

## Lymphedema

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Simon J. Simonian · Benoit Blondeau

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# **Lymphedema**

Diagnosis and Treatment



**Springer**

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# Foreword

Lower extremities do not only allow the upper part of the body containing heart, lungs, and alimentary tract to be transferred from one place to another, but they also carry our brain where it commands. We live longer, our brains work longer, our legs become worn out. Mentally fully capable older individuals become home-, chair-, bed-confined. Sick legs eliminate them from professional and social life. Any new information on diagnosis and treatment of diseases of lower extremities is desperately needed—not only for education of medical professionals but also for patients, who are often the earliest “diagnosers” of this illness. One of the pathological conditions affecting human legs is edema. Of course, edema is only a symptom of an ongoing process in soft and hard tissues of the limb. Hundreds of millions of people around the world either already suffer from pathological events in their extremities or will suffer in the future. Each pathological process in the limbs involves the lymphatic system. The lymph system is a regulatory and defence organization regulating water and chemical environment of cells, participates in healing and defends against penetrating microorganisms. There are pathological factors specifically damaging the limb lymphatic system, but this system may also be adversely affected by diseases specific for other tissues (e.g. vein, tendons, ligaments, bones and nerves). The book *Lymphe-dema* by Lawrence L. Tretbar, Cheryl L. Morgan, B.B. Lee, Simon J. Simonian, and Benoit Blondeau gives a comprehensible insight into all aspects of the lymphatic system under physiological and pathological conditions. The authors are authorities in the field of lymphology and phlebology and managed to present their knowledge in a most condensed fashion. The book has been written in simple language and can be useful even for those who are far away from clinical medicine. Multiple color figures do not only perfectly illustrate what happens to the extremity in case of damage of the lymphatics and lymph nodes, they are so expressive that having seen them no professional or patient would neglect early limb swelling and postpone referring to or seeing a specialist.

Waldemar L. Olszewski  
Professor of Surgery  
Former President, International Society of Lymphology

# Preface

Lymphology is finally recognized by American medicine as a distinct medical specialty. Its acceptance has no doubt been hastened by a more complete understanding of the embryologic and microscopic changes found in lymphatic diseases. Technologic advances (e.g., scanning electron microscopy or lymphangioscintigraphy) have also contributed to our understanding of the lymphatic system.

As an increasing amount of knowledge emerges from the study of the lymphatics, it is clearly apparent that the venous system is intimately associated with it. This fact is readily observed by the authors.

Members of the public, as well as health professionals, are looking for new and reliable information on lymphedema. As cancer survivors age, their risk of developing lymphedema increases. Unfortunately, one common source of information, the Internet, may present information that is incomplete, misleading, inadequate, and often inappropriate.

Using evidence-based sources and their own extensive clinical experience, our authors have assembled an impressive amount of clinical and research material. They have created a pool of information that should help us form a more unified concept of the lymphatic system, and its many aberrations.

One goal of this book is to provide some simple guidelines for the physician who must direct and follow the patient's progress during treatment of lymphatic or venous disorders. This requires a basic understanding of the vascular disorders, available interventions and the need for life-long follow-up.

Another goal is to inform a knowledgeable public that lymphedema is a problem that can be treated—successfully. No longer should a person accept the concept that lymphedema is something they “must learn to live with.”

It is our collective experience that patients who face this complex, potentially disfiguring and disabling medical problem achieve superior outcomes when managed by a knowledgeable physician and an experienced therapist. They also demonstrate greater adherence to the recovery program.

Lastly, only through the concerted efforts of the “team,” physicians, therapists, and patients, can the insurance carriers be convinced that people with

lymphatic diseases deserve the same economic support as those with other vascular diseases.

My gratitude to the authors, especially Dr. Cheryl L. Morgan, for their contributions, and to Emily Iker, MD, for the use of her many photographs.

Lawrence L. Tretbar

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# 1

# Structure and Function of the Lymphatic System

Lawrence L. Tretbar

## Early Investigations

Like many anatomical discoveries, the early anatomists described the lymphatic system in morphologic terms. Little was recognized about the function of the system until some centuries later.

The visibility of the blood circulatory system made it an easy system to study and encouraged early investigators to examine it thoroughly. Nevertheless, many curious anatomists recognized the differences between the blood circulatory system and the lymphatic system.

Hippocrates described “chyle” in the intestinal tract. Of interest, too, is his equation of lymphatic states with emotional states. He described 3 lymphatic temperaments: phlegm (lymph and chyle), yellow bile, and black bile (1,2).

Similarly, during the Middle Ages “physiks,” i.e. academic physicians, promulgated the concept of 4 “humors” within the body: blood, black bile, yellow bile, and phlegm. According to this belief, if you had too much phlegm you became phlegmatic, too much black bile caused melancholy, and an excess of yellow bile made you to feel bilious. An overflow of blood allowed you to become sanguine, clever, and thoughtful. We still talk about humors, for example one may be in a good or bad humor. We still describe pulmonary mucous as phlegm. While the descriptive terms phlegmatic, sanguine, bilious, and melancholy are perhaps archaic, they nevertheless remain a part of our language.

During the early 17th century, Aselli pointed out the differences between lymph vessels and veins and was the first to describe the lacteals, “venae albae et lacteae,” or white and milklike veins (3,4). He died before publishing his findings, but fortunately 2 colleagues proceeded to publish them in 1627, a year after his death (5) (Figure 1-1).

A young Swedish anatomist, Rudbeck, further identified the nature of the lymphatic system. He recognized it as a distinct system, separate from the blood circulatory system, that ultimately drains its contents into the upper veins (6,7).

During this period of discovery, Harvey, a former student of Fabricius in Padua, defined the blood circulatory system. However, his major publication in 1628, a year after Aselli’s, made no mention of the lymphatics and only described the circulation of blood through its various compartments (8,9). Later, he did make many comments on the findings of other anatomists regarding their contributions to lymphatic research.

The English school of investigation provided other contributions to the understanding of the lymphatics. The Hunter brothers in London established the Anatomy School on Windmill Street (10) (Figure 1-2).

Mascagni, a professor of anatomy in Siena, created and published a magnificent compendium of work in 1787. It contributed enormously to the understanding of the lymphatic system, especially its anatomy. Its illustrations are as useful today as they were then (11) (Figure 1-3).