

Fig. 1. In a patient with adult-onset primary upper extremity lymphedema, bilateral lymphatic function is usually very different.

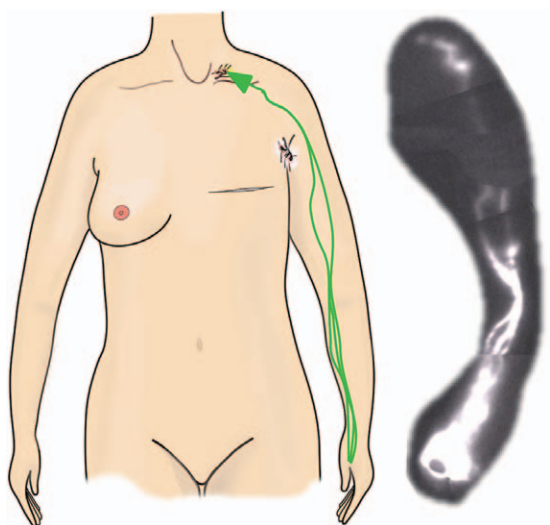


Fig. 2. When the collateral route develops, the accumulation of dye at lymph nodes may not be indicative of lymphatic function.

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DISCLOSURE

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Reply: Comparison of Preoperative and Postoperative Lymphatic Function is Essential to Understand the Changes in Lymphatic Function

Sir:

We have read Dr. Akita and Dr. Mitsukawa’s comment with interest and we agree with many of their statements regarding the usefulness of lymphoscintigraphy and indocyanine green lymphography in the diagnosis of limb lymphedema.¹ As a comment to their letter, we would like to further discuss the importance that the two methods have in the prevention, diagnosis, and treatment of secondary upper limb lymphedema after axillary dissection.

Lymphoscintigraphy provides a complete picture of lymphatic flow in both upper limbs, allowing us to simultaneously visualize, in anterior and posterior projections, their lymphatic structures (vessels and nodes), and to observe the liver uptake of the radiotracer as an expression of lymph progression from the injection site to the systemic venous circulation.² After an axillary dissection, absent visualization of infraclavicular/supraclavicular nodes and the presence of dermal backflow are lymphoscintigraphic criteria for lymphedema (Fig. 1).³ As Dr. Akita correctly pointed out, accumulation of the radiotracer in the axillary nodes may not necessarily indicate lymphatic function.¹ Theoretically, regardless of the explanation provided by Akita, after axillary dissection, axillary nodes should not be visualized. Accumulation in axillary nodes in the presence of dermal backflow could indicate residual lymphatic function but also incomplete dissection: in these contexts, the presence of residual axillary nodes with related lymphatics does not guarantee a normal lymphatic flow. As a result, lymphedema develops because no compensation, such as the formation of lymphaticovenous anastomoses, develops (Fig. 2).

Asymmetry and delayed tracer appearance time do not necessarily indicate lymphatic dysfunction, because they are present even preoperatively and in healthy individuals.² However, as we suggested and as Akita confirmed, preoperative and postoperative lymphoscintigraphic patterns based on tracer appearance time



Fig. 1. Anterior projection (ANT) of lymphoscintigraphic image taken at 120 minutes after injection of the radiotracer in the second interdigital webspace of both hands in a female breast cancer patient after axillary lymphadenectomy with right (R) upper limb lymphedema. Lymphoscintigraphy shows absent visualization of infraclavicular/supraclavicular lymph nodes (red arrow) and dermal backflow (green arrow) on the right upper limb. L, left.

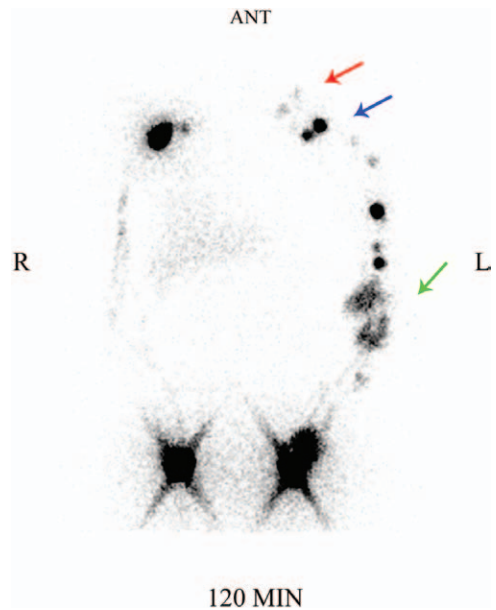


Fig. 2. Anterior projection (ANT) of lymphoscintigraphic image taken at 120 minutes after injection of the radiotracer in the second interdigital webspace of both hands in a female breast cancer patient after axillary lymphadenectomy with left (L) upper limb lymphedema. Lymphoscintigraphy shows visualization of residual axillary nodes (blue arrow), infraclavicular/supraclavicular lymph nodes (red arrow), and dermal backflow (green arrow) on the left upper limb. R, right.

should be investigated in future studies because they could allow detection of predisposed individuals.^{1,2,4}

Indocyanine green lymphography, compared with lymphoscintigraphy, allows early diagnosis of lymphedema without radiation exposure and provides detailed anatomical information on superficial lymphatic vessels and on the distribution of lymphatic alterations in a lymphedematous limb. It also allows accurate surgical planning by identifying patients who have residual lymphatic function and localization of those lymphatics for lymphaticovenous anastomoses.^{4,5} Its limit is that it does not allow simultaneous visualization of both limbs, to analyze deeper lymphatic structures and the relationships between the deep and superficial lymphatic systems and the systemic venous circulation.^{1,2}

Lymphoscintigraphy and indocyanine green lymphography do not exclude each other but are rather complementary. They should both be used preoperatively and postoperatively in patients at risk for and in patients affected by lymphedema. To do this would allow us to better understand the physiology of a normal lymphatic system (preoperatively) and the pathologic and/or compensation mechanisms that begin after a traumatic event such as surgery for lymph node dissection. The combination of both allows better treatment planning by combining the detailed anatomical and functional information of indocyanine green lymphography with the functional overview on lymphatic flow provided by lymphoscintigraphy. We still do not

know enough about lymphedema and lymphatic function to declare that one technique is better than the other: all our weapons should be used to provide detailed information.

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