

Immune System Group Project Report

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Introduction: The assignment for immune system class focused in 3 parts. First, Basic concept of immune system, Second, Phase of wound healing, Third, Acupuncture points which enhancing healing.

First, one of the common definitions about immune system is, a group of organs that work together to defend from foreign substances which are harmful to human body¹. (e.g. pathogens, parasitic worms, allergens, fungus, *etc.*). The group of organs that play the role for defense mechanism is from the thymus, spleen, lymph nodes, macrophages, lymphocytes which included the B cells, T cells, proteins, and antibodies, etc.. Also, includes special deposits of lymphoid tissue by gastrointestinal tract and bone marrow do the great work of keeping human health and preventing infections*. The principal of defense mechanism is the organ system that detect and distinguish the self from non-self. For example, immune cells, such as the white blood cells, also called leukocytes, which come in two basic types that combine to seek out and produce an immune response against non-self or foreign bodies leading to immunity, protect against diseases. The two basic types of leukocytes are: phagocytes, cells that chew up invading organisms, and lymphocytes, cells that allow the body to remember and recognize previous invaders and help the body destroy them. A number of different cells are considered phagocytes. One of the most common type of phagocytes is the

neutrophil, which is part of the core mechanism of the healing process, because it's primarily function is to fight bacteria.

Second, the phases of wound healing consist of three parts²;

Inflammatory phase: The inflammatory phase which takes up to 3 days, is the body's natural response to injury. After initial wounding, the blood vessels in the wound bed contract and a clot is formed, which usually is aided by Inflammation by platelets, neutrophils, and macrophages. To clear debris in about a 48 hrs. period, clot formation, vessel permeability and neutrophil migration into tissue happens.

Proliferation Phase: The proliferation phase usually started day 3 to weeks after the wound.

During proliferation, the wound is 'rebuilt' with new granulation tissue which includes action of Fibroblasts, myofibroblasts, endothelial cells, keratinocytes, macrophages, deposition of granulation tissue and type III collagen, angiogenesis, epithelial cell proliferation, dissolution of clot, and wound contraction (mediated by myofibroblasts). Healthy granulation tissue is dependent upon the fibroblast receiving sufficient levels of oxygen and nutrients supplied by the blood vessels. Healthy granulation tissue is granular and uneven in texture; it does not bleed easily and is pink / red in color. The color and condition of the granulation tissue is often an indicator of how the wound is healing. Dark granulation tissue can be indicative of poor perfusion, ischemia and / or infection. Epithelial cells finally resurface the wound. Delayed wound healing in vitamin C deficiency and copper deficiency.

Maturation phase: The maturation phase takes from 1 week–6+ months after wound. Maturation is the final phase and occurs once the wound has closed. This phase involves replacing process which type III collagen to type I collagen. Tensile strength of tissue is increasing, because the cellular activity reduces and the number of blood vessels in the wounded area regress and decrease. Delayed wound healing in zinc deficiency.

Third, Acupuncture points which enhancing healing: The characteristic that acupuncture enhances resistance is closely related with the immune system, which functions in defense, homeostasis, and surveillance. More and more research has revealed that acupuncture can regulate immunity, for example, to enhance anticancer and anti stress immune function and exert anti-inflammation effects. This may be the basis of acupuncture in preventing and treating later diseases. This special issue was developed to stimulate the continuing efforts in promoting the research on acupuncture and immunity.

The acupuncture point ST36 (Zusanli) is widely applied in immune-related diseases. In “Electroacupuncture at Bilateral Zusanli Points (ST36) Protects Intestinal Mucosal Immune Barrier in Sepsis” M. Zhu et al. reported that EA preconditioning at ST36 obviously ameliorated CLP-induced intestinal injury and high permeability and exerted protective effects on intestinal mucosal immune barrier by increasing the concentration of sIgA and the percentage of CD3+, γ/δ , and CD4+ T cells and the ratio of CD4+/CD8+ T cells, which eventually decreased the mortality of sepsis^{3*}.

One study indicates that DU14 (Dazhui) combine with LI4 (Hegu) increased TEAS white blood cell counts significantly³. In this study, stimulating Zusanli (ST36) induces corticotropin-releasing

factors, which enhance the function of the pituitary, adrenal cortex, and sympathetic–adrenal systems and the secretion of vasoactive substances, ultimately adjusting the pressure in the marrow cavity, regulating bone marrow blood flow, and promoting the formation of white blood cells (20). In this study, TEAS increased white blood cell counts. Medication with prophylactic agents also increased white blood cell counts. The white blood cell count was decreased from the beginning of chemotherapy and reached its lowest level on day 14. From day 21 onwards, the white blood cell count began to rise, but the number of white blood cells was higher in the TEAS group than in the control group, indicating that acupuncture point electrical stimulation can increase the white blood cell count⁴.

Conclusion: ST36, LI4, DU14 are very useful points to enhancing immune system.

Reference:

1. <https://toxtutor.nlm.nih.gov/08-003.html>
2. <http://www.clinimed.co.uk/wound-care/education/wound-essentials/phases-of-wound-healing.aspx>
3. Evidence-Based Complementary and Alternative Medicine Volume 2015 (2015), Article ID 260620, 2 pages <http://dx.doi.org/10.1155/2015/260620> Editorial
4. <http://jtd.amegroups.com/article/view/12453/html>

* Pacifically related contents are highlighted.