



Veins are not Drains - Most Inflammation Linked to Lymphatic Dysfunction

Review of *All Edema is Lymphedema: Progressing Lymphedema and Wound Management to an Integrated Model of Care.*¹



Co-author, Frank Aviles, Jr. is a new LLN board member who presented at our October 21, 2023 conference. In their 2022 article, he and Heather Hettrick explain the major paradigm shift in researchers' understanding of fluid circulation in the interstitial tissues, and how this new understanding affects patients with lymphatic dysfunction.

I was taught that blood and plasma leave the heart through the arteries and capillaries and return through the venules and veins. This is the Starling Principle of microvascular fluid exchange, that was published in 1896. But Starling did not have modern technology to see and study the lymphatic system.

In 2010, Levick and Michel demonstrated that “**nearly 100% of all fluid and proteins moving from the blood capillaries into the interstitial space is subsequently absorbed by the lymphatic capillaries alone,**” not the venules and veins! There is “no net reabsorption of fluid back into the venous side.” This is why Aviles and Hettrick state, “All edema is related to lymphatic dysfunction, whether transient or permanent, thereby creating a lymphedema continuum.” Their detailed defense of this statement and explanation of microcirculation is exquisite.

The revised Starling Hypothesis for Microvascular Fluid Exchange is now also referred to as the Michel-Weinbaum Glycocalyx Model. This new understanding has profound implications for treatment of wounds, inflammation, and lymphedema. Manual lymphatic drainage (MLD) is already being incorporated into post-op treatment of orthopedic surgeries and has been shown to improve outcomes. Additional implications are still being processed by the medical community.

Everyone gets inflammation. Its role in chronic disease and injury is a popular topic of research and publication. Recognition of the lymphatic connection to edema should shine a light and benefit all humans, especially patients with chronic inflammation like lymphedema.

~From LLN Newsletter Editor, Sharon S. Shepard

¹ Hettrick H, Aviles F. [All edema is lymphedema: progressing lymphedema and wound management to an integrated model of care.](#) Wound Manag Prev. 2022 Jan;68(1):8-15. PMID: 35263273.

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