LymphScanner Ratio Table

PWC=Percentage Water Content/TDC=Tissue Dielectric Content

REFERENCE (see over for references)	BODY PART	PWC RATIO SUGGESTIVE FOR LYMPHOEDEMA (PWC ratios are used except where stated)	MEASUREMENT SITE / COMMENT
1	Arm	Greater than 1.2	Measurement site 6cm distal to the antecubital fossa. Compared with unaffected arm.
2	Arm	Greater than or equal to 1.45 upper arm Greater than or equal to 1.3 forearm	Bicep site 8cm proximal to antecubital fossa compared with unaffected arm Forearm site 6cm distal to antecubital fossa compared with unaffected arm
3	Hand	Greater than 1.23	Measurement site dorsum of thumb web space. Compares affected with unaffected. Based on 2SD from the mean.
4	Breast	Greater than or equal to 1.4	Compared the healthy breast to operative or irradiated breast. Measured each of 4 quadrants with probe placed in the middle of each quadrant with the edge of the probe 10 mm from the areola. Based on 3SD from the mean.
5	Breast (following reconstruction)	Data given is TDC: Unaffected breast 41.9%, pre op affected breast 45.6%. Post op affected breast 72.8%	4 quadrants measured which were summed and then averaged. Compares affected/unaffected breasts pre- and post-op. Patients with free flap breast reconstructions demonstrated significant persistent oedema of the reconstructed breast.
6	Lower Limb	Calf/forearm ratio greater than 1.35	Calculates ratio comparing calf to forearm. Measurement sites used 1. calf 8cm proximal to the medial malleoli. 2.forearm 5cm distal to medial antecubital fossa
7	Lower limb – using PWC spot readings	Lower leg greater than or equal to 47.8% PWC (TDC=38.3) Ankle greater than or equal to 44.1% PWC (TDC 35.2)	Measurement sites used: 1dorsum of the central part of middle foot, 2. between the medial malleolus and achilles, 3. lateral leg half-way between knee and lateral malleolus. Noted that inter-observer agreement for foot site is low and should be interpreted with caution.
8	Lower limb	Foot/arm ratio greater than or equal to1.39 Leg/arm ratio greater than or equal to1.33	Measuring points used: 1. anterior forearm 5cm distal to the antecubital fossa 2. medial lower leg 6cm proximal to the medial malleolus 3. 1.5cm proximal to the webspace between 1st and 2nd toes. Based on 2SD from the mean. Research showed there are differences between males and females.
9	Head and neck	Neck Arm Index (NAI) greater than 1.8 Submental Arm Index (SAI) greater than 1.95 recommended	Calculates ratio comparing head/neck sites with forearm. See fig 1 in research paper for head/neck measurement and forearm sites. It is suggested that Neck Arm Index (NAI) be determined by averaging the two neck sites.
10	Thorax	Thorax/thorax greater than 1.32 Thorax/forearm greater than 1.7 Thorax/bicep greater than 1.9	Thorax site 10cm distal to axilla (compare with contralateral thorax) Forearm site 6cm distal to antecubital fossa Bicep site 8cm proximal to antecubital fossa Note arm to thorax ratios may be better discriminators.

REFERENCES

1. 2014 - Tissue Dielectric Constant (TDC) Measurements as A Means of Characterizing Localized Tissue Water in Arms of Women With and Without Breast Cancer Treatment Related Lymphedema. HN Mayrovitz, DN Weingrad, S Davey, Lymphology 47, 142-150
2. 2014 - Assessing Localized Skin-To-Fat Water in Arms of Women with Breast Cancer Via Tissue Dielectric Constant Measurements in Pre-Surgery Patients, Harvey N Mayrovitz & Daniel N Weingrad, Lidice Lopez, Annals of Surgical Oncology 22(5)
3. 2018 - Reference Values for Assessing Localized Hand Lymphedema Using Inter-Hand Tissue Dielectric Constant Ratios, Harvey N Mayrovitz, Evelina Arzanova, Scarlett Somarriba, Samar Eisa. Lymphatic Research and Biology 16 (5)
4. 2014 - Breast Oedema Following Breast Conserving Surgery and Radiotherapy. Johansson, K, Lahtinen T and Bjork-Eriksson T, European Journal of Lymphology and Related Problems 25(70): 1-5
5. 2017 - Breast Oedema Following Free Flap Breast Reconstruction. Greenhowe, Stephen, McClymont, Munnoch, The Breast 34, 73-76
6. 2019 - Assessing Lower Extremity Lymphedema Using Upper and Lower Extremity Tissue Dielectric Constant Rations: Method and Normal Reference Values, Mayrovitz, H. Lymphatic Research and Biology 17 (4)
7. 2012 - Validity and Interobserver Agreement of Lower Extremity Local Tissue Water Measurements in Health Women Using Tissue Dielectric Constant. Jensen, Birkballe, Norregaard, Karlsmark, Clin Physio Funct Imaging. p 217-322
8. 2019 - Possible Applications of Normative Lower to Upper Limb Ratios of Tissue Dielectric Constant to Lower Extremity Edema. Mayrovitz, Alvarex, Labra, Mikulka, Woody, International Angiology. pp 70- 75
9. 2021 - An Approach Toward Assessing Head and Neck Lymphedema Using Tissue Dielectric Constant Ratios: Method and Normal Reference Values. Mayrovitz, Patel, Kavadi, Khan & Bartolone, Lymphatic Research and Biology. Pg. 1-6
10. 2018 - Tissue Dielectric Constant Ratios as a Method to Characterize Truncal Lymphedema. Mayrovitz HN and Weingrad DN, Lymphology 51: 125131