



A Science of Medicine
The Art of Care

The Challenging Response of Physis to Inflammation

Part 2: Nature and Role of Inflammation- Benefits and Drawbacks

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Background



The role of inflammation in the process of healing has been misunderstood for many years. Recent neurological and immunological research has shed light on its importance in the human healing process. A clear shift in science is taking inflammation away from being the enemy of health and a condition to be suppressed and or eliminated, to one in which its importance and role is allowed to proceed. ¹

The Role of Inflammation

As part of the immune response, inflammation plays an important role in defending the body against pathogens such as viruses, bacteria, fungi, and other parasites. Acute inflammation releases leukocytes, erythrocytes and components of plasma into the affected tissue. If the inflammation is not corrected it can lead to chronic inflammation.

Chronic inflammation releases lymphocytes and macrophages into the affected tissue, and it is closely associated with allergies, atherosclerosis, cancer, arthritis, and Alzheimer's disease, as well as autoimmune diseases.

Biochemical influences, such as the imbalance of dietary fats, absence of specific substances that adversely affect the production of anti-inflammatory cells, as well as specific nutrient problems, result in chronic inflammation. ²

A scientist at the La Jolla Institute for Allergy & Immunology, Klaus Ley, reported in a study published in Nature, that neutrophils are the human body's first line of defence; “they are the main cells that protect us from bacterial infections”. Their protective function is a positive one; however, they also have inflammatory properties that may eventually lead to heart disease and several autoimmune diseases, such as lupus. Effectively manipulating neutrophils is vital in disrupting inflammatory diseases.³

Functions of inflammation

1. Inflammation is the first step in the healing or repair process after some physical or chemical injury or stress. It is a normal bodily function and it is a healthy action when it is controlled. If there no inflammation even a small cut on the finger could lead to death.
2. Inflammation prevents the spread of damaged cells to other areas of the body that could cause secondary problems. A local infection, for example, can be contained due to the inflammatory response, instead of causing a body-wide infection.
3. Inflammation rids the body of damaged and dead cells.²

Benefits of inflammation

- Destruction of microbes, thereby eradicating infection
- Detoxification of toxins
- Clears infections
- Facilitates in the healing process
- Repairs damages tissues

Drawbacks of inflammation

Inflammatory responses may be harmful, such as in an anaphylactic shock. Inflammation of the peritoneum, leads to fibrous bands that cause intestinal obstruction. Pericardial inflammation results in the formation of dense pericardium that impairs the functioning of the heart.

The Role of the Immune System



“Behind every natural action of the human body is an inherent wisdom, a mechanism that allows the body to heal itself. No herb, food or any other substance or procedure can do anything on its own to heal; it can only aid and assist the body in its own self-healing role. If your finger is cut, it is not the stitches or the bandage or the iodine that causes it to heal; it is the skin itself that performs this miracle. Tibb calls this ‘Physis’.⁴

Our innate immunity is what is naturally present in our bodies when we are born, and not the adaptive immunity we get after an infection or vaccination. Innate immunity is generally non-specific, while adaptive immunity is specific to one pathogen, such as the development of antibodies after a vaccination.⁵

Inflammation is a protective attempt by your body to remove harmful stimuli and to initiate the healing process, without which, recovery process would be much slower.

The endocrine glands produce and secrete hormones, which work as blood-borne chemical messengers in many of the processes of metabolism, growth and reproduction. Tibb believes that the endocrine system is under the control of the liver, which has a hot and moist quality, and the glands also have qualities of heat and moisture. This has a dominance of heat, with varying degrees of moisture. The pituitary gland has more moistness than the thyroid gland, whereas the adrenal gland has the least amount of moistness.

Each endocrine gland has a distinct role in the body, but these actions overlap, which affects each other indirectly, such as in the over-active or under-active gland. Most disorders associated with the endocrine system are the result of qualitative changes to the appropriate glands.

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The thymus gland

The word, 'thymus', comes from the ancient Greek word, 'thymos', which Galen described as meaning 'a warty excrescence or growth' resembling a bunch of thyme. In ancient Greece the thymus gland was believed to be the seat of the soul, volition, temperament, courage and emotions, as well as the organ of purification of the nervous system. Gorillas display their strength and courage before a fight by beating the chest with its hands over the breastbone. This is the innate reaction to stimulate the thymus gland.

The modern view of the thymus gland is the belief that it is the 'brain' of the immune system of the body. It is part of the endocrine system, and it is located behind the breastbone in front of the heart, and it consists of two lobes that join in front of the trachea.

Galen observed that the thymus is at its largest during infancy. It shrinks with advancing years. The glandular tissue converts into connective and fatty tissue. The shrinking of size of the thymus results in a reduction of the number of T-lymphocytes, thereby weakening the immune system.

Its function is to transform lymphocytes (white blood cells) into T-cells, which are transported to the lymph glands. T-cell maturation is regulated by hormones,

including thymopoietin and thymosin, which are produced by thymic epithelial cells.⁶ Fever and Swelling of the lymph glands are a signal that immune cells are multiplying to fight off invaders of the body, such as bacteria, viruses, fungi, or parasites.

One of the primary functions of the thymus is to prevent autoimmunity. Autoimmune diseases are caused by a hyperactive immune system which reacts against the host organism (self) causing disease, instead of attacking the foreign pathogens.

Lymph nodes

Lymph nodes function as filters of tissues and tissue fluids, which trap foreign organisms, cell debris and tumour cells. They are sites of origin and production of lymphocytes for normal physiological functions.

Lymph vessels route the fluid through nodes that are located throughout the body. Lymph nodes are small structures that work as filters for harmful substances. They contain immune cells that can attack and destroy germs in the lymph fluid to help fight infection.⁷

Inflammatory conditions often lead to enlarged nodes, and it is a sign of blocked energy and toxins in the lymphatic system. The body reacts by moving the toxins out of the body via the excretory channels, namely: faeces, urine, skin, lungs and menses (in females). Excretion from the skin may be in the form of an abscess, boil, cyst, pustule or tumour.

The spleen

The role of the spleen in patients with ulcerative colitis and Crohn's disease was assessed by counting pitted erythrocytes with differential interference microscopy and by splenic ultrasound. This research may show marked hyposplenism and remain at risk of overwhelming infection and operative complications.⁸

The immune system may trigger an inflammatory response when there are no foreign substances to fight off, as in autoimmune diseases. The protective immune system is not able to protect the body, resulting in damage to its own tissues. The body responds as if normal tissues are infected or somehow abnormal, as in the case of arthritis, such as rheumatoid gouty arthritis; the most common being osteoarthritis.

The Five Cardinal Signs of Inflammation

The first four cardinal signs are commonly referred to as the classical acute inflammatory response, as a result of a traumatic event, such as a muscular tear. The fifth sign results in chronic conditions, with varying degrees of loss of function.

1. Pain (dolor)
2. Redness (rubor)
3. Swelling (tumor)
4. Heat (calor)
5. Loss of function (functiolaesa)

These five signs are the result of an acute inflammatory response to try to rid the body of the irritant, stimuli, damaged cells or pathogens, in order for the healing process to take place. However, these signs are only evident if the inflammation is very close to the surface of the skin. If it is deeper in the body, the internal organs may not have the sensory nerve endings to pick up the pain response, but as in the case of pneumonia, the inflammation causes swelling which pushes against the parietal pleura, resulting in pain.⁹

The Five Cardinal Signs of Inflammation

1. **Pain** (dolor)

In acute inflammation the immediate injury causes acute pain, which is a defence mechanism to alert the body to move away from the site. This acute pain is sharp and stabbing, which ends when no longer in contact with the source of the damage.

- Secondary pain is deep and spreading, which may last for minutes, hours or longer, depending on the extent of the injury. The instinctive reaction is to keep the injured part as still as possible and to protect it during the course of the healing process. The damaged cells cause rupturing of its walls, and it is the release of small particles into the surrounding tissue which trigger the sensory nerves to produce this on-going secondary pain.
- Inflammation primarily causes pain because the swelling pushes against the sensitive nerve endings, as well as other biochemical processes, which send pain signals to the brain.⁹

2. **Redness** (rubor)

Initially vasoconstriction occurs which decreases the flow of blood to protect the body from losing too much blood. The sensory nerves react by stimulating the small blood vessels (arterioles) to dilate, which increases the flow of blood to the site of the inflamed area, causing redness, and increasing the permeability of the walls of the blood vessels. This increase in blood flow

enables the white blood cells to flow out of the arteries and veins into the surrounding tissue, in an effort for the immune system to defend itself from the possible invasion of pathogens.

3. **Swelling or Oedema** (tumor)

The damaged cells release chemicals including histamine, serotonin, bradykinin, and prostaglandins. These chemicals cause blood vessels to leak protein rich fluid into the tissues. There is an increased hydrostatic pressure, caused by vasodilatation, decreased osmotic pressure due to leakage of high protein fluid, resulting in a marked outflow of fluid, with the formation of oedema. This process helps to isolate the foreign substance from further contact with body tissues.

4. **Heat** (calor)

Initially there is just a minimal amount of capillary permeability, with no escape of proteins or cells, resulting in the swelling being mainly composed of water and dissolved electrolytes (transudate). When there is an increase in capillary permeability, the plasma and proteins escape causing the extravascular fluid to become cloudy and more viscous (exudate). This fluid contains a large amount of leucocytes, also referred to as pus.¹⁰

The loss of protein from the plasma reduces the intravascular osmotic pressure, and increases the osmotic pressure of the interstitial fluid. This increased blood flow through the dilated vessels, as well as the increase in the hydrostatic pressure, causes an outflow of fluid into the interstitial cells, resulting in oedema.¹¹

Heat is produced as the result of this increased flow of blood flow, as well as the increase of the levels of prostaglandin E2 in the brain. The hypothalamus responds by increasing the temperature of the body, which may result in fever, which aids in the defence of the body against infection. This increase in temperature decreases the rate in which bacteria can divide, thus slowing down the spread of infection. Fever also accelerates the speed at which the immune cells divide, in an effort to counterattack the invading bacteria.

From a Tibb perspective, all four humours are in balance, in a healthy person, in relation to the temperament of the individual. However, if there is a surplus or imbalance (dyscrasia) of one fluid, then the temperament and physical health is negatively affected. The body changes the proportions of the humours and commences to generate heat (a fever) in order to “boil off” the affected humour(s). This process is called “coction”. Usually some discharge will be seen during this time, such as pus, which represents the removal of the

affected humour(s) by the body. The increase in fever facilitates the coction process of the excess/abnormal humour.

Most inflammatory conditions are the result of excessive heat, followed by dryness.

Lethargy

In order to raise the body's core temperature, the body has to work harder, thereby utilising more energy. For every one degree Celsius increase, the body requires about 10-13 per cent more energy. Physis reacts by causing lethargy and apathy which reduces the energy output.¹²

5. Loss of function

“*Function laesa*”, or loss of function, was originally referred to as ‘rigor’. Pyrexia is the elevation of the normal body temperature, which may occur, amongst other causes, as a result of bacterial or viral infections. Pyrogens are secreted by toxic bacteria, and which are released from degenerating tissues of the body, which cause fever during disease conditions. The results include tissue destruction, pyrogenic substances or dehydration. The pathologic consequences of hyperpyrexia are localized haemorrhages and degeneration of cells throughout the body. Pain or loss of function is associated with various substances released by damaged tissues that act on local nerve endings.¹³

In addition to the physical changes, there are the psychological ones, which include lethargy, apathy, loss of appetite and increasing sensitivity to pain, which can be very debilitating.

Summary

Inflammation protects the body by removing harmful stimuli and by initiating the healing process, without which, recovery process would be much slower. Tibb views inflammation as an essential part of the body's attempt to heal itself, by promoting Physis to restore internal balance within the body.

The presenting signs and symptoms of an acute inflammatory response are both warning and protective mechanisms of the body by getting rid of the irritant, stimuli, damaged cells or pathogens in order to facilitate healing. Any attempts to impede this natural process will interfere with the innate healing ability of Physis, with the resultant chronic inflammatory process, which can lead to many serious conditions and loss of functioning.

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