HOW TO USE THIS APPLICATION NOTE

**PATIENT SYMPTOMS** Verify that your patient's symptoms correspond to one or more of those listed in Figure 1.

**DOPPLEX® EQUIPMENT REQUIRED** Select the most appropriate Pocket unit to perform the examination. For suggestion of suitable equipment, refer to Figure 2.

**PROCEDURE** Connect your Rheo Dopplex® II to the Dopplex® Printa II Package or Reporter Software Package (and a computer), and begin your examination, refer to Figure 3.

**TOURNIQUET POSITION** Figure 4 suggests position for Tourniquet.

**EXAMINATION RESULTS** Taking careful note of your Rheo Dopplex® II display and venous waveforms, refer to Figure 5 overleaf and compare your examination results with those shown.

**NOTES** Refer to Figure 6 overleaf for general notes relating to this form of examination for venous incompetence.

It is ESSENTIAL that the PPG curve is used to confirm the Refill Time.

---

**FIGURE 1 PATIENT SYMPTOMS**
- SWELLING
- VARICOSE VEINS
- VENOUS ULCERS
- VENOUS EDEMA
- POST-THROMBOTIC SYNDROME

**FIGURE 2 DOPPLEX EQUIPMENT REQUIRED**
- Rheo Dopplex® II.
- Dopplex® Printa II or Dopplex® Reporter Software package.

**FIGURE 3 PROCEDURE**
- Remove footwear and stockings.
- Place foot on insulated mat.
- Adjust height to minimize weight on feet.
- Obese patients should be reclined to reduce venous compression.
- Fit sensor 10cm above the medial malleolus (use length of blue cable).
- Ensure patient is relaxed i.e., pulse rate stable
- Undertake exercise routine.

---

**FIGURE 4 TOURNIQUET POSITION**

<table>
<thead>
<tr>
<th>Tourniquet Position</th>
<th>Limb Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>UT Tq</td>
<td>S 60</td>
</tr>
<tr>
<td>AK Tq</td>
<td>M 70</td>
</tr>
<tr>
<td>BK Tq</td>
<td>L 80</td>
</tr>
</tbody>
</table>

---

**TABLE**

<table>
<thead>
<tr>
<th>Tourniquet Position</th>
<th>Limb Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>UT Tq = Upper thigh</td>
<td>S 60 M 70 L 80</td>
</tr>
<tr>
<td>AK Tq = Above knee</td>
<td>S 60 M 70 L 80</td>
</tr>
<tr>
<td>BK Tq = Below knee</td>
<td>S 40 M 50 L 60</td>
</tr>
</tbody>
</table>
### FIGURE 5  EXAMINATION

#### NORMAL

If Refill Time (RT) is greater than 25 seconds, then venous insufficiency is not present or is not significant.

- Normal
  - RT > 25s
- Equivocal
  - RT = 20-25s
- Abnormal
  - RT < 20s
  - Abnormal
    - RT < 10s
    - Vp < 10

#### ABNORMAL

If Refill Time (RT) is less than 20 seconds, then venous reflux is present. Apply the tourniquet cuff at the appropriate positions to determine the level of venous insufficiency, (See flowchart below).

Venous refill from arterial inflow

- Some venous reflux present
- Venous incompetence present
- Deep venous obstruction/insufficiency

### DECISION MAKING FLOWCHART FOR VENOUS INCOMPETENCE

- Guidelines for RT:
  - Normal: >25s
  - Equivocal: 20-25s
  - Abnormal: <20s

- **AK Tq** (To Isolate all Reflux From SFJ & Thigh Perforator)
  - Abnormal
  - Normal

- **BKT q** (To Isolate SSV Reflux)
  - Normal
  - Abnormal

- **UTTq** (To Isolate SFJ Reflux)
  - Normal
  - Abnormal
  - >1.0
  - 0.8-1.0
  - <0.8

- **SSV**
  - Incompetence

- **Calf Perforator/ Deep Vein Incompetence**

- **Thigh Perforator Incompetence**

- **LSV Incompetence**

- **Deep Vein**

- **No Further Investigation (Because of Ostial Arteries Due To Diabetes)**

- **Arterial Disease Present**

- **Arterial Investigation eg, Duplex Scanning**

**Flowchart is for guidance only**

### FIGURE 6  NOTES

Differentiation between deep vein and calf perforator incompetence is not possible with PPG. In these cases, further investigation, i.e. Duplex scanning should be undertaken. Patients with gross edema could produce normal results with venous incompetence present.

**Guidelines for RT:**
- Normal: >25s
- Equivocal: 20-25s
- Abnormal: <20s

**PPG TRACE**
- Abnormal
- Normal

**PLANTAR FLEXION**
- Abnormal
- Normal

**HINT**
- If obvious varicosities present then repeat test with alternative flexion procedures, i.e.-
  1) Plantar Flex: heels while standing
  2) Half Knee bend while standing
  3) Manual calf compression with patient standing

**REFERENCES:**
- McEnroe, CS, O’Donnell ThF, Mackey WC. Correlation of clinical findings with venous hemodynamics in 386 patients with chronic venous insufficiency. 156;148-52
- Our thanks go to Dr. Mo Aslam, Dept of Surgery. Hammersmith Hospital, London, UK

**EDUCATIONAL MATERIAL AVAILABLE FROM HUNTELEIGH DIAGNOSTICS**
- Library of Sounds Audio Cassette
- Assessment & Treatment of Leg Ulcers Video
- Vascular Investigations Video
- Assessment of the Diabetic Foot Video
- ABPI & TBPI guides.

**APPLICATION NOTES AVAILABLE FROM HUNTELEIGH DIAGNOSTICS**

**NOTE 1** - Arterial Investigation Of The Lower Limb

**NOTE 2** - Venous Investigation Of The Lower Limb Using Doppler

**NOTE 3** - Venous Investigation Of The Lower Limb Using PPG

**NOTE 4** - Screening For The Absence Of An Acute DVT Using PPG

**NOTE 5** - Using A Hand Held Doppler To Assist With PICC Placement