

Background and Purpose

- Previous reports suggest that skin blood flow is reduced in arms of women with lymphedema due to breast cancer treatment.
- Since tissue oxygenation depends on blood flow, we sought to determine if tissue oxygen tension (TcPO₂) is also reduced and if so, if therapy that reduces edema and tissue hardness has a beneficial effect.

Methods Overview

- Transcutaneous oxygen tension (TcPO₂) was measured on fibrotic tissue areas of 15 breast cancer survivors who had developed unilateral arm lymphedema.
- Measurements were done on both the affected arm and the control arm with arms down and with arms raised.
- Done prior to starting CDP therapy and at the end of the treatment sequence

ABSTRACT

Reports suggest that skin blood flow is reduced in arms of women with lymphedema due to breast cancer treatment. Since tissue oxygenation depends on blood flow, we sought to determine if transcutaneous oxygen tension (TcPO₂) is also reduced and if so, if therapy that reduces edema also improves oxygenation. TcPO₂ was measured in fibrotic areas of edematous arms and in non-affected arms of 15 women with unilateral arm lymphedema before and after CDP therapy. Fibrosis was assessed by indentation recovery times (IRT) after applying an indenter-like device. Arm volumes and edema percentages were determined from circumferences using automated software calculations. Treatment significantly (p < 0.01) reduced arm edema (mean±SD) from 28.6±22.9% to 18.1±17.7% and fibrotic segment edema from 42.6±30.1% to 25.0±20.4% and softened fibrotic tissue judged by reductions in IRT (88.7±60.7 sec vs. 23.1±38.8 sec, p < 0.001). Surprisingly, TcPO₂ did not differ between arms initially and was unchanged by treatment, being 60.1±8.8 mmHg at the start and 61.8±9.2 mmHg after treatment. Thus, despite significant amounts of initial edema, TcPO₂ was not less in edematous arms nor was it changed by therapy that decreased edema. These findings suggest that for resting conditions, blood perfusion is adequate to prevent significant tissue oxygenation deficits.

Transcutaneous Oxygen and Tissue Properties

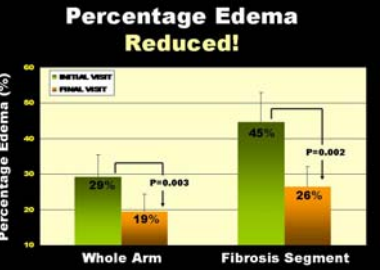
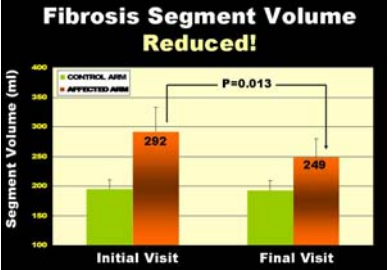
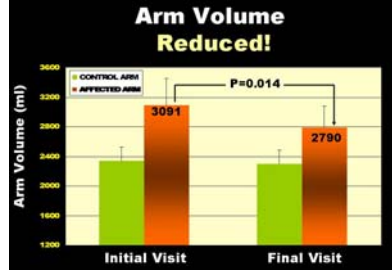


Arm Volume Determination

- Volumes of whole arm and of the target fibrotic segments were determined by software (LVP3.0)* that automatically calculated volume and edema percentages from measured circumferences.
- Measurements were made before and after standard CDP therapy sequences.



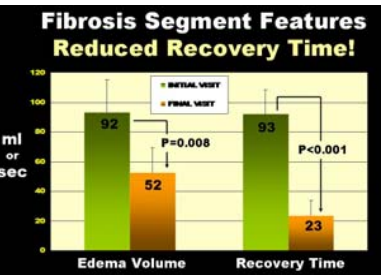
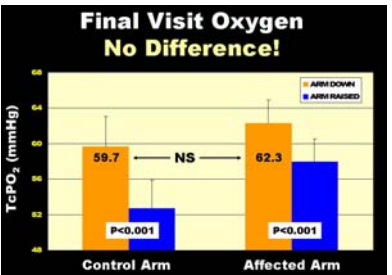
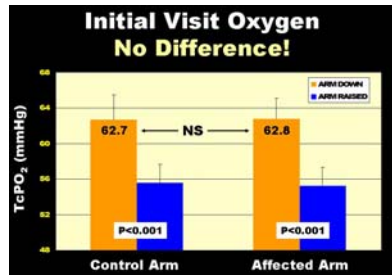
Main Research Findings



Summary and Conclusions

In this study of a small group of post-mastectomy patients, treatment of the affected arm significantly reduced total arm and fibrotic segment edema and softened fibrotic tissue.

However, despite significant amounts of initial edema of the affected arm, its TcPO₂ value was not initially less than in the non-affected contralateral arm nor was the affected arm's TcPO₂ value changed by therapy.



These findings suggest that for resting conditions, blood perfusion is adequate to prevent significant tissue oxygen deficits within the edema territory as determined by the present measures.