

## Review

### Lymph – The Essence of Life

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#### ABSTRACT

*Lymph is the cream of all we eat and drink. In fact, it is the cream of all creams. Biologically, lymph contains most ingredients of the blood except red pigment. It has same composition as of the interstitial fluid and works for the defense of the body. However, as per Yoga psychology, lymph is a hormone and other glands, use this to manufacture their respective hormones. It is also the food for the brain cells and the cause of psychic change. Most importantly, its formation is affected by physical and psychic environment to which the role of microvita may be further added. The present article deals with the prevailing scientific knowledge, the concept of yoga psychology, the new science of bio-psychology and the microvita, regarding importance of lymph and the possible future scientific research.*

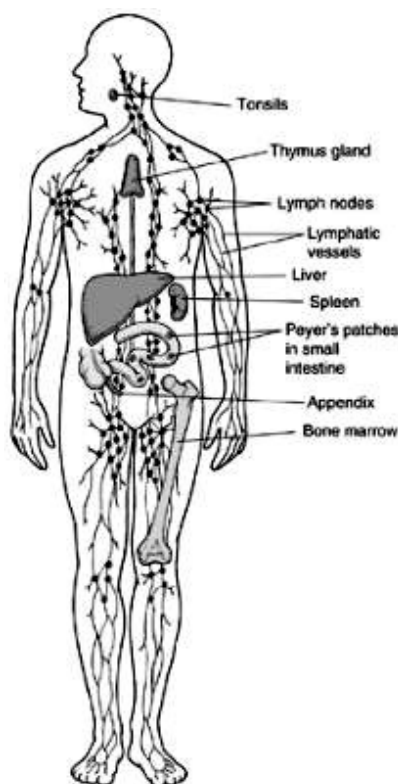
**KEYWORDS:** Immuno-proteins, Thymus, Sentient food, Microvita, Physico-psycho-Spiritual practice.

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#### INTRODUCTION

The streams of spirituality and medical sciences have been flowing for thousands of years without any interrelationship between two. It is only last two or three decades that the synthesis between these two sciences has emerged. It was in fact, the pioneer concepts of microvita and biopsychology coined by Shrii P.R.Sarkar, that the people among all strata have started thinking in terms of synthesizing spiritual science and physical science. In fact, concept of microvita is the link between these two. Whatever he said in his discourses, are entirely logical and rational but still need empirical verifications and

acceptance by scientific community. In fact, many of his claims are a way ahead of science in its present state. Hopefully, the intellectual mass will analyze, verify and accept the concepts and utilize them for human welfare. The concept of lymph is one of the examples where the streams of sciences (spiritual and medical) diverge. The present article is an attempt to search interrelation among the physical, psychological, para-psychological and spiritual thoughts about lymph and the possible connection of lymph with microvita



**Figure 1 : Lymph nodes and Limphatic vessels**

### Lymphatic System

The lymphatic system represents an accessory route through which fluid can flow from the interstitial spaces into the blood (Fig. 1). It is important to note that the lymphatics can carry proteins and large particulate matter away from the tissue spaces, neither of which can be removed by absorption directly into the blood capillaries. The return of proteins to the blood from the interstitial spaces is an essential function without which life cannot sustain.

### Scientific Concept

Lymph contains most ingredients of the blood except red pigment. It is extracted from the blood, processed and modified by the regional lymph glands before returning to the blood. It is through lymphatics that the lymph is collected from all regions of the body and is poured into the blood. The lymph glands are present all over the body and grouped in certain areas. Superficially they are around the joints e.g. axilla, groin, elbow, knee. The other important groups are in the neck, chest and abdomen. Besides these, lymphatic tissue are present in various other organs e.g. the liver, spleen, gut, tonsils etc. All tissues have lymphatic channels except the brain, spinal cord, bones, deeper parts of the nerve and some parts of the skin and muscles. These tissues do have minute channels called perilymphatics or paralympatics through which interstitial fluid can flow. This fluid eventually empties either into the lymphatic vessels or in the case of the brain, in the cerebrospinal fluid and then directly into the blood. This whole system

of lymph with lymph glands, lymphatics and scattered lymphoid tissues are called the lymphoid system.

Essentially all the lymph vessels from the lower part of the body eventually empty into the thoracic duct, which empties at the junction of the left internal jugular vein and left subclavian vein. Lymph from the left side of the head, the left arm and the parts of the chest region also enter the thoracic duct. Lymph from the right side of the neck and head, the right arm and parts of the right thorax enters the right lymph duct (much smaller than the thoracic duct) which empties at the junction of the right subclavian vein and right internal jugular vein.

The fluid that returns to the circulation by way of the lymphatics is extremely important because substances of high molecular weight, such as proteins, cannot be absorbed from the tissue in any other way, although they can enter the lymphatic capillaries, almost unimpeded. The reason for this is a special structure of the lymphatic capillaries.

### Formation of Lymph

Lymph is derived from interstitial fluid that flows into the lymphatics. Therefore, lymph as it first enters the terminal lymphatics has almost the same composition as of the interstitial fluid. Twenty liters of fluid is filtered per day in the intercellular spaces from the small blood capillaries. Seventeen liters with all its electrolytes is soon reabsorbed back into the venous blood. The remaining 3 liters along with filtered proteins remain in intercellular spaces. The protein molecules,

because of their large size are not reabsorbed through the small pores of venous capillaries. The remaining three liters of fluid in the tissue with its protein content must be continuously removed. If the proteins filtered in the tissues are not removed readily by lymphatics, the tissues will develop edema. This will disturb the dynamics of fluid exchange, which is crucial for the life.

The protein concentration in the interstitial fluid of most tissues averages about 2g/dl, and the protein concentration of lymph flowing from these tissues is near this value. In the liver, lymph formed has a protein concentration as high as 6g/dl and lymph formed in the intestine has a protein concentration as rd high as 3-4g/dl. Because about 2/3 of all lymph is derived from the liver and intestines, the thoracic duct lymph, which is a mixture of lymph from all area of the body, usually has a protein concentration of 3-5g/dl.

The lymphatic system is also one of the major routes for absorption of nutrients from the gastrointestinal tract especially for absorption of virtually all fats in food. Indeed, after a fatty meal, thoracic duct lymph sometimes contains as much as 1-2% fat.

Finally, even large particles; such as bacteria can push their way between the endothelial cells of the lymphatic capillaries and in this way enter the lymph. As the lymph passes through the lymph nodes, these particles are almost entirely removed and destroyed.

It is important to note that proteins are the most essential ingredients of human chemistry and the body conserves them at

all costs. In this direction, lymph plays an important role by conserving the protein and thereby maintaining tissue structure. Proteins are present in every cell of the body and provide the skeleton of the cells, thereby maintain the shape and structure of the cells. Proteins also help in carrying the minerals like iron, calcium, magnesium etc. in the body . Furthermore, proteins are made of amino acid molecules which are utilized by some endocrine glands to manufacture their hormones e.g. thyroid, parathyroid and pituitary glands.

Lymph also transports fat, particularly from the regions of the gastrointestinal tract where it is absorbed from the diet. Like proteins, fat is also an important ingredient of the human body and execute important physiologic functions. The cell wall is made up of fat, through which exchanges of various nutrients and minerals occur. Some cells have special fat components for specialized functions. Brain cells for example, are rich in fat, which has special conducting properties for the propagation of nerve impulses. Some endocrine glands such as adrenal and sex glands utilize fat for synthesis of their hormones which are called steroid hormones.

In a nutshell, lymphatic system plays a very important role in the transportation of the two most important biological nutrients, the protein and fat, in the human body. These two ingredients are crucial for the maintenance of structural integrity, hormonal synthesis and sustaining human health.

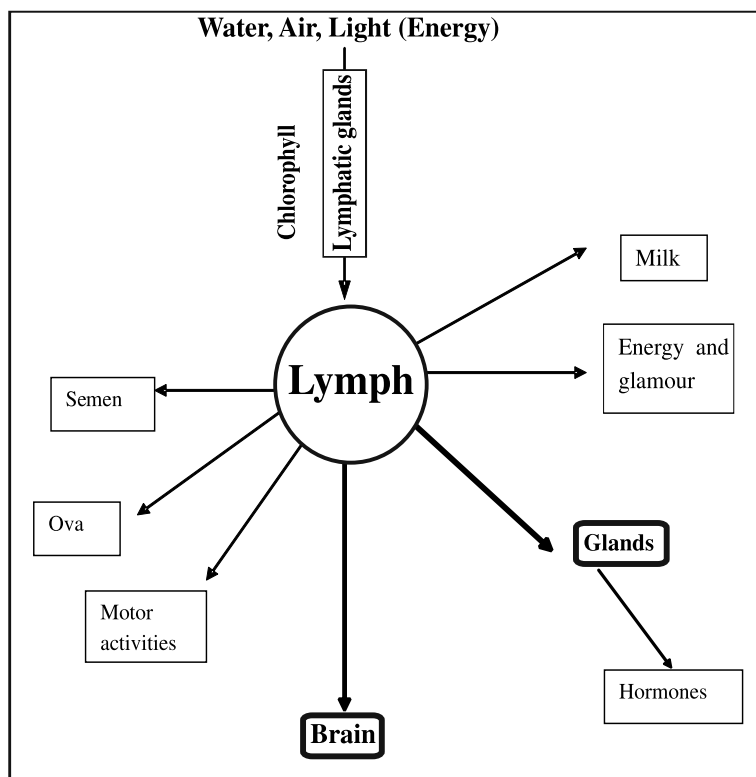


Figure 2 : Lymph for all round development

### Circulation of Lymph

Lymph flows at the rate of 120 ml/hr, much slower than the blood. This can be increased about 5 to 15 fold by exercise and decreased by the rest. Valves exist in all the lymphatic channels. The lymphatic pump is enhanced by muscle contraction, movements of the parts of the body, compression and by arterial pulsation. Respiratory movements of the chest and lungs also enhance this pumping effect.

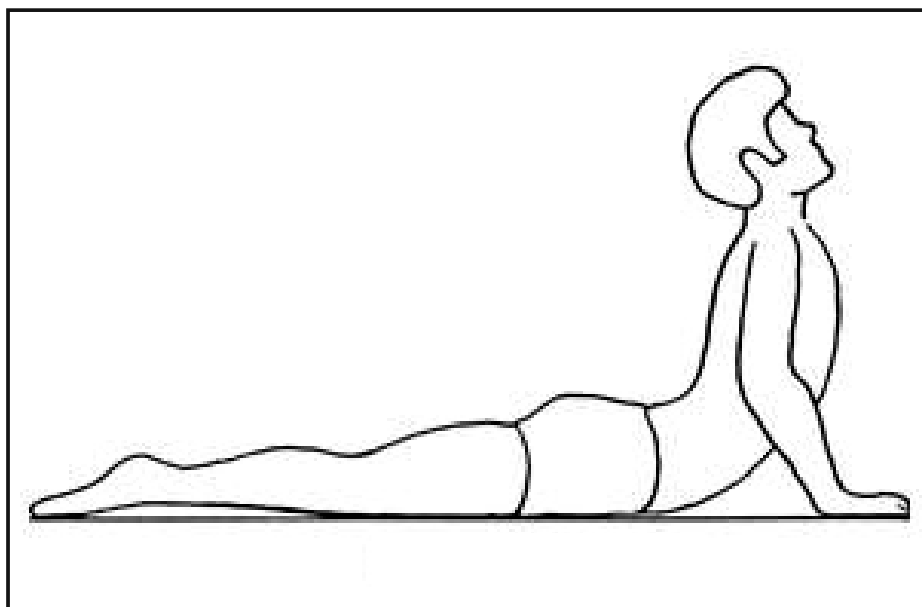
Some organs are located in the remote nooks and corners of the body from which lymph drainage is not easy in the ordinary conditions and therefore the flow of lymph is minimal from these organs. Kidneys, adrenal glands and pancreas are adhered to the back wall of the abdomen where normal day to day activities do not produce a significant movement or compression of these organs. Furthermore, lymph flow from these organs is further reduced in people leading sedentary life styles. To reach every nook and corner of the body, one needs special postures which may not be vigorous, nevertheless; very effective in enhancing the lymph flow from these remotely placed organs. These special postures (a'sana's or yogic postures) when coupled with coordinated breathing (Pr'ana'ya'm) squeeze the main lymphatic channels in the chest, enhance the lymph flow many fold (Fig. 3).

When lymph flow is decreased in the face of normal lymph formation, the tissue loses its luster and becomes swollen or edematous. This is associated with the loss of energy. On the other hand, when lymph formation is decreased as occurs in dehydration and debilitating conditions, the energy is sapped and glamour is lost.

### Lymphoid – the Defense System

A more important function of the lymphoid system is removal of various foreign materials such as dust particles inhaled in lungs, viruses and bacteria which have invaded the tissues. These are removed before they reach the blood. Lymphatics traverse through a number of lymph glands where the lymph is exposed to many kinds of defensive cells, called macrophages that engulf the foreign intruders and digest them out of existence. These scavenger cells are well programmed to recognize what is foreign to the body and which is its own.

In the lymph glands, many cells and proteins are added to the lymph, which plays a very important role in the immune reactions of the body and hence called immuno-lymphocytes and immuno-proteins respectively. These two immune materials are produced by the different regions of the lymph nodes. The region of the lymph node, which produces lymphocytes (T- lymphocytes) is dependent upon the thymus gland. The region of the lymph glands, which have cells that produces immuno-proteins or immuno-globulins are dependent on the signals from the bone marrow (B-lymphocytes) and produce various classes of immunoglobulins (IgG IgM, IgA, IgE). These proteins immobilize and inactivate the intruders while the Tlymphocytes engulf them. Thus after passing through the lymph nodes, the lymph gains (immune cells and proteins) and loses (harmful intruders) something.



**Figure 3 : Yogic a'sana - Cobra Posture**

### Thymus- heart of Lymphoid System

It is regarded as the heart of the lymphoid system because whatever happens in the lymph glands and in the lymphoid tissues is pre-planned preprogrammed and predetermined in the thymus gland. In the fetus, the thymus gland is very active in sorting out its affairs. It is so choosy in the early stage that 90% of its own cells that multiply are rejected and killed. Only the very 'fit' and 'competent' one are allowed leaving the gland to migrate to the lymph glands. These migrating cells are 'stamped' and primed to recognize between self and non-self. This message stays with them as long as they live and when they multiply in the lymph glands, their off- springs carry this message from generation to generation.

### Changes in the Thymus Gland

At birth, the thymus has almost finished all its functions. It weighs about 10-15 g and at puberty, its weight doubles its birth weight to about 30-40 g. The growth of the gland after 5 to 6 years of age is due to the increase in its supporting tissues rather than in the cell mass. In fact, the lymphocytes in the gland progressively decrease after this age.

The androgen hormones secreted by the adrenals and sex glands have an antagonistic relationship between these glands and the thymus. Experimentally, it has been shown that removal of sex glands and adrenal glands delays the normal involution of the thymus glands whereas injection of cortisone or androgen sex hormones, cause shrinking or atrophy of the thymus.

By mid-adult life, the thymus shrinks to about 10 g. The remaining cells in the thymus continue to secrete a hormone called thymopoietin or thymosin whose main function is to keep reminding the migrated lymphocytes in the lymph glands what they have been programmed for. It is because of this hormone that the thymus is classed as an endocrine gland despite being the centre of the lymphoid system. This dual role of the thymus is perhaps suggestive of the close relationship between the lymph and the hormones.

### Functions of Lymphoid System

1. Transportation of lymph from all parts of the body to the blood
2. Defense of the body
3. Recognition of self and non-self

### Yoga Psychological Concept of Lymph

In Yoga psychology, lymph is considered as an important constituent of the body because many glands and sub-glands in the human body are dependent on lymph. The initial stuff in the manufacture of lymph is the energy and vitality derived from the different quinequelemental factors of the Universe such as, light, water etc. It is the cream of all we eat and drink. It is cream of all creams.

Lymph is a hormone manufactured by lymphatic glands. It is the initial hormone and other glands use lymph to manufacture their respective hormones. The lymphatic glands supply the

raw material to glands for hormone production. Lymph also maintains the luster of the skin.

In the male and female bodies, the lymphatic glands become very active at the time of puberty. A special type of nerve sensation occurs in the genitals which creates vigor in a person and gives the feeling in the mind "I shall have to do something". At that age, one decides or tries to decide one's future.

The testes glands convert lymph into semen. If the testes function properly and if there is no hindrance from the lymphatic glands, intelligence will develop. Without the testes, solar plexus (Ana'hat cakra) will be undeveloped and intelligence will decrease. Lymph is also the food for the brain cells, so a shortage in lymph supply to the brain cells affects the intellectual growth of a person. Human qualities grow along with the growth of lymph. The lymph is converted into semen by the testes. Man should have proper control over the conversion of lymph into semen. This is the principle part of Brahmacharya Sa'dhana'.

When the lymphatic glands and the testes start functioning at the same time, the testes work in a proper manner. The raw material for the testes is the hormone generated by the lymphatic glands. In the female body, ova are created in the ovaries. Some of the lymph helps in maintaining proper energy and glamour in the body, and a certain portion, in the case of females, is converted into milk.

In the case of spiritual aspirants, there is excessive hormone secretion in the solar plexus. Love for children is converted into love for the Supreme. The solar plexus cannot function properly if the supply of the lymph is not perennial or regular. Lymph is thus the cause of psychic change, the transformation of love for the unit into love for the Supreme.

For the manufacture of lymph, chlorophyll is a must. Chlorophyll accelerates the speed of the production of lymph, but it doesn't act as the initial stuff. Those who are vegetarians produce more lymph because they get chlorophyll from green vegetables. Those who take animal proteins suffer from want of lymph.

### Food, Lymph and Intellect (Brain)

As per yoga psychology, there is intimate relation with the food consumed, the lymph formed and the development of intellectual faculties. In the case of human being, those who are vegetarians and taking sentient food, will manufacture more lymph and that lymph will nourish the glands and plexii and will be utilized as a food for the brain. Moreover, those who are practicing Brahmacharya Sa'dhana' - more lymph will be directed to the intellectual advancement because less will be converted into semen and finally lost. On the other hand, those who consume static food, more of animal proteins- the lymph formation will be less leading to relative intellectual backwardness. Furthermore, lymph will be converted to semen leading to less availability to nourish brain.

In case of animals, those who are granivorous like cows and monkeys will produce more lymph because of more chlorophyll in their diet and will be more intellectually



advanced and it is possible for them to do sa'dhana` in future. On the other hand, those who are carnivorous like cats, tigers, and dogs, though clever and cunning, but are less intellectual than granivorous. They will manufacture less lymph because of lack of chlorophyll in the diet and their brains will be less intellectually developed, and therefore, they cannot do sa'dhana`.

It is well said that what we think depend on what we eat and the link between eating and thinking, thereby is probably the lymph which nourishes the brain. This is purely the concept of yoga psychology and the modern science has to do research in this direction.



**Figure 4 : Sentient food**

### **Lymph, Milk Production and Motor Activities**

Lymph is also required for the production of milk. Till women give birth to their children, they can move fast but after their children are born, they can't move so fast. If cows give excessive milk, they can't move fast. Deer can move fast but they give little milk. Tiger and cats are carnivorous, that's why they give little milk. Cows and buffaloes give much milk because they take chlorophyll from green grass and green vegetation.

### **Catalysts for Lymph Production**

There are certain factors which act as positive and negative catalysts in the manufacture of lymph. A good environment, both physical and psychic, acts as positive catalyst. Positive psychic and positive physical environments are positive catalytic agents and negative psychic and negative physical environments are negative catalytic agents. Even if food is sentient, but environment is negative, such condition is detrimental to mental progress. Cinema halls, prostitute houses, busy commercial places are negative physical environments. Bad discussions, bad books and bad thoughts prevailing among the local populations are negative psychic environments.

Positive high grade discussions create positive psychic environment. Where spiritual aspirants gather, where spiritual discussions are held (Dharma Cakra, Dharma Maha Cakra) such environments serve as positive catalyst. That is why Shiva recommended satsanga or good company for the attainment of salvation. Satsanga provides positive psychic environment. It will help in the manufacture of lymph. The creation of hormones in the other glands depends upon these positive and negative catalytic agents.

In case of spiritual aspirants or Sa'dhakas, a major portion of the lymph remains in the body. That is why their intellectual standard is higher than the common people. The surplus lymph goes to the brain and serves as food for the nerve cells.



**Figure 5 : Physico-psycho-spiritual meditation**

### **Lymph – for Physical, Mental and Psycho-spiritual Development**

Lymph is produced from the energy and vitality acquired from the different quinequelemental factors of the Universe. Chlorophyll accelerates the speed of its production. Lymphatic glands supply lymph to the glands and surplus lymph goes to the brain (Fig. 2). Lymph is therefore responsible for energy and glamour, motor activity and production of milk, ova and semen (Physical process). It also goes to glands and plexii producing appropriate hormonal secretions responsible for psychic and psycho-spiritual development. Finally it nourishes brain, causing intellectual development. Hence, lymph is cause of all round development. Sarkar has rightly said that “Human qualities grow along with the growth of lymph”.

### **The Link between Science and Yoga Psychology**

At first instance, it is difficult to link the two divergent concepts of lymph. Medical science accepts it as a system responsible for transportation of proteins and fats from interstitial fluid back to blood along with its immunological functions. Spiritual science, on the other hand, considers lymph as the important element having hormonal function and responsible for intellectual advancement. How lymph can be related with hormone? Yoga psychology proposes that the lymph provides raw material for synthesis of hormones. For example, the sex glands in males and females, when activated, utilize the lymph to form sperms and ova and their respective hormones. Biological science gives no comments on this concept.

An interesting coincidence is the observation of high concentration of Acquired Immuno Deficiency Syndrome (AIDS) virus in the lymph glands and the seminal fluid even though the virus enters the body through the blood stream. Both these organs, lymph glands and testes, probably have tissues, which the AIDS virus has affinity for. It is also possible that the

lymph is concentrated in the testes making it more vulnerable to the viruses. Whatever the mechanism may be, there is apparently a close relationship between lymph and the testes.

The contention of Shrii Sarkar that lymph is a hormone seems extremely logical. The parts of the lymphoid system have a structure of glands and their contents, i.e. the lymph, is poured directly into the blood which is the requirement for being an endocrine gland, even though transport channels are involved in this function. Lymph contains the precursor of all hormones in the form of protein and fat as well as its own hormones in the form of immunoglobulin and thymosin. In fact, the lymph is as essential for life as are hormones with the difference that hormones are secreted in minute quantity whereas lymph is produced in copious amounts.

One of the most remarkable assertions of Shrii Sarkar is the influence of physical and psychic environments on lymph formation. Physical environments such as cinema, hotels, halls, commercial counters, gatherings, and crowded shopping centers have negative effect on lymph formation. Similarly the negative psychic environment such as those created in pornographic materials, sexual fantasies and excessive sexual indulgences act as a negative catalyst for lymph formation. On the other hand, spiritual company and spiritual discussions create a positive environment facilitating the lymph formation.

It can be concluded that knowledge of the lymph and lymphoid system in modern science is relatively recent and primitive. It is only since the advent of cancer and AIDS that the lymphoid system has attracted attention of medical researchers. Even now the focus of attention is the lymphocytes and the immune response. The relationship between hormone and lymph is not recognized as yet by medical science and it is in this area that Shrii. P.R. Sarkar has given numerous clues for future research.

### Microvita and Lymph Production

Shrii P. R. Sarkar's concept of microvita further adds to the explanation of some un-explained. A positive physical and psychic environment induced by positive microvita, therefore enhances more lymph formation (the food for the brain), which brings higher psycho-spiritual status. That higher mental status proves to be a boon for the progress of human faculties and an asset to move towards the closeness of Supreme desideratum. Generating positive microvita environment, (physical and psychic) by increasing their concentration with the help of sentient food, satsanga, swadhyaya, spiritual practice, collective meditation and kiirtana, in fact, affect the entire

human endocrinology because microvita act as positive catalytic agents for the lymph production which is the mother of all hormones (Fig. 4,5,6 ). Chlorophyll; though, accelerate the speed of lymph formation, yet it does not act as an initial stuff. The initial stuff is the energy and vitality derived from the different quinelemental factors such as light, water etc. to which we would like to add positive microvita. These positive microvita may act as initial stuff or undoubtedly, as said earlier, they act as positive catalytic agent for lymph formation. It is an assumption, a theoretical proposition which needs further discussion and verification.



**Figure 6 : Collective Kiirtana**

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