

A WELL LUBRICATED MACHINE

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The Myth and Reality of Lymph-draining in Modern Phytotherapy

Although apparently solid, 60-70% of the human body is actually made up of fluids. The task of the lymphatic system is precisely that of allowing a balanced flow of the fluids to the various compartments of the organism and preventing their stasis. This function has intrigued man since the dawn of medicine: ever since the times of Hippocrates and Galen, health correlated with a delicate balance between the different "humours" circulating in the body, one of which was the "lymphatic" humour. The imbalance between these different components of the human body was essentially traced back to an accumulation of toxic substances in the organism, today called "toxins", for the elimination of which the human body implemented a number of strategies. A fever, for example, was not inter-

preted as a mere symptom but as an actual process of defence that was to be sustained and encouraged to foster a "perspiratio", the aim of which was that of eliminating the toxins. Medicinal plants were divided into "cold" and "hot": the use of the latter had the aim of helping the "defence" function of the organism. This "humoral" conception of the human body dominated the whole of medicine in the Middle Ages, a period in which illness was interpreted mainly as an accumulation of "mucus" and "catarrhs" in the organism. The accumulation of these "congestive toxins" was to be heated until they dried out, in a process that recalls the philosophy of alchemy which at that period was rampant. This concept was reflected in modern times with the advent in the United States of Eclectic Medicine, where, the use of *Capsicum annuum* was openly recommended in the

case of a feverish reaction: heat was good, whilst illness was none other than being gradually overcome by cold, until death. The humours became more fluid thanks to the heating action of substances such as red chilli, *Lobelia inflata*, *Viburnum opulus* etc. From the 18th to the 20th century, the advent of the mechanistic conception of science and the establishment of modern physiology gradually reduced the importance of the "humoral" conception in official medicine. This concept survived however in some important "heretical" theories which are still common, and which, based on the romantic philosophy of Goethe and Schiller, have had key importance on the development of modern non-conventional medicines, such as Hahnemann's homeopathy, Schussler's theory of salts and the holistic conceptions of Rudolf Steiner. All these theories, in different ways, basically re-elaborate the

ancient concept of humours, the importance of maintaining the self-healing processes of the body, often openly identified as a real "detoxification".

This process coincides with increasing attention to chronic illnesses, where the fibrotic or fibro-sclerotic processes become preponderant.

A contemporary vision

There can be few doubts today that our cell metabolism, as well as generating the energy necessary for the life of our tissues, inevitably produces scoriae or waste. This process is in constant equilibrium with the defences that our organism is obliged to mobilize to cope with attack by pathogenic agents and exogenous toxic substances. This means that our cells continuously produce products to be eliminated which are progressively excreted in extracellular liquids, in the interstitial matrix which is receiving increased attention by researchers. The liquid of the intercellular spaces is in a delicate equilibrium between the fluids that transudate from the capillary anastomosis (which bring new nourishment and oxygen) and those that are drained by the lymphatic system. The idea that the lymphatic system

has a purifying action on our organism therefore appears anything but groundless. This function has been somewhat overlooked until the present and the attention of modern medicine has focused above all on the functions of the lymphatic system in the defence of the organism.

The immune function of the lymphatic system

The lymphatic system is essentially made up of lymphatic nodes linked by an articulated system of vessels. The lymphatic nodes are none other than small bean-shaped organs, consisting essentially of a reticular tissue structure.

There are mainly two types of cells, lymphocytes and macrophages, trapped here. These white blood cells originate in the thymus gland and in the bone marrow and, through the circulation of the blood, reach the secondary lymphoid organs: the lymph nodes, the spleen and the tissue of the intestinal, respiratory, urinary mucus and of the genital organs. The lymphocytes can move freely inside and outside the lymphatic system and can circulate in the various organs thanks to the lymphatic vessels. They can reach any cell and

tissue in the organism, thanks to this efficient communication system. In recent years, the cells and vessels of the digestive system, referred to generally by the abbreviation GALT, "gut-associated lymphoid tissue", have taken on special importance. It helps to identify and sequester the harmful substances ingested with food, whilst the lymphatic vessels and the cells contained in the mucus membranes in the mucus membranes are collectively defined as "MALT", literally "m u c o s a l - a s s o c i a t e d lymphoid tissue". The lymphatic tissue is highly specialized and interacts through the bed of the arteriovenous capillaries both with the air we breathe and with the matter ingested.

The lymphatic system as a "draining" organ

Any infection causes a swelling of the lymph nodes and has repercussions at the level of the lymphatic ducts. In this case, the swelling of the lymph nodes is transformed into a high level of activity, whilst the lymphatic ducts become hot, tense and dilated, at times with clear red stripes on the skin. In extreme forms, the lymphatic drainage in a quadrant of the human body is completely

blocked and a so-called lymphatic oedema develops, an increase in the volume of the whole area mainly due to the stagnation of the lymph in the interstitial tissue.

In these circumstances, the "purifying" function of the lymphatic system is obviously completely compromised. A prolonged stagnation of the lymphatic system leads to a complete failure of the valvular system in the individual ducts, often creating a backward flow, seriously compromising the flow of nutritious factors to the individual cells. The cell membranes possess micropores which are selectively permeable, which means that they selectively admit specific substances and they pump out others. The permeability is regulated by the concentration of substances dissolved inside and outside the cell. If a cell reaches a particular concentration the cell is forced to allow their admittance, at times preventing access to other nutritive factors. The reflux of substances derived from cell catabolism, due to lymphatic stasis, often causes serious consequences on cell nourishment. The organs rich in a lymphatic system are obviously those which are the first to be affected by this state of suffering. Tonsils and the appendix are

the first organs to be affected by an insufficient lymphatic flow that causes them frequent inflammatory states. The breast too, with its dense reticular network of lymphatic nodes and vessels can be affected by a stagnation of the lymphatic system. The prolonged stasis of lymphatic fluids rich in proteins and minerals may lead to the fibrosis of the ducts and the surrounding tissue. Discussion is still under way on whether this may be one of the mechanisms underlying cellulitis, which in the last analysis could be interpreted as an inflammatory condition of the lymphatic ducts and surrounding tissue.

"Cell rubbish"

Today modern science has a specific term to define the refuse of cell metabolism, or at least the main waste: free radicals. This term identifies highly reactive substances produced in the mitochondria as a consequence of the normal metabolic processes aimed at producing energy. Their accumulation is progressive with age. The deleterious action of free radicals lies in their great capacity of reacting with any cell structure, deactivating them or causing alterations lying at the basis of many

diseases. There are basically two ways in which our organism can defend itself from the action of these harmful substances: by removing their presence or deactivating them thanks to the action of anti-oxidant substances. The characteristics of an ideal lymph-drainer should be the combination of a fluidifying or diuretic action capable of mobilizing the stagnant fluids with a resolute anti-oxidant action in such a way as to neutralize the action of cell metabolism waste.

Three interesting examples of medicinal plants with a Lymph-draining Action.

Copaiba sap: the ideal antioxidant

The sap of *Copaiba reticulata* Ducke has been used for thousands of years by the Indians of Amazonia in a way that to a certain extent recalls the use of lymph-draining substances in our culture. A few drops of this oleoresin are taken in the morning on an empty stomach, to purify the organism, reinforce the body, as preventive treatment against various infections of the respiratory tract and of the kidneys and to fight the signs of ageing. The great esteem of the local

populations for this remedy is indicative of a profound therapeutic activity, which is however difficult to describe. Extensive forest cultivation of this plant are present in Brazil even if all research has been carried out on the Peruvian varieties, considered of better quality. Copaiba sap has shown in the past an interesting anti-inflammatory (Basile et al. 1988) and gastroprotective (Paiva et al. 1998) action, with a mechanism that boosts the secretion of mucus by the cells of the intestinal wall, which to a certain extent reminiscent of that of liquorice.

But it is above all the research by the Argentinean group of Christian Desmarchelier that has highlighted the extraordinary anti-oxidant properties of this product and has offered a scientific explanation of the legacy of Amazonian tradition.

In an in-vitro test on hydroxy-radicals (Fenton reaction), Copaiba sap with a concentration of 3 lg/ml has shown a far greater anti-oxidant power than catechin (5 lg/ml) and other natural compounds found in green tea (Desmarchelier et al. 1997). Subsequently, the anti-oxidant action of this oleoresin was compared to that of other Amazonian plant extracts, including those of

Uncaria tomentosa, in an animal model of lipid peroxidation (Desmarchelier and Moraes Barros in press), with these more efficient at a lower concentration. The Argentinean research group has also succeeded in isolating a substance that is probably responsible for such a marked anti-radical activity from amongst the countless chemical compounds contained in the Copaiba sap: profisetinidin (Desmarchelier et al., in press). It is active in vitro at a lower concentration than the other anti-oxidant substances known to date. Lastly, mention must be made of a very interesting in vitro test carried out using an analysis method defined as TRAP (Total Antioxidant Reactivity) which can evaluate not only the quantity of anti-oxidants but also their reactivity in biological fluids. This method is today considered the most reliable to measure the real anti-oxidant activity of different substances (Lissi et al. 1995). With this method it is possible to prove that the greatest anti-oxidant properties have been shown for Copaiba sap and the extracts of *Dracontium lorentense* (Jergon Sacha) (Desmarchelier et al. 1997). Overall, Copaiba sap is connoted as one of the natural substances with the greatest

anti-oxidant activity and it is for these properties that it has probably traditionally been used as a lymph-draining substance.

Horse chestnut (*Aesculus hippocastanum* L.): venous draining

Horse chestnut is a plant that has always been used for lymph-draining. Its action is particularly useful when lymphatic stasis is associated with an oedema due to concomitant venous stasis (often on a varicose basis). The active ingredient is escine, a substance registered in many European countries as a drug for topical and systemic use. Oral administration of escine has shown an anti-inflammatory, capillary-protective and anti-oedematous activity, even if for lymph-draining purposes the whole extract of horse chestnut has traditionally been used (standardized at approximately 15% in escine) (Mills and Bone 2000). Escine has nevertheless shown a specific inhibitory action on hyaluronidase, the enzyme responsible for the breakage of hyaluronic acid and, in the final analysis, for the viscosity of the interstitial matrix in the extracellular spaces (...). The specific indication for extracts of horse chestnut is

nevertheless chronic venous insufficiency, which implies a defective venous return and a stasis of the liquids in the limbs.

On horse chestnut extracts, taken at the average dosage of 600 mg/die (corresponding to about 100 mg of escine), there are about 13 randomized clinical tests, forming the object of a recent meta-analysis by the group of Pittler and Ernst (1998).

All the studies agree on greater efficacy compared to the substances used as a placebo: the Authors' conclusions were that extracts of Horse chestnut represent a reliable and efficacious therapy for the treatment of varicose veins and venous insufficiency, capable of mobilizing the stagnation of fluids in the lower limbs.

The Authors also underlined the undeniable advantage of a prolonged effect on the oedema and on the stagnation compared to extracts of *Ruscus* (butcher's broom).

Another review which had previously compared the various therapies available for the stagnation of fluids in the lower limbs (diosmin, beta-hydroxyethyl-rutoside and extracts of horse chestnut) had moreover highlighted how the extracts of horse chestnut had a benefits/risk

ratio that was definitely advantageous and a therapeutic action that was essentially comparable with a conservative therapy by means of elastic wraps (Diehm 1996). Overall, the lymph-draining properties of horse chestnut can mainly be traced back to its anti-oedematogenic and venotonic action which make it the natural product of choice in the case of stagnation of liquids in the lower limbs.

Agrimonia
(*Agrimonia eupatoria*):
the renal lymph-draining
substance

Agrimonia eupatoria has been used as a draining substance in the case of liquid retention for some time. Only recently has scientific research confirmed this activity in animal models (Giacchetti et al 1986). In the past its action has been defined as "aquaretic" as it encourages the elimination of liquids from the organism, probably associated with a concomitant excretion of potassium.

This action seems due principally to an increased flow in the kidneys (Robbins and Tyler 1999) and is different from that of modern diuretics which interfere with the reabsorption of potassium in the distal tubules of the neph-

ron and therefore cause a greater elimination of electrolytes with more serious collateral effects (Mills and Bone, 2000).

The use of *Agrimonia eupatoria* is consequently associated with higher levels of potassium compared to the use of other substances with a diuretic action (Szentmihaly et al. 1998).

The real clinical meaning of this data is difficult to describe but considering that one of the problems of the use of any substance with a diuretic action is precisely the depletion of potassium, the use of substances that foster saving this ion is unquestionably to be preferred when the aim is to obtain the mobilization and elimination of liquids from the organism.

Concluding this brief review, it is clear that amongst the medicinal plants used in the past for lymph-draining, there exist natural substances with undeniable and interesting therapeutic properties. It is the task of clinical and laboratory research to define the reality of truthful and fictitious statements in the obscure field of an often ambiguous terminology. These brief examples nevertheless help to highlight how different studies have

shown how it is possible to translate an ambiguous term such as the word "lymph-draining" into precise therapeutic properties, that can be scientifically proven as an antioxidant, venotonic or diuretic action, in the interest not only of the researcher but above all consumers, who can thus have certain and accurate indications at their disposal.

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