

Adaptive immune response: case study



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Adaptive Response

Abstract

Adaptive immunity is an important part of the immune system. It is the third line of defense in the human body, which includes highly specialized systemic cells and processes that eliminate or prevent pathogenic growth. Once external barriers have been compromised and inflammation (innate immunity) has been activated, the adaptive response is called into action (Huether & McCance, 2012). It develops slower than the innate inflammatory response and is specific—unlike inflammation, which is non-specific—and has immunological memory that recognizes each pathogen by a signature antibody (Huether & McCance, 2012). In addition, the activated B cells and T cells can develop to memory cells that respond rapidly and efficiently to a subsequent encounter with a pathogen. Adaptive immunity response primary obligation is destroying infectious agents that are resistant to inflammation and provides long-term protection against future exposure to the same agents (Huether & McCance, 2012).

Adaptive Response

The adaptive response consists of an antibody response and cell-mediated response, which are carried out by different lymphocytes cells, B cells and T cells respectively. B cells (B indicates bone marrow) are the major cells involved in the creation of antibodies that circulate in blood plasma and lymph, where they have capacity bind to almost any foreign antigen found in the environment (Huether & McCance, 2012). Binding of antibody inactivates virus and microbial toxins by blocking their ability to bind to receptors on host cells. Antibodies, also known as immunoglobulin, are large Y shaped

proteins, which are typically composed of two large heavy pair chains and two small light chains (Huether & McCance, 2012). There are five types of immunoglobulin: IgA, IgD, IgE, IgG, and IgM, which are characterized by differences in structure and function, each has evolved to handle particular antigens (Huether & McCance, 2012). The antibody responses are also called humoral immunity. Another adaptive response is known as cell-mediated immunity responses that activate T cells to combat against a foreign antigen presented on the surface of a host cell. Also, T cells produce signal molecules that trigger macrophages, natural killers (NK), antigen specific cytotoxic T-lymphocytes, and release of various cytokines in responses to an antigen (Huether & McCance, 2012). The purpose of this paper is to explain pathophysiology of disorders presented in the scenarios, including associated alterations, and adaptive responses to the alteration as well as construct a mind map for the selected disorder. Furthermore, consider the epidemiology, pathophysiology, risks factors, clinical presentation, and diagnosis of the disorder and any adaptive responses to alteration.

Scenario 1:

The first scenario the patient's mother mentioned that Jennifer is usually healthy and has no significant medical history. However, physical examination revealed clinical manifestations, which include fever; tympanic membranes slightly redden on the periphery, throat erythematous with 4+ tonsils and diffuse exudate; anterior cervical nodes palpable and tender to touch. The child indicated throat hurts and painful to swallow. Vital signs reveal increased temperature, pulse and respiratory rate that suggested tonsillitis disorder.

Pathophysiology

Tonsillitis is an inflammatory condition of the tonsils due to bacteria, allergies or respiratory problems (Tonsillitis, 2014). When inflamed, tonsils become swollen and red with a grayish or yellowish coating on its surface. Tonsillitis usually begins with a sudden sore throat and painful swallowing. Tonsillitis causes tonsils and throat tissues to swell obstructing air from passing in and out of the respiratory system (Huether & McCance, 2012). The tonsils infection is common in children under age six and teenagers but rare in adults. The adaptive response activates the different B cells and T cells lymphocytes to eliminate the alteration, so body can return back to hemostasis.

Scenario 2:**Pathophysiology**

Irritant contact dermatitis is a common nonimmunologically mediated inflammation arising from the release of proinflammatory cytokines from skin cells (principally keratinocytes), usually in responses to chemical stimuli such as cleansers, soap detergent, and various chemical agents (Hogan & Elson, 2013). The main pathophysiological changes are skin barrier disruption, epidermal cellular changes and cytokine release. Irritant contact dermatitis is a major occupational disease; skin disorders comprise up to 40% of occupational illness (Hogan & Elson, 2013). Patient work history is crucial in making diagnoses, and appearance of the skin. It may be treated with topical agents such as corticosteroid skin creams, emollients or moisturizers to prevent further irritation (Hogan & Elson, 2013).

Scenario 2:

The patient presented with redness and irritation of his hands. The history revealed no allergies or significant medical history except for recurrent ear infections as a child. He denied any unknown exposure to irritants. Also, patient admits to working in maintenance and often working with abrasive solvent and chemical. Normally he wears gloves, but this particular time the patient did not wear gloves. He exposed his hands to some cleaning solutions. The patient's detailed history and clinical manifestations led the student to a diagnosis of irritant contact dermatitis.

Pathophysiology

Stress is any situation that results in a reaction of the human body called the stress response (Huether & McCance, 2012). The stress response is a set of adaptations that are mobilized throughout the body to correct state of allostatic imbalance. This involves a fairly stereotyped set neural and endocrine changes. A critical one is the secretion of catecholamines-epinephrine and norepinephrine from the nerve endings of the sympathetic nervous system projecting throughout the body (Huether & McCance, 2012). Catecholamine induces vasoconstriction and increases in heart rate and blood pressure. It also increases the amount of nutrient and oxygen that is available to the muscle's reaction during a stress response (Huether & McCance, 2012). Another is secretion by the adrenal glands of a class of steroid hormones called glucocorticoids (GCs) ((Huether & McCance, 2012). While there is an array of additional changes in levels of various hormones during stress (generally an increase in circulating levels of glucagon, prolactin, and beta-endorphin, decreases in insulin and reproductive

hormones), secretion of GCs and the activation of the sympathetic nervous system constitute workhorses of the stress response (Huether & McCance, 2012). Some common symptoms can include: increase heart rate, chest pain, poor appetite, depression, and insomnia. Usually, coping strategies are beneficial in helping individuals manage stress physical and psychological (Huether & McCance, 2012). Adaptive responses help prepare the body for fight or flight by activating adaptive immunity response to correct imbalance.

Scenario 3:

The patient in this case study recently retired from her job as an administrative assistance at a local hospital. She does have a history of hypertensive, but controlled for years with medication. Patient reported having problem sleeping, occasionally rapid heart rate, and decrease appetite. She also mentioned her 87-year old mother moved in a few years ago after falling down a flight of stairs and broken her hip. Martha is taking care of her mother who requires enormous amount assistance with activities of daily living. She is worried about her own health at her age and sleep habits therefore clinical manifestations suggested stress disorder.

Mind Map for Tonsillitis Disorder

Epidemiology

Irritant contact dermatitis is common in occupations that involve repeated hand washing or repeated exposure of the skin to water, food materials, and other irritants. High-risk occupations include maintenance, health care workers food preparation, and hairstylists (Hogan & Elson, 2013). The prevalence of occupational hand dermatitis was found to be 55.6% in 2

intensive care units and was 69.7% in the most highly exposed workers. Irritant contact dermatitis is significantly more common in women than men. The high frequency of hand eczema in women in comparison with men is caused by environmental factors, not genetic factors.

Pathophysiology

Irritant Contact Dermatitis (ICD) is a common nonimmunologically mediated inflammation arising from the release of proinflammatory cytokines from skin cells (principally keratinocytes), usually in responses to chemical stimuli such as cleansers, soap detergent, and various chemical agents (Hogan & Elson, 2013). The main pathophysiological changes are skin barrier disruption, epidermal cellular changes and cytokine release hones naïve T-lymphocytes to the skin. Patients with altered barrier function are more prone to ICD.

Risk factors

People who work in occupational hazard environment and handles irritant such as cleaners, nurses, construction workers, mechanics, and agricultural workers are at risk for developing irritant contact dermatitis (Mayo Clinic, 2012). Another risk factor is younger workers often less experienced than their older colleagues or may have a more careless attitude about safety measures causing them to develop the disorder (Mayo Clinic, 2012).

Clinical presentation

Clinically, irritant contact dermatitis presents with scaly erythematous plaques, cracking of the skin, inflammation, dryness, and fissuring. It commonly involves web spaces that extend to the dorsal and ventral surface of the hand and fingers (Mayo Clinic, 2012). Vesicles do not typically form.

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Pruritus can be mild; however, stinging, burning and pain are frequently reported symptoms.

Diagnosis

Irritant contact dermatitis does not need a specific test because ICD can be diagnosed through clinical examination and a careful history. A clinical examination must include a careful look at the distribution of the dermatitis (palmar, dorsal, face, abdomen, web spaces, and fingernails) as well as the extension of dermatitis to wrists or forearms (Mayo Clinic, 2012). The history should include a questionnaire that addresses the individual name and address of the employer; the worker's job's title and a description of functions. The worker should provide a list of all chemicals handled and supply information about them, such as found on the Material Safety Data Sheets (MSDS) in order to provide an appropriate diagnosis (Mayo Clinic, 2012).

Adaptive responses to alteration

Harding or accommodation has been defined as the adaptation of the skin from altered local expression of multiple cytokines and inflammatory mediators with repeated irritation from skin irritants. Accommodated skin has a relatively thicker layer of stratum granulosum versus normal skin. Accommodated skin may exhibit a slight sheen and glossy appearance with a mild scale. On manipulation, there may also be a slight loss of elasticity (Huether & McCance, 2012).

Conclusion

When successful, an adaptive immune response terminates infection and provides long-lasting protective immunity against the pathogen that

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provoked response. Adaptive immunity is an evolving process within a person's lifetime, in which each infection changes the make-up of that individual's lymphocyte population. Adaptive immunity is an evolving process within a person's lifetime, in which each infection changes the make-up of that individual's lymphocyte population (Huether & McCance, 2012). These changes are neither inherited nor passed on but, during the course of a lifetime, they determine a person's fitness and their susceptibility to disease. Failures to develop a successful adaptive response can arise from inherited deficiencies in the immune system or from the pathogen's ability to escape, avoid, or subvert the immune response. Such failures can lead to debilitating chronic infections or death (Huether & McCance, 2012).

References

Golden, S. & Shaw, T. (2013). Hand dermatitis: Review of clinical features and treatment options. Retrieved from www.cutis.com/fileadmin/content.../SCMS_vol32_No3_Golden.pdf

Hogan, D., & Elston, D. M. (2013). Irritant contact dermatitis. Medscape. Retrieved from emedicine.medscape.com/article/1049353-overview

Huether, S. E., & McCance, K. L. (2012). Understanding pathophysiology (Laureate custom ed.). St. Louis, MO: Mosby.

Mayo Clinic. (2012). Tonsillitis. Retrieved from www.mayoclinic.org/diseases.../tonsillitis/.../con-20023538

Tonsillitis. (2014). In *Encyclopedia Britannica*. Retrieved from <http://www.britannica.com/Ebchecked/topic/599370/tonsillitis>

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