L-Dex® Assessment
Instructions for Use

ImpediMed Limited
ABN 65 089 705 144
Unit 1
50 Parker Court
Pinkenba Qld 4008
Australia

Distributed in the United States by:
ImpediMed Inc
5900 Pasteur Court, Suite 125
Carlsbad, CA 92008
(877) 247-0111 option 4
tsu@impedimed.com

Phone: + 61 7 3860 3700
Fax : + 61 7 3260 1225
Email : enquiries@impedimed.com
Web site : http://www.impedimed.com

For assistance with product set up please review the help videos at https://www.impedimed.com. For other assistance, or to report product issues, please contact ImpediMed U.S. by email at tsu@impedimed.com or by phone at: + 877 247 0111 option 4.

EC	REP

MDSS GmbH
Schiffgraben 41
30175 Hannover
Germany

UKRP
MDSS-UK RP Ltd.
6 Wilmslow Road, Rusholme
Manchester M14 5TP
United Kingdom

CE 2797

For EU Customers: All products at the end of their life may be returned to ImpediMed for recycling.

For patent(s) and/or patent application(s) see: https://www.impedimed.com/patents/

1 Safety Instructions

These symbols are provided to guide you in the use of this product safely and correctly, and to prevent risk and injury to you and others. For more safety instructions and other symbols, see SOZO System Instructions for Use (LBL-525).

Symbol	Definition
	**WARNING!** Indicates matters in which bodily harm or material damage or incorrect measurements may arise as a result of incorrect handling.
	Follow instructions for use.
	Note

2 L-Dex® for Lymphedema

2.1 Indications for Use

The SOZO body fluid analyzer, or SOZO device, has the following uses:

For adult human patients at risk of lymphedema:

A bioimpedance spectroscopy device for use on adult human patients, utilizing impedance ratios that are displayed as an L-Dex ratio that supports the measurement of extracellular volume differences between the limbs, and is presented to the clinician on an L-Dex scale as an aid to their clinical assessment of lymphedema.

The use of the device to obtain an L-Dex score is only indicated for patients who will have or who have had lymph nodes, from the axillary and/or pelvic regions, removed, damaged or irradiated.

2.2 Instructions for Use

Ensure that you have read and understand all sections of this Instructions for Use (IFU) for setup, installation and use of the SOZOapp, and also ensure that you have read and understand the instructions for use for setup, installation and use of MySOZO and the SOZOapp in all sections of the main SOZO System IFU (LBL-525). All warnings, contraindications and precautions apply. In addition, consider the following when using SOZO to take L-Dex measurements on a patient:

For a patient who cannot effectively separate their inner thighs, it may be necessary to place insulating material, such as dry clothes, between the patient's legs. Ensure also that the patient's upper arms and elbows are not in contact with their torso.

Prior to taking a measurement, the patient's profile in the SOZOapp must be updated to indicate:

- Unilateral vs. bilateral: whether one arm or one leg is at risk (unilateral), or if both legs are at risk of lymphedema (bilateral);
- Body element: whether the arm(s) or leg(s) are at risk of lymphedema;
- Risk limb: whether the right or left limb is at risk of lymphedema; and
- Limb dominance: whether the left arm/right arm or left leg/right leg is dominant.

Ensure that you update the patient profile correctly to fit each patient's needs, taking into consideration the relevant facts and circumstances related to measurement, as identified in the main SOZO System Instructions for Use (LBL-525), since this will affect the validity of measurements. Incorrect measurements may impact the accuracy of the L-Dex calculations and may affect the L-Dex assessment based upon L-Dex calculations. For more information about making the correct selections, see instructions for use of the SOZOapp and MySOZO in the main SOZO System Instructions for Use (LBL 525).

3 The Lymphedema Index (L-Dex®)

The SOZO System displays L-Dex assessment results based upon patient measurements taken with the SOZO Device. The L-Dex assessment produces an L-Dex score, which is based on the ratio of the impedance of the unaffected limb(s) to impedance of the at-risk limb(s). Research has established a normal range of L-Dex scores in healthy patients. Normal L-Dex score ranges are presented in the L-Dex assessment results to assist with patient evaluation.

For patients at risk of unilateral lymphedema in the arm or leg, one L-Dex score will be presented for the at-risk limb. For patients at risk of bilateral leg lymphedema, two L-Dex scores will be presented, one for each at-risk limb.

The underlying calculations for unilateral assessments using the SOZO System have not changed from any previous L-Dex devices. The impedance of the extracellular fluid space (R0) of the unaffected limb is compared with the contralateral affected limb. Clinical data has shown this to have “excellent” accuracy when used as a clinical aid to assess unilateral fluid accumulation in the limb following cancer treatment.[1]

When transitioning from L-Dex devices used in a supine position to use of the SOZO System in a sitting or standing position, there may be a one-time shift in L-Dex scores. The shift has been shown to not be significant.

For assessment of patients at risk of bilateral leg lymphedema, where fluid accumulation could occur in both legs, simultaneously, the comparison of contralateral limbs is not an option. SOZO uses the R0 impedance of the unaffected ipsilateral limb, instead of the unaffected contralateral limb, for bilateral assessments of fluid increases. Clinical data also has shown that arm R0, when compared to leg R0 for the assessment of fluid accumulation in bilateral leg measurements, has “very good” accuracy.[1] For definitions of key terms and more discussion of measurement of patients at risk of bilateral lymphedema, see the glossary and instructions in the main SOZO System Instructions for Use (LBL525).

Note: If a unilateral patient is subsequently considered to be at risk for bilateral lymphedema and their profile has been updated, the L-Dex scores for the previously measured limb will be recalculated using this bilateral approach. This may result in a shift in previous L-Dex scores.

For more direction on viewing L-Dex assessment results in the SOZOapp and MySOZO, consult the main SOZO System Instructions for Use (LBL-525).

[1] SOZO’s L-Dex® accuracy was determined using Receiver Operating Characteristic (ROC) curve analysis. Area under the curve (AUC) scores are established using ROC curves which compare the true positive rate (Sensitivity) against the false positive rate (100 minus Specificity) for different cut-off points of a parameter. Each point on the ROC curve represents a sensitivity/specificity pair corresponding to a particular decision threshold. The area under the ROC curve (AUC) is a measure of how well a parameter can distinguish between two groups (diseased/normal). The closer the modeled AUC comes to 1, the better it is. SOZO’s L-Dex® accuracy was calculated with an area under the curve (AUC) of 0.95 for unilateral assessment and 0.80 for bilateral assessment.

3.1 L-Dex® Scores

The L-Dex scale is a tool to assist in the clinical assessment of lymphedema by a medical provider. The SOZO System displays the current L-Dex score using the L-Dex scale. The L-Dex scale shows the patient's L-Dex score as either inside or outside of the normal range of L-Dex score for a healthy person.

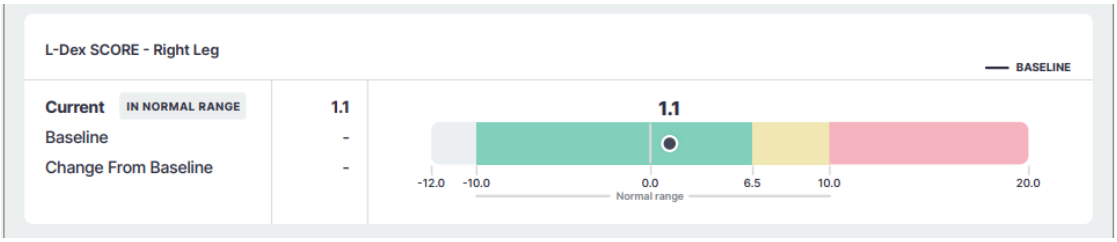
The L-Dex scale normal range (plus or minus 3 standard deviations) measured for a healthy person without lymphedema ranges between +10 and -10 L-Dex units. If a baseline is not set, the normal range will center around an L-Dex score of 0 which is the mean of the matched healthy population.

L-Dex Scores ≤ -10

L-Dex scores equal to or less than -10 may be caused by procedural errors. A warning will be displayed stating that the measurement is out of range. Follow the instructions for use to ascertain the accuracy of the measurements in question.

L-Dex Scores >10

L-Dex scores greater than 10 may indicate the early signs of lymphedema



L-Dex Categories without a Baseline

Gray (Below Normal L-Dex)	L-Dex scores below 3 standard deviations less than the population mean (below -10).
Green (Normal L-Dex)	L-Dex scores between 3 standard deviations less than the population mean and 2 standard deviations greater than the population mean (-10 to 6.5).
Yellow (Normal L-Dex)	L-Dex scores between 2 and 3 standard deviations greater than the population mean (6.5 to 10).
Red (Above Normal L-Dex)	L-Dex scores above 3 standard deviations greater than the population mean (above 10).

Because each person has a different starting L-Dex score, the L-Dex scale normal range can be tailored to an individual patient by reviewing the change in L-Dex score from a Lymphedema Assessment taken prior to treatment. This is known as a baseline measurement and the change in L-Dex score is used to categorize the measurement. In this case, an increase of 6.5 L-Dex units (two standard deviations) from the baseline may indicate early signs of lymphedema.

When a baseline is set, the normal range will reflect a -10 to +6.5 range around the selected baseline L-Dex score. From this comparison, changes in patient fluid levels may be identified, and evaluated as changes which fall within normal or abnormal ranges.

Change in L-Dex Scores ≥+6.5

L-Dex scores that have changed +6.5 L-Dex units from the baseline may indicate early signs of lymphedema.

L-Dex Categories with a Baseline

Gray (Below Normal Change)	Change in L-Dex scores from the baseline that are greater than 3 standard deviations below the baseline (change greater than -10).
Green (Normal Change)	Change in L-Dex scores from the baseline between 3 standard deviations less than the baseline and 2 standard deviations greater than the baseline (change between -10 and +6.5).
Yellow (Elevated Normal Change)	Change in L-Dex scores from the baseline between 2 and 3 standard deviations greater than the baseline (change between +6.5 and +10).
Red (Above Normal Change)	Change in L-Dex scores from the baseline that are greater than 3 standard deviations above the baseline (change greater than +10).

It is recommended to use a baseline taken prior to cancer treatment whenever possible to customize the L-Dex scale for the individual. If a patient has already begun cancer treatment and there is no way to determine a healthy baseline, the clinician should use clinical judgment in conjunction with other assessments to select the most appropriate baseline measurement. If a patient has already developed lymphedema and SOZO is being used to track their progress, do not set the baseline.

3.2 Recommended Measurement Frequency

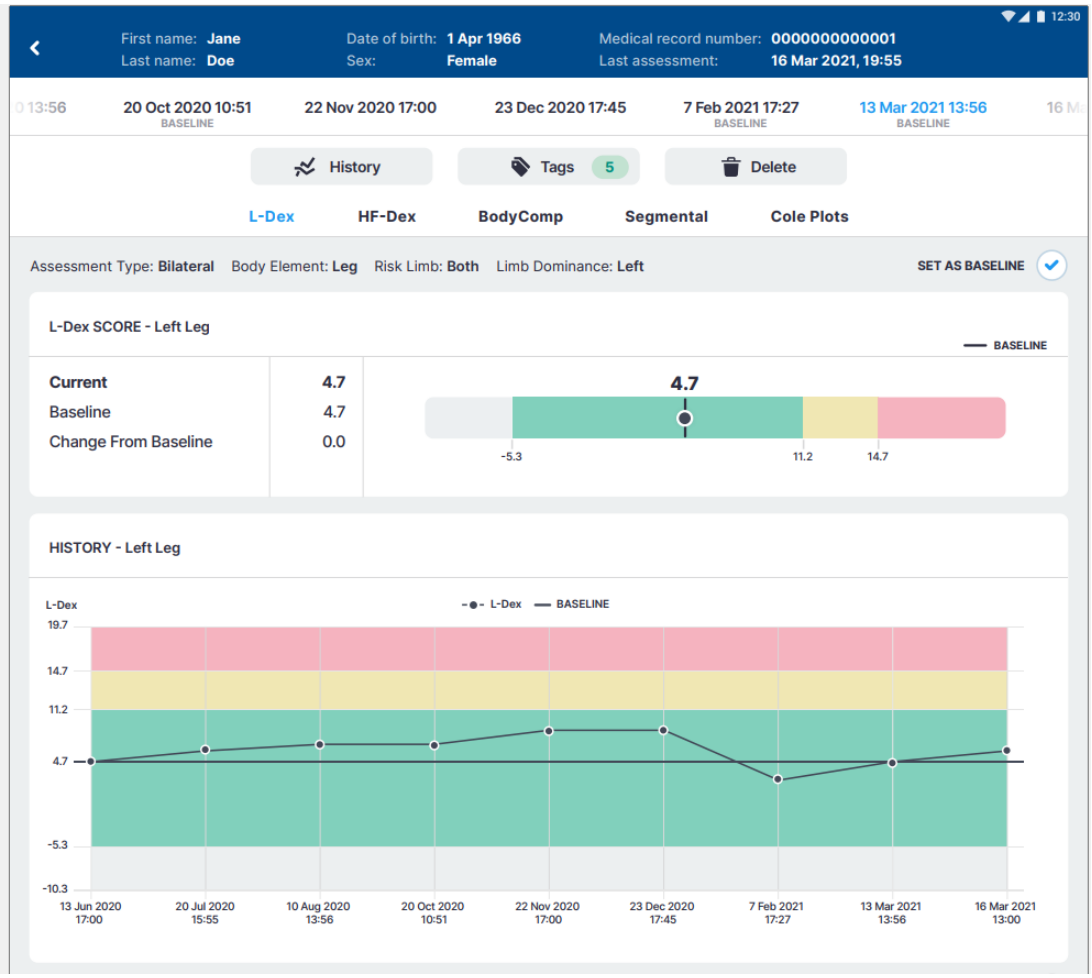
ImpediMed recommends the following frequency of measurements for patients at risk of lymphedema:

- Pre-operative baseline
- Years 1-3: Every 3 months
- Years 4-5: Every 6 months
- Year 6+: Annually

4 L-Dex® Assessments

4.1 Measurement Results

After a successful measurement, the SOZOapp screen will display the results of an L-Dex measurement. In addition to the immediate results, a history of previous patient measurements is displayed in graph format, to allow comparison between current results and previous results. This shows increases or decreases in the L-Dex score over time. The same patient history information can be accessed from MySOZO through a web browser. For more about accessing MySOZO, see the main SOZO System Instructions for Use (LBL-525).



4.2 Setting the Baseline

Selection of a baseline – a “normal L-Dex score” for an individual patient – is the optimal way to track changes over time. To set a baseline, select the most appropriate measurement by date from the patient’s dashboard, and tap the button next to ‘*set as baseline*’:

Please note that if an incorrect baseline is selected, simply select the correct measurement and baseline.

For an L-Dex score, the optimal baseline is typically one of the first few measurements taken, preferably before surgery or other intervention that could impact the lymphatic system.

For more information about setting the baseline for an L-Dex assessment, see the main SOZO System Instructions for Use (LBL-525).

All prior measurements with the L-Dex Assessment may be viewed in MySOZO as well. For more about accessing MySOZO, see the main SOZO System Instructions for Use (LBL-525).

4.3 Availability of L-Dex Assessment

Each Assessment must have a separate license. Only Assessment types with licenses are available to the user. The available Assessment types for a given user are displayed in the SOZOapp and MySOZO. Therefore, the L-Dex Assessment and associated results displays are only available if licensed. For more information about licensing of Assessments and determining the availability of Assessments for users, see the main SOZO System Instructions for Use (LBL-525).

4.4 Choosing the Proper Assessment

It is recommended that only the most appropriate and relevant assessment is selected for each patient, taking into consideration patient diagnosis and the individual needs of the patient as determined by their health care provider.

5 Bilateral Arm L-Dex Assessments

ImpediMed has recently confirmed that some patients at unilateral risk of lymphedema are incorrectly being assessed using the bilateral arm L-Dex assessment and that the bilateral arm L-Dex assessment does not have the same level of sensitivity to help detect early signs of lymphedema as the unilateral arm L-Dex assessment.

This could result in the under-recognition of early lymphedema. The potential health hazards associated with this issue include:

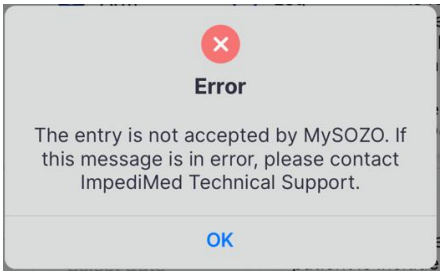
- Delay in early intervention, which could result in progression to clinical lymphedema.
- More aggressive intervention if clinical lymphedema develops.

Version 4.1.0.3 and 5.0.0.1 of the MySOZO software, released in August 2023 contains an update to make unilateral L-Dex the sole assessment option for arms. L-Dex assessments for legs will not be impacted,

5.1 Impact to patient settings who had bilateral arm selections:

At the time of the software update, all patients who had bilateral arm selections chosen were modified to deselect their L-Dex related assessments. If another assessment type was chosen, such as BodyComp, then only those assessment results will be shown. If no other assessment type was chosen for the impacted patient, no data will be shown when reviewing results.

When using MySOZO.com to edit patient lymphedema settings, a user is not able to select both bilateral and arms as a selection. When using the SOZOapp, a user is able to select bilateral and arms as a selection, but gets the following error message when attempting to save the patient profile:



5.2 Recommended course of action for impacted patients:

We recommend that you confirm the risk profile of the impacted patients in MySOZO and take the following actions:

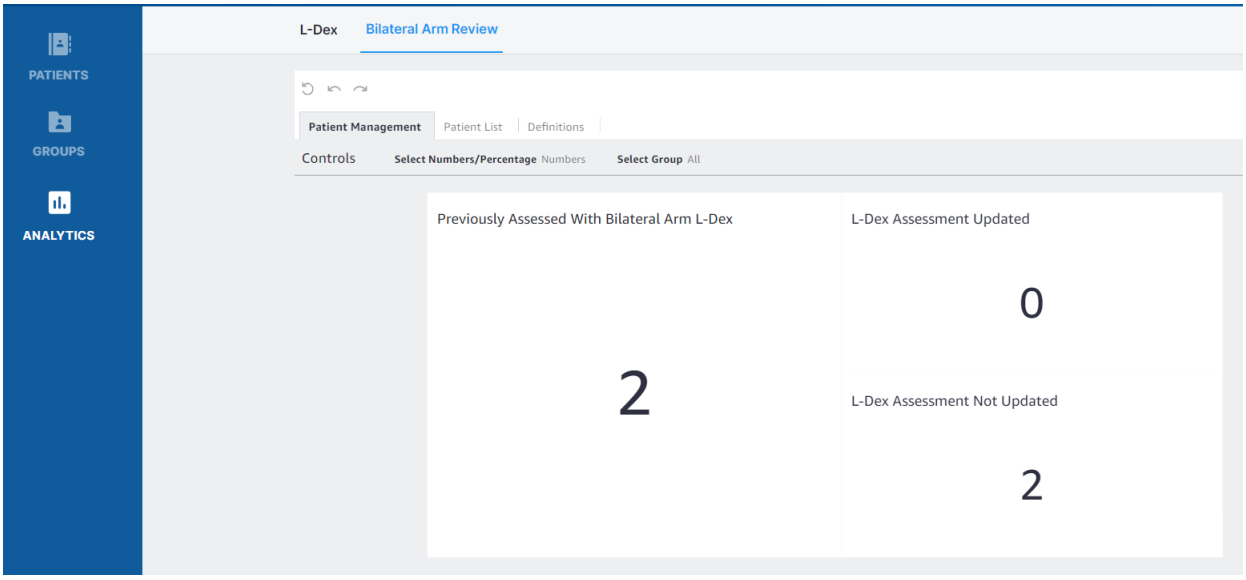
- For patients at unilateral risk for lymphedema (over 90% of breast cancer patients)[2], confirm that the unilateral arm L-Dex assessment is selected in the patient profile and continue to screen for early signs of lymphedema.

[2] Heron DE, et al. Risk factors and outcomes for patients with synchronous and metachronous disease. *Cancer* 2000;88(12):2739-50.

- For patients at bilateral risk for lymphedema (3-10% of breast cancer patients)[2], guidelines suggest routine screening using clinical exam and symptom assessment.

5.3 Identification of impacted patients

To aide in the identification of impacted patients and to track follow up and patient profile settings at the time of the software update, a new tab within the analytics module has been created as shown below. The data shows the number of patients who were originally assessed with Bilateral Arm for L-Dex assessment at the time of the software update as well as those patients who have since had L-Dex assessments updated.



By selecting a chart and navigating to the patient list, individual patients can be identified and their settings at the time of the software update has been saved under:

- “Previous surgery date” (if entered)
- “Previous LPP Start Date” (if entered),
- “Previous Limb Dominance Selection”