC/Dr. Paul M. Feorino

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Pediatric Leukemia

By Carlo Ledesma and Chiemi K. Standridge

Abstract

Leukemia is a type of cancer that starts in the marrow of bones and often manifests as a clonal disorder. Leukemia affects developing blood cells – usually white blood cells – causing the cells to behave inappropriately. These cells tend to propagate rapidly, escape apoptotic control causing an overgrowth that takes healthy cells and damages, kills, or replaces healthy organs causing severe side effects of the person affected. There are several steps and processes used to establish a diagnosis of hematopoietic neoplasm that can vary depending on the age of the patient, clone affected and severity of the illness. Treatment of leukemia may vary to a degree, but almost always includes chemotherapy and can often take several years to complete. It is important to note that there are more novel forms of treatment other than traditional chemotherapy treatments. Immunotherapy and stem cell transplants are found to have success in the remission.

Pediatric Leukemia

Pediatric Leukemia is one of the most devastating forms of cancer today. This is not only because it is considered acute cancer 95% of the time, but also because it affects the most vulnerable amongst us – our children. Leukemia is a cancer that starts in young blood cells of the bone marrow. Leukemia usually starts in white blood cells but it is possible that it could start in other blood cells too. In fact, any blood-forming cell in bone marrow can become leukemia. About seventy-five percent of all acute leukemia seen in the pediatric population are known as “ALL” or acute lymphocytic (or lymphoblastic) leukemia.

Once a cell changes – becomes “rogue” – it no longer functions as normal. It tends to escape apoptotic control and sometimes escapes the bone marrow vasculature. Leukemia cells may reproduce very quickly and live longer than they are supposed to live. This generally causes a build-up of “rogue” or bad cells which crowds out the healthy cells. Most of the time, leukemia cells tend to overflow and rapidly spill into the bloodstream where they travel to other parts of the body, continue to reproduce, affecting other bodily functions. The crossing of leukemic cells in the blood brain barrier causes adverse results to the patient and obviously, can have disastrous results. According to the Centers for Disease Control and Prevention, cancer kills more people every year than criminal activity and leukemia is the most common form of cancer in children and teens. That’s why there is an incredible amount of research going on to finding a cure. There is a lot we are learning in cancer research every day and there is a lot more we still need to learn before we finally defeat this terrible affliction. Research on stem cell transplants and immunotherapy...
Case Presentation

A 46-year-old female was seen in her primary care physician’s office for complaints of a sore elbow after having returned from a 3-week long trail ride in rural Arizona. When reporting her recent medical history, the patient could not recall any injuries to her arm or elbow in the past few weeks. She did report that she had been treated with azithromycin for a sinus infection two weeks before she left for the trail ride. However, at the time when she left for Arizona, she had completed the prescription and all of her symptoms had resolved.

She reported that the elbow was not sore or swollen previously. When quizzed about her occupation, she reported that she was a successful horse trainer and an all-around champion of animals in general. She had a thriving dog rescue on her property, which was also home to several exotic birds, five tanks of tropical fish both freshwater and salt water, one iguana, and one pot belly pig.

In reviewing the clinical history, the physician noted that the patient had been a two-pack-a-day smoker for several years prior to this visit, but had been successful in a smoking cessation program within the last year and now did not smoke at all. Over the previous winter, she had experienced some difficulty breathing, and a course of corticosteroids was prescribed by her pulmonologist. The breathing issues were resolved upon completion of the steroids.

Upon physical examination, the patient’s vital signs, including blood pressure and respiration, were all within normal adult range, and her temperature was 98.6°F. The physical exam was unremarkable except for a large swollen area just below the elbow on the right arm. The area on the arm was red, warm, and very sore to the touch. The physician was concerned this was an infectious process with fluid present. An outpatient surgery procedure was scheduled for the next day so the physician could better examine and aspirate the area. The volume of the aspirate was 10 ml. It was thick, opaque, and yellow.

The aspirate was processed for routine bacterial cultures, which included both aerobes and anaerobes, along with orders for fungal cultures and mycobacterial cultures. The patient was released four hours after the procedure and went home to rest.

Laboratory Testing

Prior to the surgery, the physician ordered preoperative testing. The tests included a urinalysis (Table 1), complete blood count (Table 2), and basic metabolic panel (Table 3).

During the surgical procedure, the elbow was aspirated. The Gram stain of the aspirate showed moderate neutrophils and no bacteria. No fungal elements were seen in the Gram stain, and the acid-fast stain using a concentrated Kinyoun stain was negative for acid-fast bacilli. For the routine culture, the aspirate.
Introduction
A previous manuscript published in the Journal of Continuing Education Topics and Issues was entitled Retinal Detachment: A Patient’s Perspective (August 2017, Volume 19, Number 3) described the eye as a part of the body’s sensory system that detects stimuli in the internal/external environment and transmits those stimuli to the central nervous system. The eye was further described as a special sense receptor since the receptors of the eye are only located in specialized sensory organs, whereas generalized senses have receptors that are widely distributed throughout the body. The eyes are the receptor organs of sight, and they function to receive images and transmit them to the brain (Roberts, 2017).

Eye Structure
As we begin a discussion of macular degeneration, it is necessary to examine some of the vocabulary associated with the structure of the eye. The structures of the eye include the eyeball and the adnexa or structures outside the eyeball which include the bony orbit, eye muscles, eyelids, eyelashes, conjunctiva, and lacrimal apparatus (Ehrlich, Schroeder, Ehrlich, & Schroeder, 2017).

The orbits, also known as the sockets, are bilateral, symmetrical cavities located in the skull that enclose and protect the eyeball and its associated structures (muscles, blood vessels, and nerves). The boundaries of the orbit are formed by parts of seven bones (sphenoid, maxilla, palatine, zygomatic, ethmoid, lacrimal, and sphenoid) (Cohen and Hull, 2016; Ehrlich, et al., 2017).

There are six major extrinsic eye muscles arranged in three pairs. The six pairs of muscles are termed superior and inferior oblique (slanted angle), superior and inferior rectus, and lateral and medial rectus muscles (straight). These muscles are responsible for the movement of the eyeball and the superior eyelid. These muscles pull on the eyeball so that both eyes converge on a single vision field (Cohen and Hull, 2016).

The upper and lower eyelids, termed palpebrae, along with the eyebrows, and eyelashes, help to protect the eyeball from intrusion of foreign matter, excessive light entrance, and injuries due to various causes. A levator palpebra muscle is attached to each upper lid and functions by contracting to keep the eye open. If the muscle weakens and fails to keep the eye open, as with age, the eyelids may droop and interfere with vision. This is termed ptosis. The canthus is the angle created by the joining of the upper and lower eyelids (medial corner). The edges of the eyelids
Overview

Hashimoto’s disease is an immune mediated disorder wherein the immune system attacks the thyroid gland. Hashimoto’s Thyroiditis is the most common cause of hypothyroidism (HT) in women. Although it is possible for a male to have this autoimmune disorder, there is an overwhelming prevalence in manifestations in women; the ratio of occurrence is 7:1 in favor of women. (Davies, Ross, & Mulder, 2016). Intrathyroidal lymphocytic infiltration is followed by a gradual destruction of the thyroid gland which may lead to subclinical or overt hypothyroidism. Biochemical markers of the disease are thyroid peroxidase and/or thyroglobulin autoantibodies in the serum which are present with a higher prevalence in females than in males and increase with age. (Wartofsky, 2014). According to Zaletel (2011), Several genes were shown to be associated with the disease occurrence, progression, and severity. Genes for human leukocyte antigen, cytotoxic T lymphocyte antigen-4, protein tyrosine phosphatase nonreceptor-type 22, thyroglobulin, vitamin D receptor, and cytokines are considered to be of utmost importance. Amongst endogenous factors for the disease development, the attention is focused predominantly on female sex, pregnancy with postpartum period and fetal microchimerism. Environmental factors influencing HT development are iodine intake, drugs, infections and different chemicals. Disturbed self-tolerance accompanied by the increased antigen presentation is a prerequisite for the HT occurrence, whereas proper interaction of thyroid cells, antigen presenting cells, and T cells are necessary for the initiation of thyroid autoimmunity. Secreted cytokines lead predominantly to T-helper type 1 (Th1) response as well as to T-helper 17 (Th17) response which has only recently been implicated. Final outcome of HT is thyroid destruction which is mostly a consequence of the apoptotic processes combined with T-cell mediated cytotoxicity.

What is Hashimoto’s disease?

In Hashimoto’s Thyroiditis, the disease process often progresses gradually and other times patients may not ever develop symptoms. (Wartofsky, 2014). Physiologically, there is a gradual lymphocytic infiltration of the thyroid gland that is often followed by gradual destruction and fibrous replacement of thyroid parenchymal cells. It may take years for initial symptoms to develop and for thyroid hormone levels to become insufficient. Some of the common symptoms include: weight gain, constipation, goiter, and cold intolerance. (Wisse, Zieve, & Ogilvie, 2016) Once symptoms progress, there are many diagnostic tests that can be ordered by a physician to confirm the suspected diagnosis. The principal marker that is characteristic of the presence of the disease is the presence of thyroid autoantibodies (TAb). This is found in the patient’s sera against major thyroid antigens: thyroid peroxidase and thyroglobulin. Anti-thyroid peroxidase (TPO), located at the apical membrane of the thyrocyte, is essential for thyroid hormone synthesis, catalysis of iodine oxidation, iodination of...
There are three main enzymes in the body that are used to digest food: amylase (digests starches), lipase (digests fats), and protease (digests proteins). These enzymes play a major role in every function in the human body; as we age, the production of these enzymes decreases. Although, there are several more enzymes that specialize in this process, this article will focus on understanding the breakdown of amylase and lipase in the digestive system.

The digestive enzymes serum amylase and lipase are of pancreatic origin. These enzymes play a role in the diagnosis of pancreatic diseases. The normal pancreas secretes daily about 1500 ml of fluid. Over 90% of the protein secretion consists of proenzymes or enzymes that pass almost entirely into the duodenum; only a small fraction of these enzymes reaches the blood. The pancreas is located deep in the abdomen and serves as a vital part of the digestive system. Because of the deep location, tumors in the pancreas are very hard to detect. The cells producing digestive enzymes and bicarbonate are known as exocrine cells; that is, they secrete internally via a duct. The pancreas also has endocrine (hormone-producing) cells that produce insulin for control of blood glucose, as well as several other hormones. Both exocrine and endocrine pancreas cells have diseases which affect the pancreas. The exocrine pancreas diseases include pancreatitis (acute, chronic, hereditary, and autoimmune), pancreatic cancer, pancreatic cysts, cystic fibrosis, and pancreatic insufficiency. Those diseases which affect the endocrine pancreas include diabetes.

There are two known types of amylase which specialize on carbohydrates, salivary and pancreatic amylase. Amylase helps the body breakdown starches which convert into sugars. It occurs in human saliva which begins the chemical process of digestion. Salivary amylase is produced in the salivary glands. The salivary glands in the mouth make amylase in which the digestive process breaks down starch and converts into sugars such as maltose and dextrose. This is a reason to limit sugars and starchy food such as rice, pasta, beans, corn, breads, and potatoes in the diet. These foods are detecting a sweet taste as sugar maltose is released. The pancreatic amylase is produced in the pancreas, which completes the digestion of carbohydrate, producing glucose that is absorbed into the blood and carried throughout the body. Glucose is a sugar that is important in the digestive and endocrine system and provides the body with its primary source of