Effect of Pulsed RF Energy on Postmastectomy Arm Lymphedema

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BEMS BUDDIES
In Quebec

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Lymphedema

- High protein content edema secondary to node removal and/or radiation therapy
- Occurs in 20-40% of postmastectomy women from months to years after surgery
- Usually progressive if untreated - Fibrosis

Treatment

Complex Decongestive Therapy (CDT)

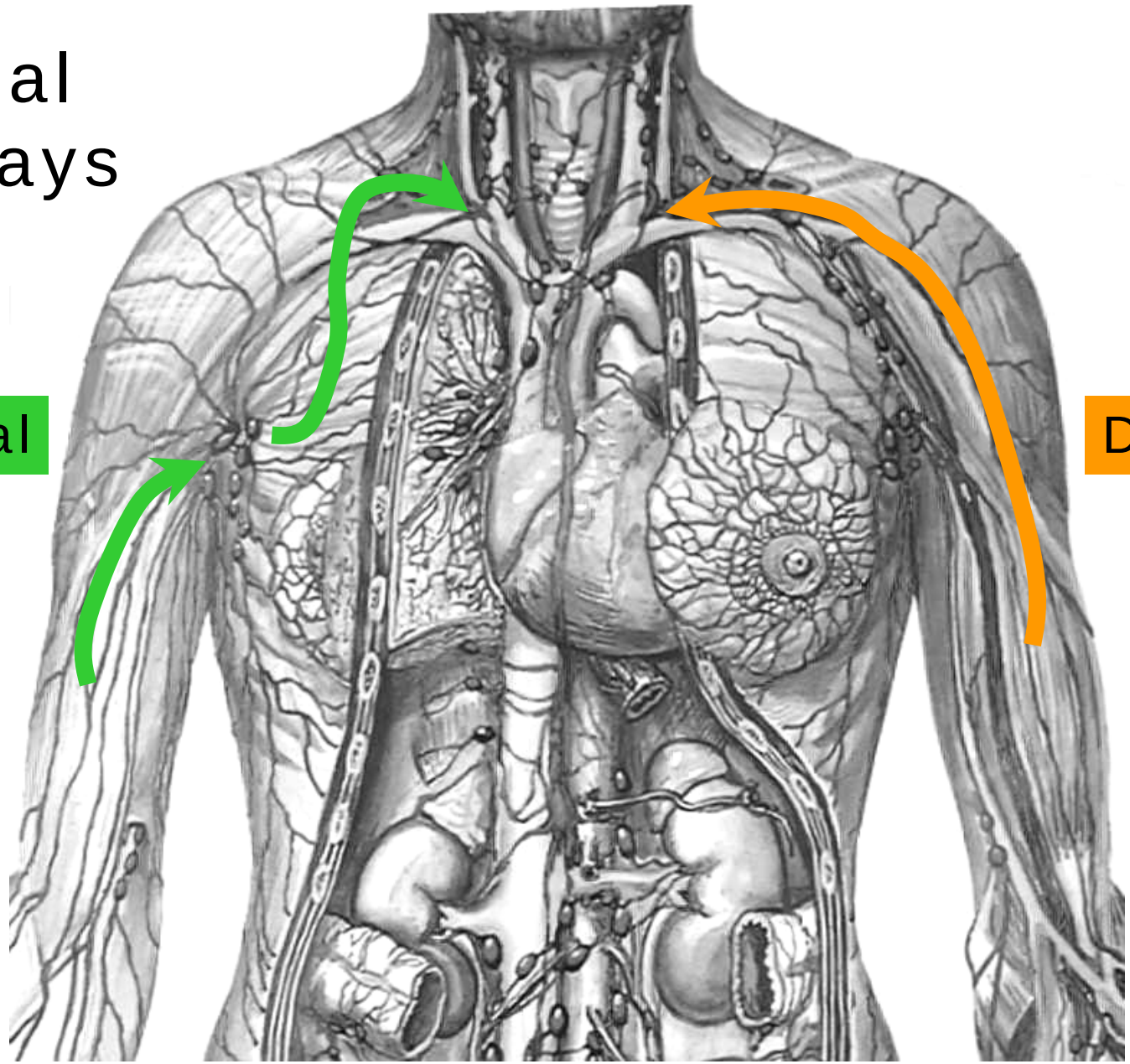
- Manual Lymph Drainage
- Compression Bandaging
- Exercise and Skin Care

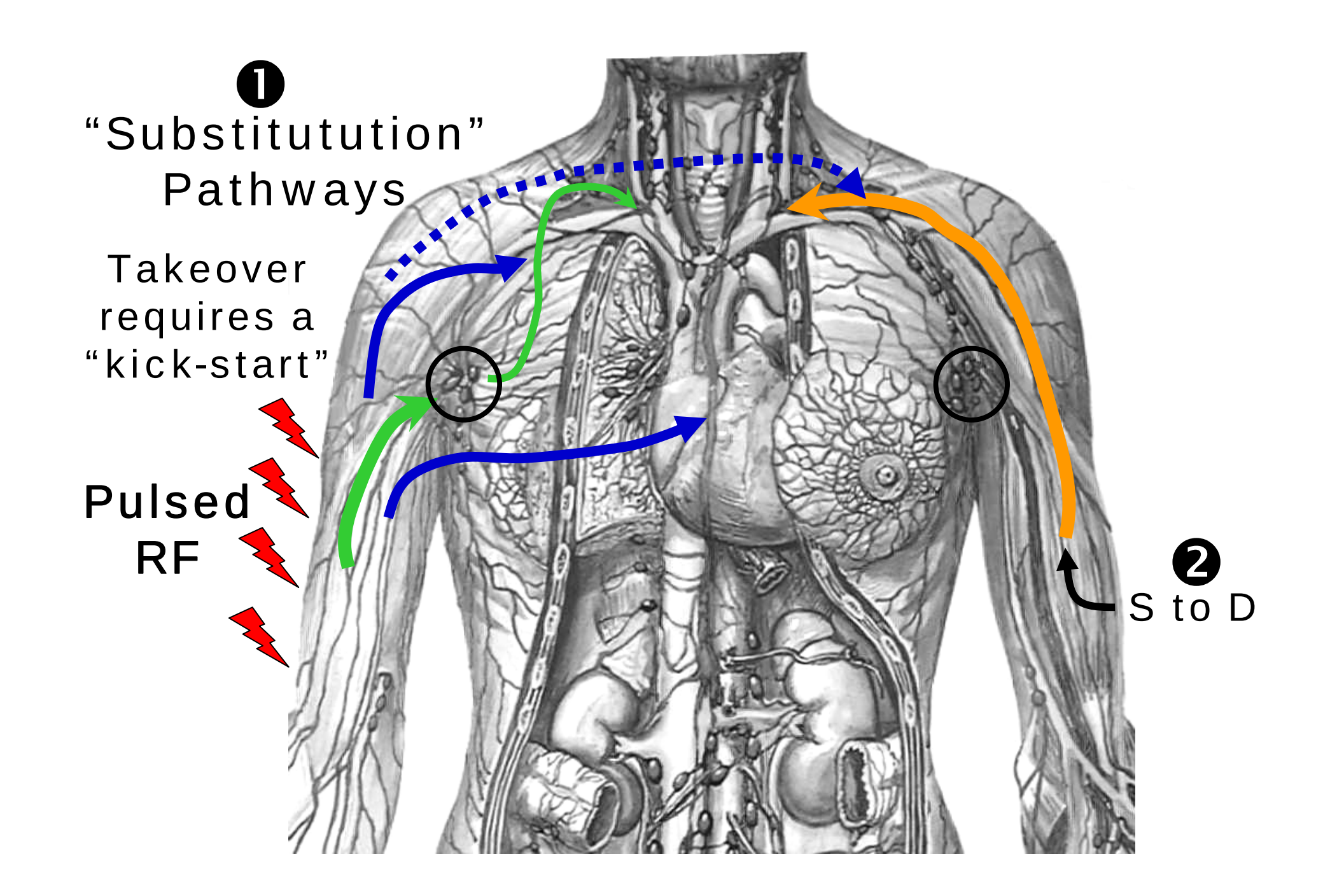
Current Study Rationale

- CDT promotes lymph drainage
  - ❶ Expands collateral channels
  - ❷ Provides alternative pathways
- Pulsed RF (PRFT)
  - ❶ Increases skin blood flow (SBF) via
  - ❷ Vascular channel enlargement

HYPOTHESIS PRFT affects lymph channels similarly to blood channels

Normal Pathways




❶
"Substitutution"
Pathways
Takeover
requires a
"kick-start"
Pulsed
RF
❷
S to D

Objectives

Pilot study to Investigate effects of Pulsed RF Therapy (PRFT) on

1. Arm Lymphedema Volume
2. Skin Blood Perfusion
3. Transcutaneous Oxygen

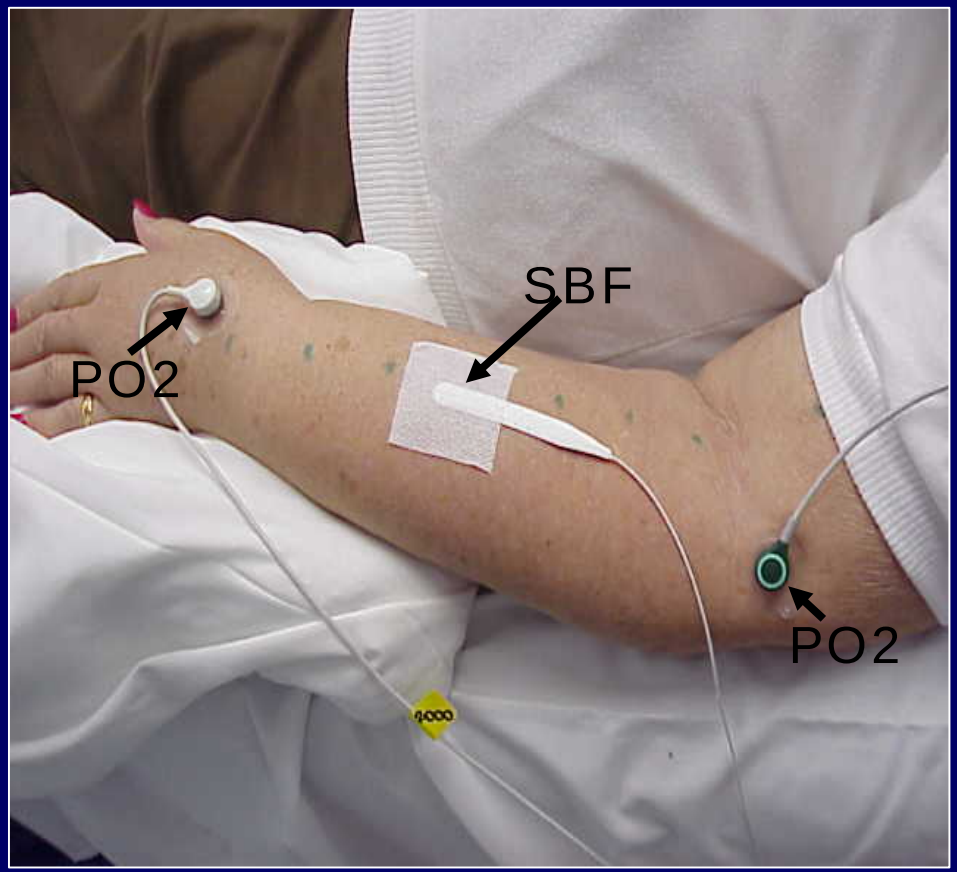
Subjects and Protocol

- Seven post-mastectomy patients in pilot study
- Unilateral Lymphedema All had prior CDT Tx
- Each Pt. treated 4-6 times over 2-weeks
- During this interval no other Tx provided

Study Treatments

- Each Tx for 60 minutes
- Tx heads (Magnatherm) covered affected arm
- Pulsed RF (27.12 MHz)
  On: 150 μsec
  Off: 1275 μsec (700/sec)
- Power: ~ 12% of max

Physiological Measurements



- Skin blood perfusion (SBF) by laser-Doppler on affected arm
- Transcutaneous O_2 (PO2) on affected and contralateral arm

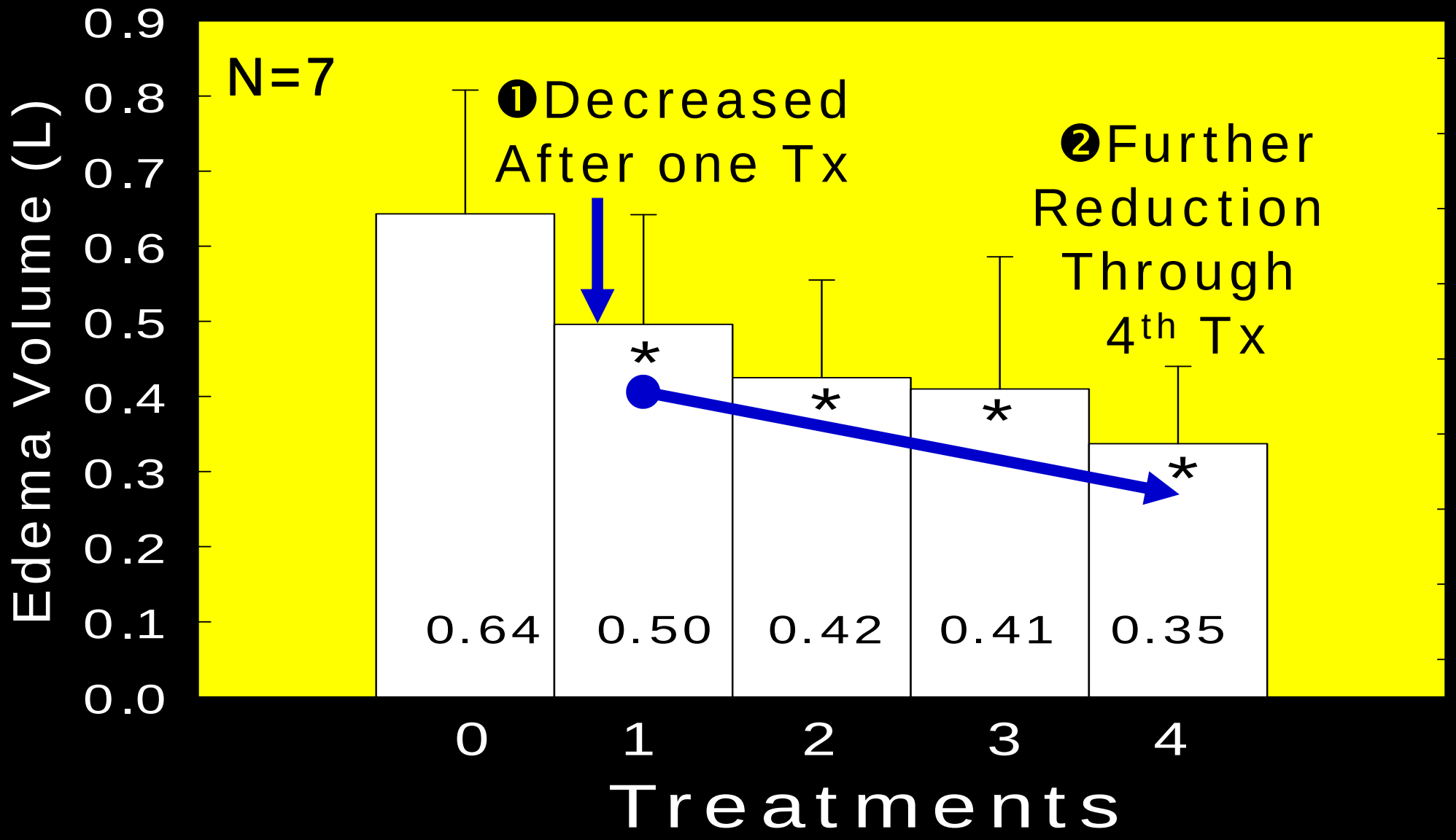
Volumes and Calculations

Affected (A) & Control (C) arms measured before Tx and prior to each subsequent Tx

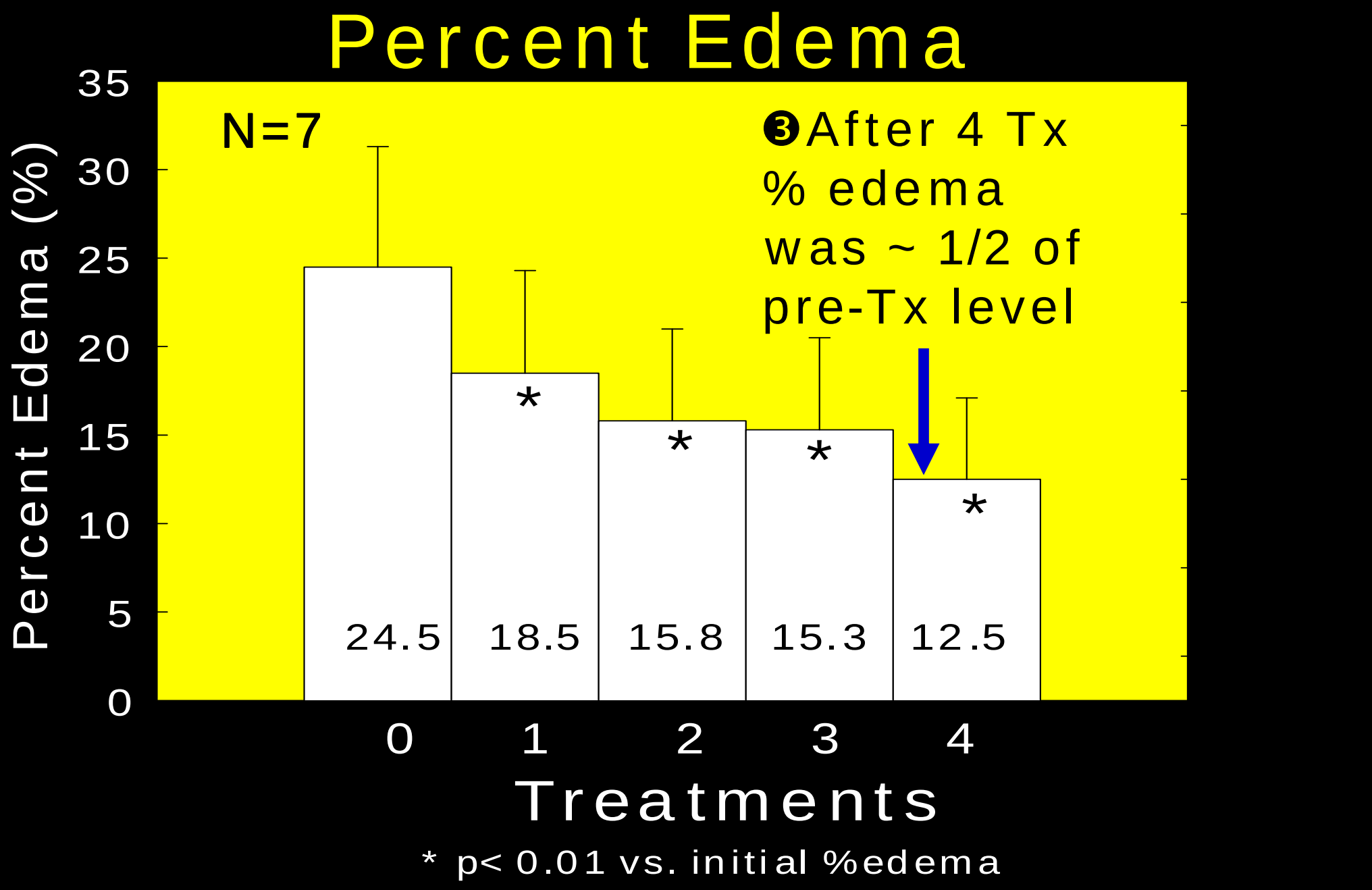
- **Circumferences** (c_1, c_2) at 4-cm intervals
- **Segmental volumes**
  $Vseg=(L/12\pi)(C_1^2+C_2^2+C_1C_2)$
- **Total arm volume**
  V_T = sum of segments
- **Edema volume** $V_{TA} - V_{TC}$
- **Percent Edema**
  %Edema= Edema Volume / V_{TC}

Results

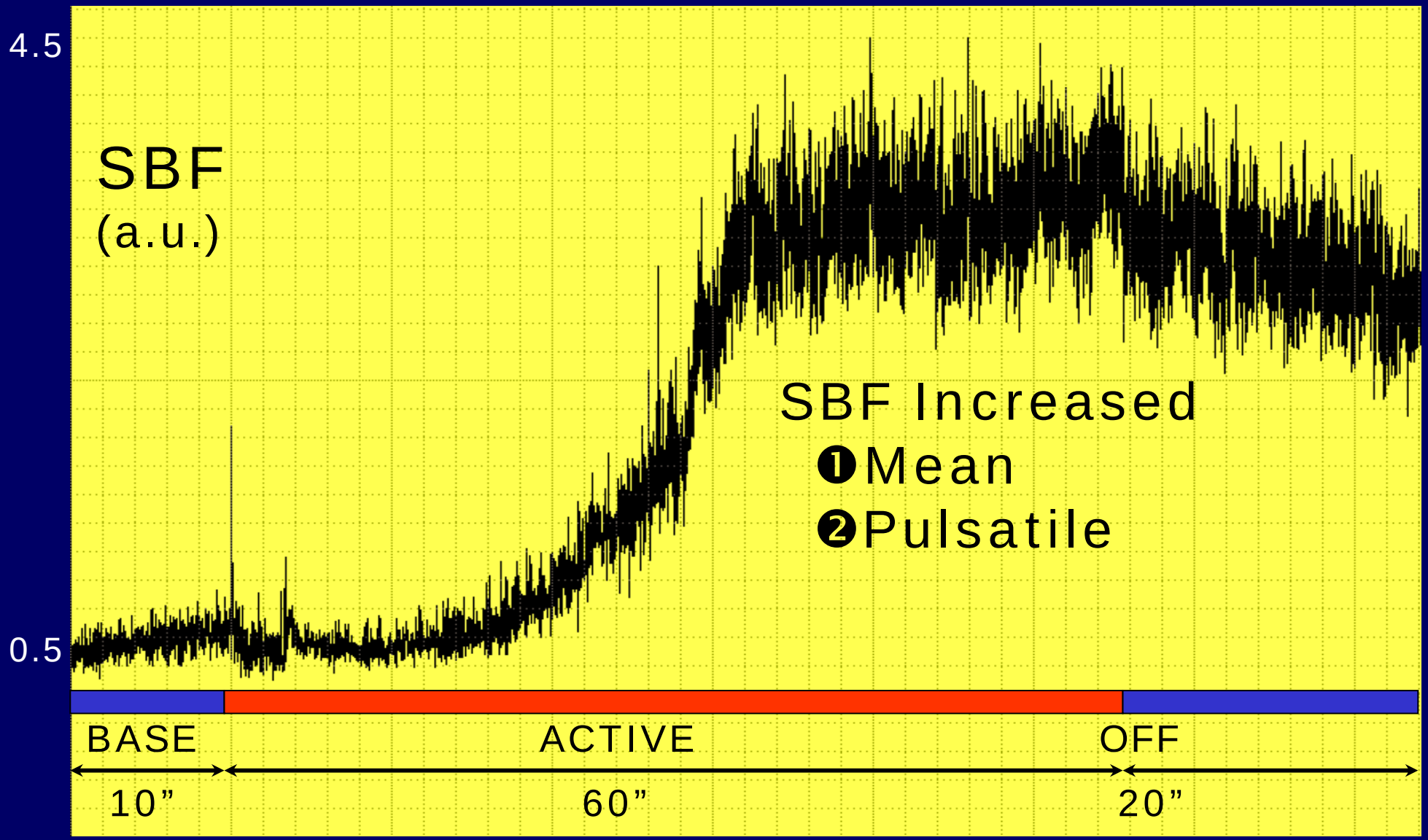
Edema Volume



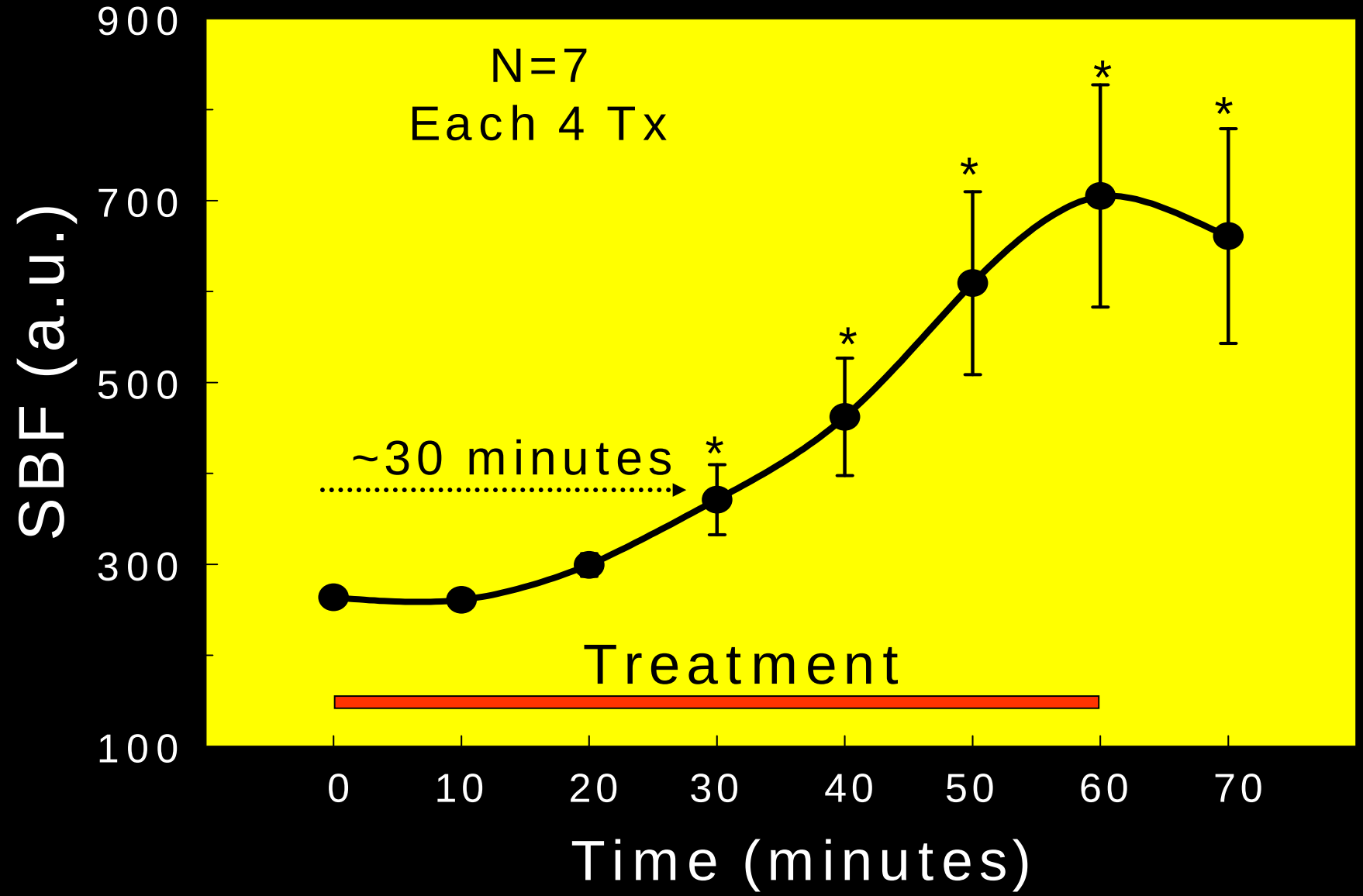
* p< 0.01 vs. initial edema volume


Percent Edema
N=7
❸After 4 Tx
% edema
was ~ 1/2 of
pre-Tx level
Percent Edema (%)
35
30
25
20
15
10
5
0
24.5
18.5
15.8
15.3
12.5
*
*
*
*
0
1
2
3
4
Treatments
* p< 0.01 vs. initial %edema

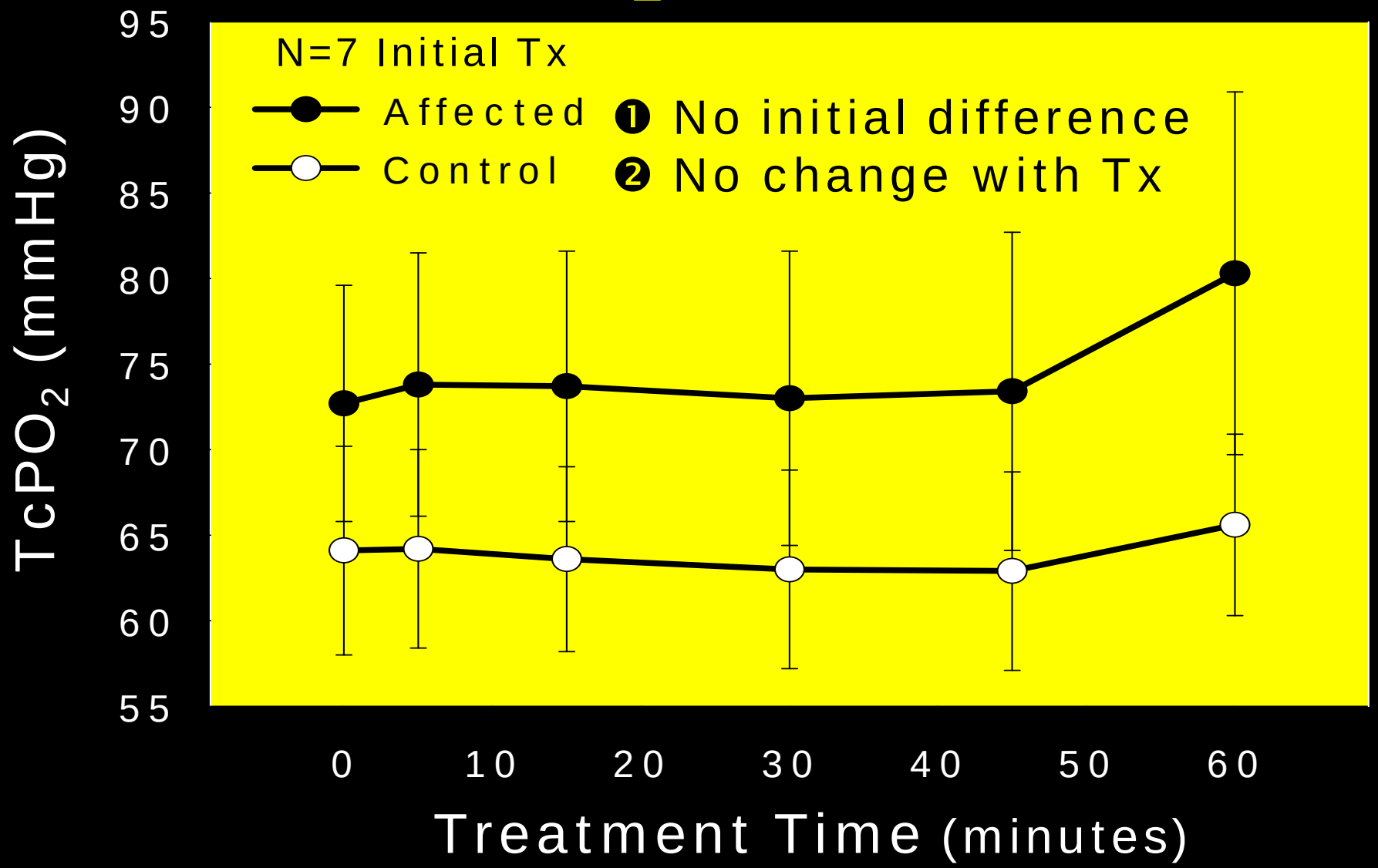
Example SBF Response



Overall SBF Response



PO_2 Response



Conclusions: Volume Changes

- PRFT shows potential benefit
- Lymphedema reduced with one treatment
- Initial PILOT findings are encouraging, BUT need placebo controlled studies (Ongoing)

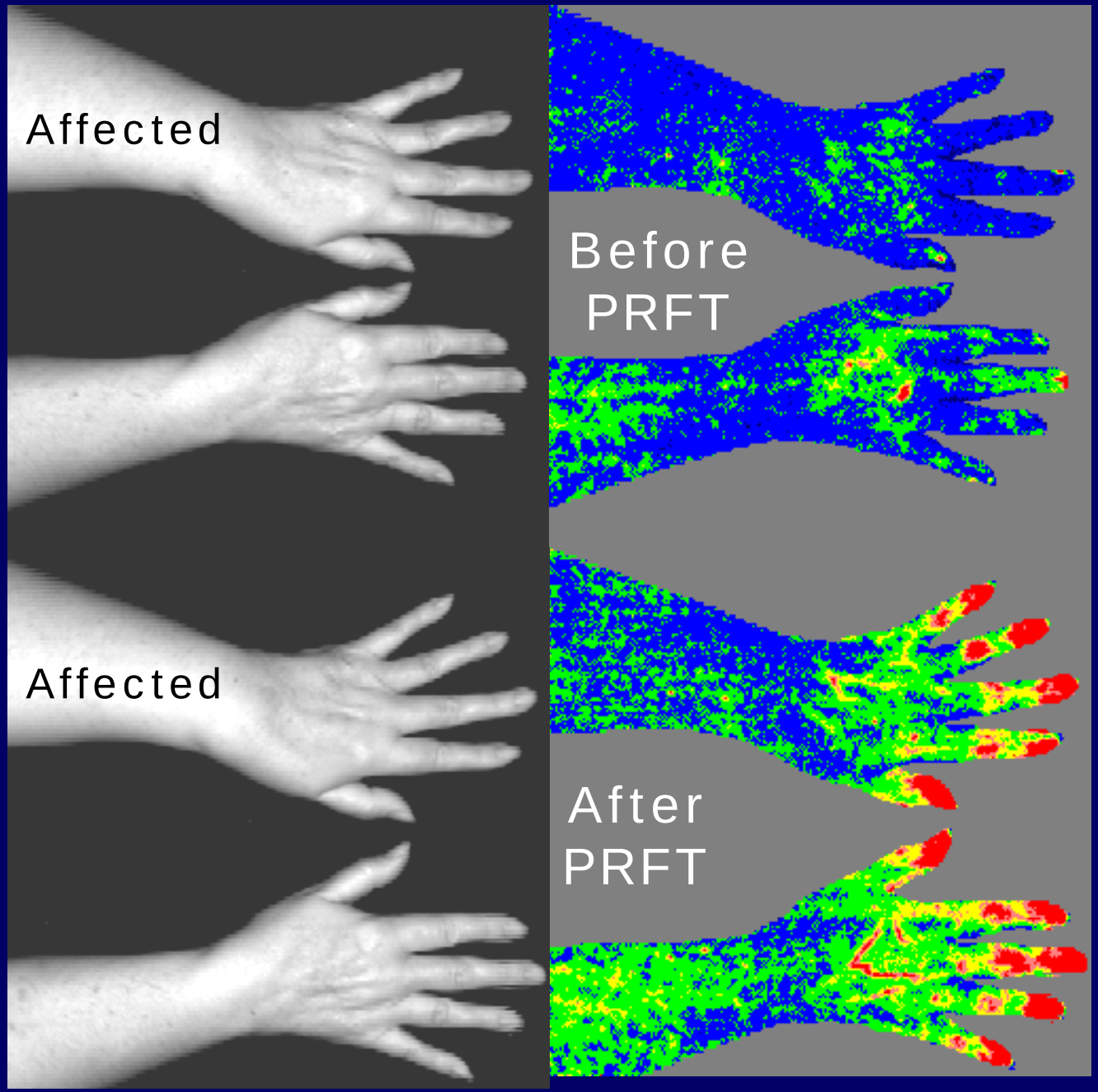
Conclusions: Blood Perfusion

- PRFT associated with SBF increase
  No effect on PO_2 (Normal levels)

- Relation of SBF increase to lymphedema reduction (if any) not established

- SPECULATION Mechanisms similar to those that increased SBF also increase lymph drainage

  ❶ Expanding collateral channels
  ❷ Increasing lymphoangiomotoricity

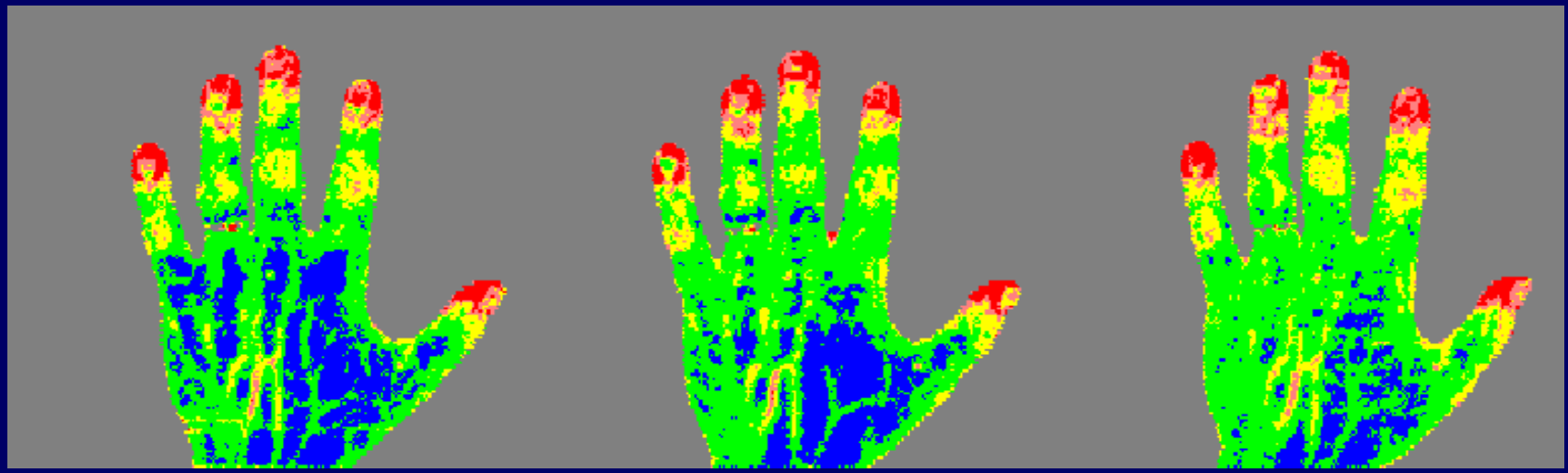


Magnatherm
PRFT
Tx for 3 wks

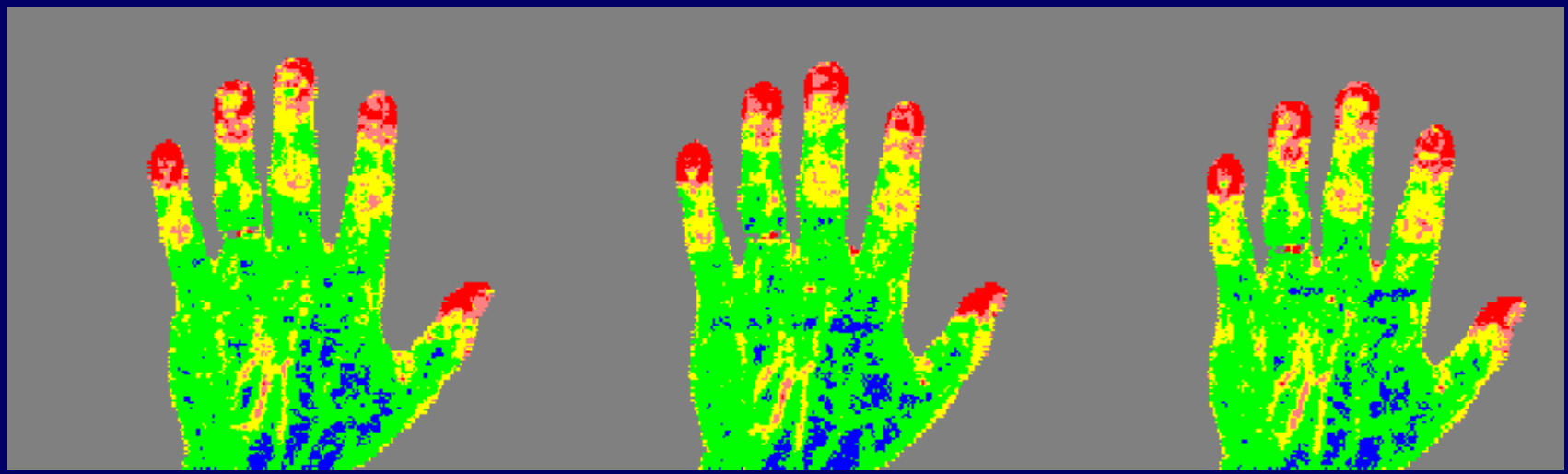
3 Sham
+
6 Active

TT 0-300

LDI PERFUSION CHANGES WITH PRFT



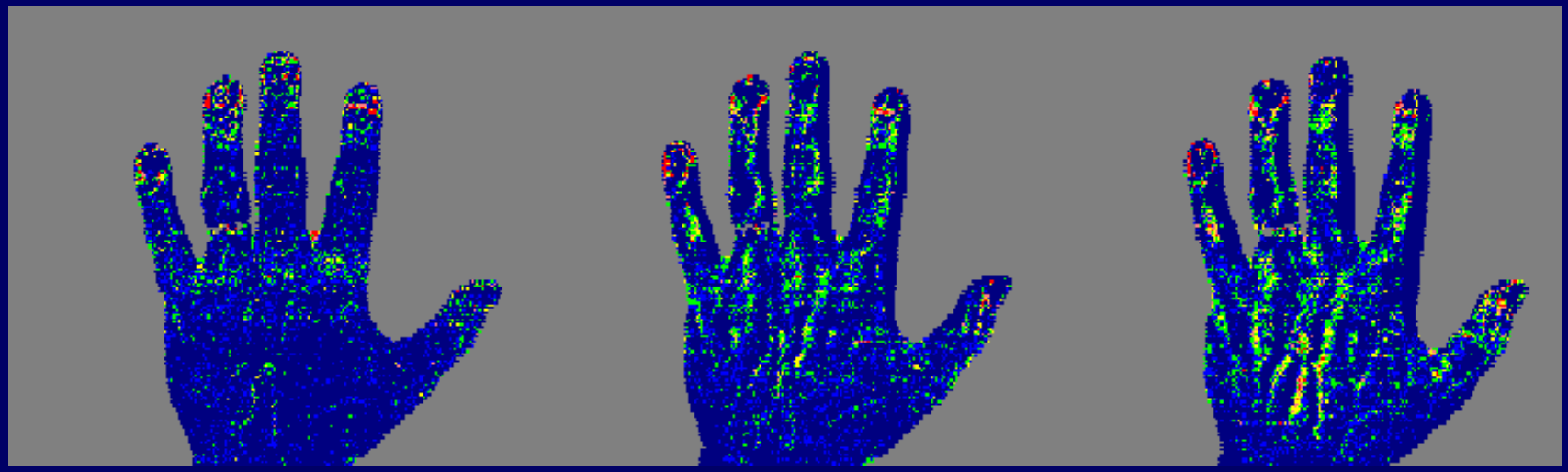
Baseline 0-4 5-9



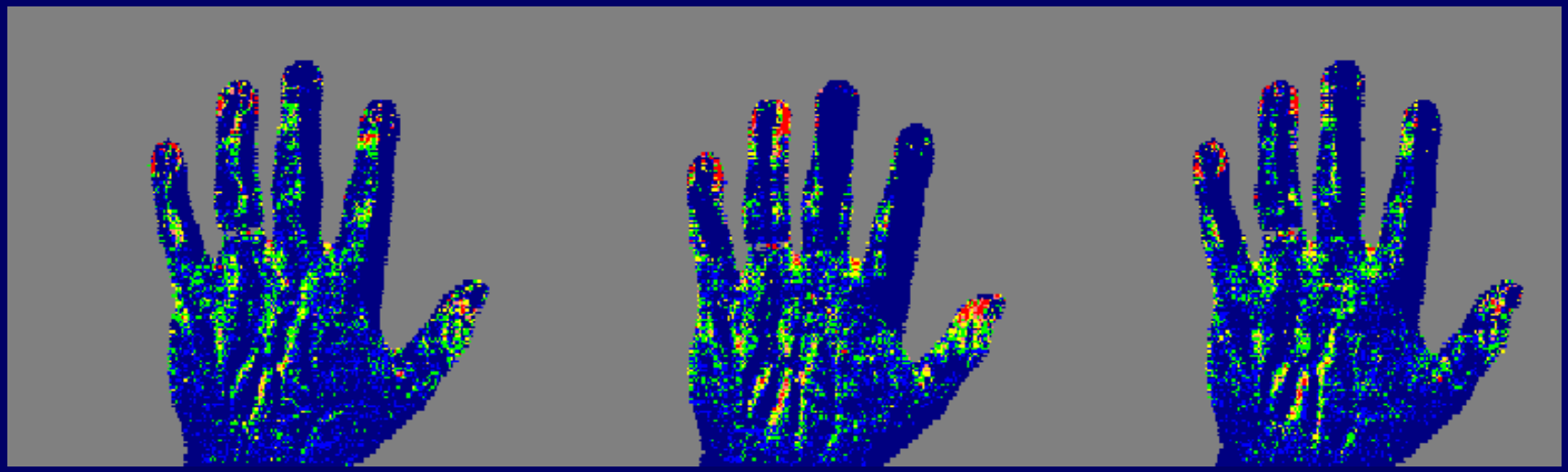
10-14 20-24 25-29

Magnatherm
P=12, R=3, 30”
0-700 pu

DIFFERENTIAL LDI PERFUSION WITH PRFT



0-4 5-9 10-14



15-19 20-24 25-29

Thanks for your Attention