

Inflammation in Atherosclerosis

By Leon Hammer, MD, Robert Heffron, MD and Kathleen Leavy, RN
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ABSTRACT

The relationship between systemic inflammation (Chinese “heat”) and atherosclerosis has been known and treated accordingly for hundreds, perhaps even thousands, of years. Through the use of herbs, acupuncture, and lifestyle changes, prevention of atherosclerosis, myocardial infarction, and stroke is possible. This article reviews the etiology of heat (inflammation) and its manifestations. Two case reports illustrate the diagnosis and treatment of cardiovascular conditions in patients with cardiac infarction and angina-like symptoms. The author concludes that Chinese treatment at any stage of the process is inexpensive, effective, available, and without adverse effects.

KEY WORDS

C-Reactive Protein, Inflammation, Myocardial Infarction, Acupuncture

INTRODUCTION

Investigators have determined that inflammation may be important in the pathogenesis of atherothrombosis.¹ C-reactive protein (CRP) is an acute-phase reactant that is a marker for underlying systemic inflammation. It can be used to measure arterial inflammation, thus predicting the risk of future myocardial infarction (MI) and stroke.⁽¹⁾

Van der Wal and associates² describe extensive postmortem analyses of 20 patients who had acute MI in which the site of plaque rupture of the implicated fatal coronary artery was trace in serial sections. They found that while the atherosclerotic plaque morphology was complicated and heterogeneous and complicated with regard to architecture and cellular composition, an inflammatory process was uniformly present.

Liuzzo and colleagues³ reported their study of CRP in 31 patients with chronic unstable angina and 29 patients with acute MI. Creatine kinase and troponin T levels were normal, but CRP levels were elevated. Elevated CRP levels at hospital admission were associated with poor outcome in patients with unstable angina.

In April 1999, Verheggen and colleagues⁴ examined 211 patients with unstable angina over an 18-month period. CRP, fibrinogen, and sedimentation rates were significantly higher in patients in whom refractory unstable angina occurred than in patients who were stabilized by medical means. The relationship of inflammatory markers to poor outcome was not affected by the presence or absence of myocardial necrosis as indicated by troponin T levels. There was no association of markers of coagulation activation or of endothelial dysfunction with in-hospital outcome. The authors concluded that these results suggest that an increase in inflammatory activity reflects the severity of the underlying process and determines in part the clinical course of unstable angina.

The relationship between systemic inflammation (the Chinese term is “heat”) and atherosclerosis has been known and treated accordingly for hundreds, perhaps even thousands, of years. Through Chinese medical diagnostic techniques, especially pulse diagnosis, it is possible

to detect this process almost from its inception, decades before the process becomes symptomatic (Figure 1 [13-3]). Through the use of herbs, acupuncture, and lifestyle changes, prevention of atherosclerosis, MI, and stroke is possible.

GENERAL PATHOGENESIS

In Chinese Medicine, there are external and internal pathogens. The internal ones are primarily emotions that are either suppressed, repressed, or out of control, or abuses of the normal life processes and rhythms. The latter includes excessive and/or improper food and drink, irregular eating, bowel, urination, or sleep patterns, or excessive sex, work, or exercise.

The results are either the slowing down of physiologic function due to suppression-repression or exhaustion, or physiologic chaos. Each takes a separate course that can be determined by the astute clinician from almost the beginning of the process.

Regarding atherosclerosis, there are at least two processes: one involving the internal pathogen heat (inflammation) and the other a deprivation of the vessel walls of fluids due to functional chaos also leading to heat and inflammation from dryness. A third process is the accumulation of damp (lipids) in the blood representing the body's attempt to cool the blood. When the production of heat outruns the ability to cool, the process of atherosclerosis accelerates and the accumulation of damp complicates the process.

Specific Pathogenesis of Heat (Inflammation), Repression, Origin, and Process

The primary source of heat in the vessels comes from daily moderate repression of emotion, involving an internal conflict. It involves two opposing forces: an "irresistible force" of the active energy of the body that demands movement, at an impasse with the "immovable object" of repression, which opposes creating a stalemate (the Chinese term "stagnation"). Slowly growing anger and resentment that cannot be expressed directly is a classic example of this dilemma, which some refer to as "impotent rage."

The issue is the stagnation of the moving of the energy that generates function. In Western biomedical terms, one could think of the inhibition of the Krebs and Cori cycles (ATP [adenosine triphosphate]). In Chinese terms, the organism requires more energy at the location of the stagnation so that the impasse is overcome and movement returns to its normal flow and rhythm.

Therefore, energy (qi) is generated in the form of metabolic heat (yang) in the affected area; in Chinese physiology, most often, the Liver. If the "immovable object," the constraint against expressing the emotion, is stronger than the "irresistible force" of the metabolic heat of the body, this heat tends to accumulate in the Liver (Constrained Liver qi).

In Chinese Medicine, the Liver is said to store the blood (an observation available to even a casual observer of the organ). Therefore, the accumulating heat will gradually be transferred to the blood that functions here to eliminate the heat. This leaves excess heat in the blood, which during its circulation in the vessels shares this heat with the vessel walls. In Western biomedicine, this is identified as inflammation. The heated blood also expands against the vessel walls, leading to their gradual distension and weakening. It would be reasonable from a Chinese perspective that, at this point, elevated CRP is present.

Restoration

Another process occurs simultaneously, one that advances the process of damage to the vessel walls. As the excess heat accumulates in the Liver and vessels, the organism wishes to either eliminate it, which is difficult as long as the impasse remains, or balance it by bringing cooling fluid (yin) to the Liver and blood. Over time, the available cooling fluid (Chinese Medicine says supplied largely by the Kidney) is depleted, and the body begins to become dry. This dryness and loss of nourishment eventually affects the vessel walls, which harden, lose their flexibility, and gradually become brittle.

Consequence

Both the inflammation from the excess heat and the brittleness from the drying process create an ideal environment and foci for the deposition of heavy materials from the blood, minerals, and lipids, which are the substance of the plaques that are identified with atherosclerosis.

Overactive Nervous System

Excess heat and the consequent depletion of fluid to balance can also be due to an overactive nervous system (agitated qi). Reasons such as anxiety, worry, obsession, and emotional shock stimulate the nerves of all organs. This becomes a vicious cycle because the drying process makes the nerves more irritable, creating more heat and requiring more fluid in the organs and the blood. The effect on the vessel walls is the same as described above. The etiology of an overactive nervous system can be constitutional (vigilance) or from circumstance.

Spices, Shock, and Increased Blood Density

Blood heat (inflammation) can also be caused either by excessive consumption of hot and spicy foods or excessive fat and sugar consumption. The former cause is obvious; the latter comes from the energy (heat) required to overcome the increased density of the blood. Actually, anything that causes a slowing of circulation will lead to this scenario, including trauma and heart disease.

Trauma is a shock to the circulation causing it to constrict; the slowing of circulation and relative increase in blood density from heart disease again requires an increased effort with metabolic heat to move the blood. When the effort is not successful, the organism eventually becomes exhausted of fluids as well as energy, leading to an inflammatory condition in the vessels in an exhausted person.

Chemical Stress and Infection

Another important source of excess heat (inflammation) from a Chinese perspective is chemical stress, including solvents in industry or used by artists, from stimulants, especially the widespread use of caffeine, and recreational stimulants such as cocaine and amphetamines. Likewise, a Liver that is weakened by disease or abuse will be less able to deal with the toxic assault of these chemicals (I have experienced where infection or toxicity creates acute internal

heat.) Ridker et al refer to "previous infection with *Chlamydia pneumoniae*, *Helicobacter pylori*, herpes simplex virus, or cytomegalovirus" as "a source of inflammation detected by C-reactive protein."¹

Overwork and Overexercise

Several etiologies of heat (inflammation) exist that may be difficult for the Western mind to grasp. In Chinese Medicine, the Liver recovers energy and provides increased vigor, a stressor when people exercise excessively or work exceptionally long hours, which impels the Liver into a state of exhaustion. The heat in the Liver, and consequently in the blood which it "stores," occurs from the metabolic heat brought to the Liver to keep up with the abusive demands on its function.

Sudden Cessation of Excessive Exercise and Work

Suddenly ceasing extreme exercise or work, especially in a young person, is another etiology of the heat (inflammatory) condition of the vessels. Because this is a more acute situation, it can lead to more profound symptoms than those due to overexercise and overwork.

The pathogenesis is that exercise causes the vascular system to expand to accommodate the increased volume of blood that is necessary to satisfy the nutritional requirements of heavy exercise; the blood vessels are therefore more dilated than normal. When the exercise is stopped abruptly, the amount of blood in the vascular system decreases suddenly, but the vessels themselves tend to remain expanded. In Chinese medical terms, that division between the 2, i.e., decreased blood volume (fluid-yin) and the still-expanded vessels (heat-yang), infers that the fluid (yin) has lost control of the heat (yang). The heat in the vessel walls cannot be balanced with fluid and slowly becomes dry and inflexible, which, in Western terms, is an inflammatory state leading to all the vascular conditions for plaque formation and atherosclerosis.

In addition to the inflammatory condition of the vessels, this etiology and pathogenesis causes severe physiological chaos that is especially disorganizing to the nervous system. In Chinese terms, this depends on the organized functional integrity of the normal heat (lighter, faster-moving energies) at the surface, in this instance, the vessel walls.

Abruptly discontinuing exercise occurs frequently among youths who have participated in high school athletics but refrain at the college level. At this point in their lives, there can be a sharp reduction in physical activity with ensuing vague complaints of tiredness, migrating pain, labile emotions, severe anxiety, explosive anger, feelings of dissociation and detachment, and other mental disturbances. There can be a sensation that the body and arms are floating away, that the body is not real, a terror-producing sensation. Such mental and emotional symptoms are particularly severe if the nervous system is already tense or weak. Often, these young people are seen by psychiatrists who often diagnose anxiety neurosis or panic attacks (demonstrating that energetic chaos is misunderstood in the biomedical world). Lifelong emotional problems can develop and are compounded by pharmacological and shock therapy.

CLINICAL MANIFESTATION

Several stages to the pathogenesis of excessive heat (inflammation) and the drying process exist, manifested clearly on the pulse and the tongue. The body attempts to maintain homeostasis by which the excess heat is released through the bowels, urine, breath, and perspiration, and the drying process is balanced by an increased supply of fluid to the vessel walls.

The Heart and Kidneys are greatly burdened maintaining these functions leading over time to an elevated blood pressure. The excess heat tends to increase, causing headaches and an even greater fragility of the vessels in the upper part of the body and brain, increasing the possibility of a cerebrovascular accident. The excessive heat (inflammation) in the blood has a vulcanizing effect on the intima of the vessel walls. This process of hardening is complicated by the later drying caused by the loss of fluid, both of which create an inflexibility and fragility that, in Western terms, is an inflammatory state leading to all the vascular conditions for plaque formation and atherosclerosis, MI, and stroke. (Within Chinese Medicine, other considerations exist in the etiology and pathogenesis of atherosclerosis, hypertension, and stroke, outside the scope of this discussion.)

CASE REPORTS

Case 1

History

A 40-year-old man presented with a history of cerebral infarction due to clotting with hypertension. The patient was left-handed; stroke affected his right side. The infarction occurred 8 years ago, and he was able to walk without impediment but has limited use of his right hand, especially for tasks that require fine motor control or strength. He has contracture of the right hand and arm with cold weather. His complaints included low backache, left heel pain, headaches, spontaneous sweating, loose bowels, thirst, insomnia, and anxiety. He gave consent to try acupuncture and other modalities for treatment.

The patient was a cattle rancher and thus engaged in daily hard physical labor outside in the Florida heat. He took a combination diuretic/angiotensin-converting enzyme inhibitor with blood pressure readings averaging 160/90 mm Hg.

Examination

Pulse: General; Heat in Blood; Thin, Tense-Tight; Slippery, Robust Pounding.

Tongue: peeled and red on the front third and sides; thick yellow greasy coat on the root.

Diagnostic Summary

Blood heat; blood and yin deficiency; Liver qi stagnation.

Damp heat in the Spleen, Stomach, and Intestines.

TREATMENT (1 year)

Principles: Remove heat from the blood; calm the mind; extinguish wind; nourish yin and blood; tonify qi, and drain damp heat in the Lower Burner (Jiao).

Acupuncture treatment consisted of scalp and body acupuncture.

Scalp acupuncture focused on Foot Motor Sensory bilaterally; Vascular Motor Cortex; Motor Suppressor Cortex on L Lower 3/5 and 4/5; Apraxia L; Motor Cortex L Lower 3/5 and 4/5.

Body acupuncture performed at L.I.-15, L.I.-11, L.I.-4, SJ-5, SJ-14, SP-10, SP-6, GB-39, KI-3, KI-1, and LV-3.

Moxibustion on SP-10 (specifically used to remove heat and toxins from blood).

Herbs (patent formulas) included:

Gastrodia and Uncaria (Tian Ma Gou Teng Yin), which contains 2 herbs specifically to remove heat from the blood: Scutellaria (Huang Qin) and Gardenia (Zhi Zi). Other herbs in the formula help to overcome the effect of the heat on the nervous system (wind) and avoid stroke: Gastrodia (Tian Ma) and Uncaria (Gou Teng). The formula also contains herbs to calm the mind, improve blood circulation, and nourish the Liver and Kidneys.

Four Marvel (Atractylodes Cang Zhu, Phellodendron, Achyranthis, and Coix), a formula that clears heat and resolves dampness. Used for severe numbness and weakness in the lower extremities.

RESULTS

The patient's response to treatment was good. His blood pressure was better controlled at an average of 132/72 mm Hg. His ability to use his right hand for daily work improved by 25%-40%. Low back pain, heel pain, and headaches disappeared; he reported better sleep and less anxiety. Bowels were still loose, he continued to report thirst, and he noted less spontaneous sweat though still sweating in heat with activity.

Case 2

History

A 54-year-old woman presented with a 25-year history of both hypertension and diabetes. Her pharmacological regimen included atorvastatin, glipizide, hydrochlorothiazide, metformin, and valsartan. The patient's blood pressure and blood sugar were not well controlled; average blood pressure was 189/90 mm Hg; average blood sugar was 150 mg/dL. She presented with an unstable angina-type symptomatology including episodes of chest pain from sharp and transient to crushing, which were only relieved by rest and nitroglycerine; spontaneous sweating; shortness of breath with meals and on exertion; and a severe infection of the gums and teeth. She provided consent to try acupuncture and related modalities for treatment.

Examination

Pulse rate was rapid, ranging from upper 80s/min to 90s/min.

Proximal positions (Kidney): Thin, Tense-Tight, Wiry.

Blood Thick (severe blood heat + damp [lipids]).

Left distal and middle positions (Heart and Liver) were Choppy (sign of blood stagnation in the Heart and Liver).

Heart Enlarged and Large Vessel (sign of aneurysm) positions.

The Wave was Flooding Deficient (sign of general qi deficiency) and there was a Ropy quality.

The tongue was pale, with darker red blotches (sign of qi deficiency with some heat); purple in the front third and sides (sign of blood stagnation in Heart and Liver) with a thin yellow coat (a sign of mild of heat in the gastrointestinal system).

Diagnostic Summary

Blood Thick (severe blood heat + damp [lipids]); Heart and Liver blood stagnation; Heart shock; general qi deficiency; Heart qi and blood deficiency; Lung qi deficiency and stagnation; yin deficiency of the vessels; Kidney essence deficiency (Tight-Wiry qualities in proximal positions).

TREATMENT (6 visits)

Herbs

Treatment to unblock the blood and reduce heat in the blood to avoid cardiac infarct and stroke. Heat in the blood was reduced indirectly. Explanation: Heart blood stagnation creates heat in the Heart and the circulation, since metabolic heat is mobilized to overcome the stagnation.

Specific Herbs: Yunnan Bai Yao [to move blood stagnation and stabilize circulation, and to cool the blood in the presence of fulminating pyrogenic infections (her gums and teeth)]; Dan Shen Yin [moves blood in Middle Burner and Heart, cools the blood and soothes irritability and is anti-inflammatory].

Overcoming the Effect of Heart Shock. Explanation: Shock to the Heart reduces its output, reducing peripheral circulation that increases the heat in the blood, since metabolic heat is mobilized to overcome the stagnation in the blood. Specific Herbs: Sheng Mai San [Heart Shock- Heart Qi and Yin deficiency].

Acupuncture was performed to remove heat from blood: GV-14; LI-11; SJ2; KI 1.

Moxibustion at SP-10

Move the blood: Chong mai [SP-4 and PC-6]; BL-17, BL-17B

Heart Shock: BL-13, BL-15, BL-43.

Build qi [spontaneous sweating; shortness of breath with meals and on exertion]: BL-20; BL-23, SP-6; HT-5 to HT-7 [through and through]; ST-36; L.I.-4; Ren -6; Ren-4; Ren-17; and Ren-12.

RESULTS

Treatment stabilized angina and lowered her blood pressure to the 160/90 mm Hg range. Based on the above diagnostic findings, and therefore due to concern regarding the condition of her heart, blood, and vessels, I encouraged the patient to consult with her primary care physician.

When this consultation gave no results, (angiogram, etc) I advised securing a new physician. After another month, a second opinion was sought and she was immediately hospitalized for tooth extraction and a 5-vessel bypass graft after finding all 5 vessels over 95% blocked.

CONCLUSION

The concept of inflammation (heat in the blood), as part of the pathogenesis of atherosclerosis and stroke that has recently entered the Western biomedical model has existed in Chinese medicine for hundreds, perhaps thousands, of years. Today within Chinese medicine, there exists a profound understanding of etiology, early inexpensive and noninvasive diagnosis (prevention at the beginning of a process that takes perhaps 30 years to manifest as clinical disease), and treatment at any stage of the process that is also inexpensive, effective, available, and without adverse effects.

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AUTHOR INFORMATION

Dr Leon Hammer is President of Governing Board, Dragon Rises College of Oriental Medicine in Gainesville, Florida.

Dr Robert Heffron's specialty is Internal Medicine, and he practices IM and Chinese medicine in Providence, Rhode Island.

Kathleen Leavy, RN, is a core faculty member at Dragon Rises College of Oriental Medicine in Gainesville, Florida.