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APPENDICES

APPENDIX A
THERMOGRAPHY

Thermography

Thermography (Fluke Thermography, Fluke TiR1 Thermal Imager model: FLK-TIR1 9HZ, Fluke cooperation, United state of America) detect radiation in the infrared range (Heat) of the electromagnetic spectrum and produce images of that radiation (Infrared radiation or IR is electromagnetic radiation with a wavelength between 0.7 and 300 micrometres, which equates to a frequency range between approximately 1 and 430 TeraHertz). (Figure 5) Since infrared radiation is emitted by all objects based on their temperatures, the amount of radiation emitted by an object increases with temperature.

Method

1. Starting position: sitting position.
2. Place the hand in mid position into the insulation box.
3. Thermography is applied to the dorsum of the hand. Hand temperature is recorded in Celsius degree. Data are collected in Thermography software (Figure 6).
4. Data of average hand temperature are gotten by Secure Digital (SD) memory card and manage in SmartView™ full analysis and reporting software (Figure 7). Areas of infrared radiation were calculated by handcraft. Landmark of average hand temperature were styloid process of radius and ulnar bone and surround all fingers.

Figure 5 Fluke TiR1Thermography

Figure 6 Thermography capture

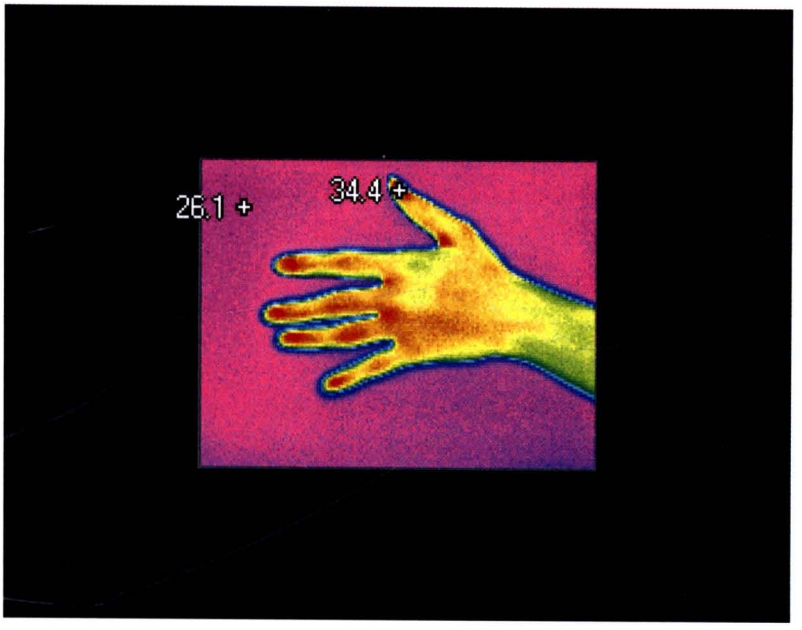

Figure 7 Thermography image; Hand average temperature (SmartView™ Full analysis and reporting software)

APPENDIX B
THERMOGRAPHY CERTIFICATION

Fluke Thermography

Certificate of Calibration

Model: **Fluke TiR1 Thermal Imager**

Accuracy: ±2°C or 2% of reading (whichever is greater)

Measurement Temperature Range: -20°C to +100°C
(Not calibrated below -10°C)

(1) 2LAZ6

1 2LAZ6

Model: FLK-TIR1 9HZ

ITEM NO: 2823121

S/N: TIR1-08051059

02-JUN-2008

Certified By: Fluke QA Manager

Fluke Corporation certifies the above instrumentation has been calibrated to meet or exceed the published specifications. The calibration was performed using instrumentation and standards that are traceable to the United States National Institute of Standards and Technology (NIST) or other signatories of the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA). This Certificate/Report shall not be reproduced, except in full, without the written consent of Fluke Corporation.

APPENDIX C

Hand Mobility in Scleroderma (HAMIS)

Hand Mobility in Scleroderma (HAMIS)

HAMIS is a hand function test for persons who have Scleroderma (systemic sclerosis). It is a performance index that consists of 9 items (Sandqvist, Eklund, 2000b) assessing the movements included in an ordinary range of motion test, i.e., finger flexion, extension and abduction, abduction and pincer grip of the thumb, dorsal extension and volar flexion of the wrist, and pronation and supination of the forearm. The different performance areas of HAMIS are composed of different-sized grips and different movements, all related to tools and movements that are part of daily occupations. Each exercise is graded on a 0–3 scale, where 0 corresponds to normal function and 3 denotes that the individual is unable to perform the task. Each hand is assessed separately. The total score of HAMIS for each hand is 27, which represents a high degree of dysfunction.

The test equipment consists of standardized cylinders diameter (diam) 5, 15, 30, 60, 70 & 90 millimeters, respectively, and spool of thread.

Finger flexion (Figure 8)

- Can bend fingers 2–5 around a pencil (5 mm diam). 0
  All fingers must be tight to the object.
- Can bend fingers 2–5 around a piece of cutlery (15 mm diam) 1
- Can bend fingers 2–5 around handlebar (30 mm diam) 2
- Cannot manage the previous item 3

Finger extension (Figure 9)

- Can feel the table completely with digits 2–5 0
- Can feel the pencil (5 mm diam) with digits 2–5 1
- Can feel the piece of cutlery (15 mm diam) with digits 2–5 2
- Cannot manage the previous item 3

Thumb abduction (Figure 10)

- Can grip around a coffee package (90 mm diam) 0
- Can grip around a milk parcel (70 mm diam) 1
- Can grip around a bottle (60 mm diam) 2
- Cannot manage the previous item 3

Pincer grip (Figure 11)

- Can form a round pincer grip 0
- Can form a D-shaped pincer grip 1
- Can form a long narrow pincer grip 2
- Cannot manage the previous item 3

Finger abduction (Figure 12)

- Can spread the fingers and then fold the handstogether to the bottom of the fingers 0
- Can spread the fingers and then fold the hands together to the first phalanx 1
- Can spread the fingers and then fold the hands together to the second phalanx 2
- Cannot manage the previous item 3

Volar flexion (Figure 13)

- (The person stands with the arms alongside the body. The object is given from behind.)
- Can grasp a spool of thread with a slight flexion of MCP and extended PIP and DIP joints 0
- Can grasp a spool of thread with a large flexion of MCP and extended PIP and DIP joints 1

Volar flexion (Figure 13)

- Can grasp a spool of thread with a large flexion of MCPand flexion of PIP 2
- Cannot manage the previous item 3

Dorsal extension (Figure 14)

- Can hold the palms together and put the wrists against the stomach 0
- Can hold the palms together and put the thumbs against the throat 1
- Can hold the palms together and put the thumbs up to the mouth 2
- Cannot manage the previous item 3

Pronation (Figure 15)

- Can put the palms of the hands on the table (MCP 2–5 must touch the surface) 0
- Can put the palms of the hands on the table (MCP 3–5 must touch the surface) 1
- Can put the palms of the hands on the table (MCP 4–5 must touch the surface) 2
- Cannot manage the previous item 3

Supination (Figure 16)

- Can put the backs of the hands on the table (MCP 2–5 must touch the surface) 0
- Can put the backs of the hands on the table (MCP 3–5 must touch the surface) 1
- Can put the backs of the hands on the table (MCP 4–5 must touch the surface) 2
- Cannot manage the previous item 3

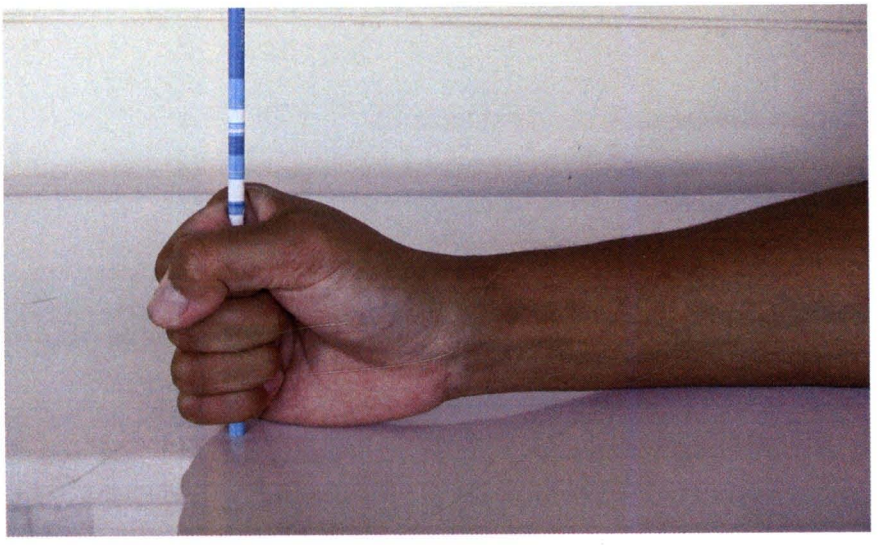

Figure 8 Finger flexion

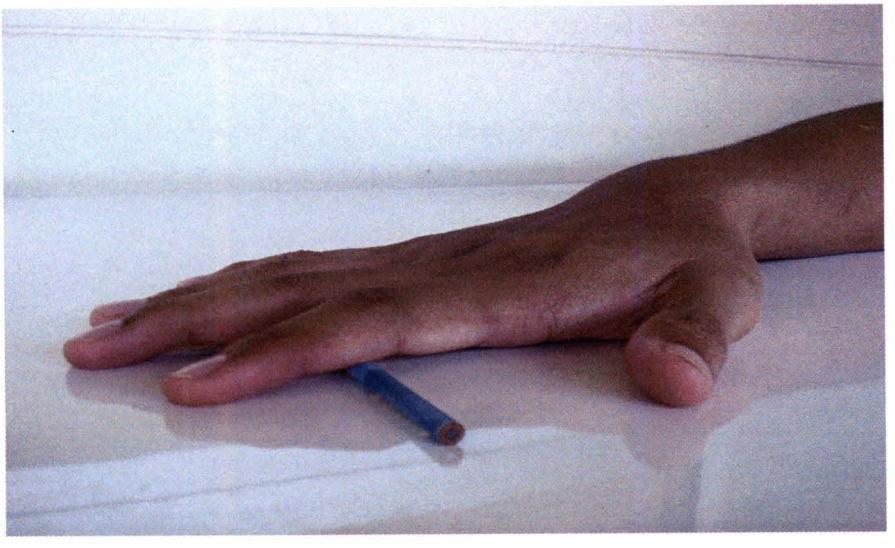

Figure 9 Finger extension

Figure 10 Thumb abduction

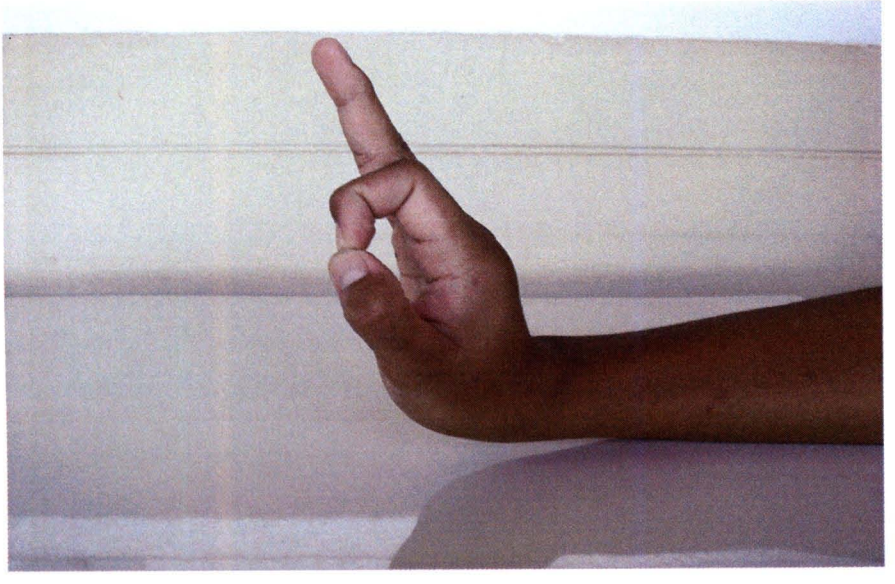

Figure 11 Pincer grip

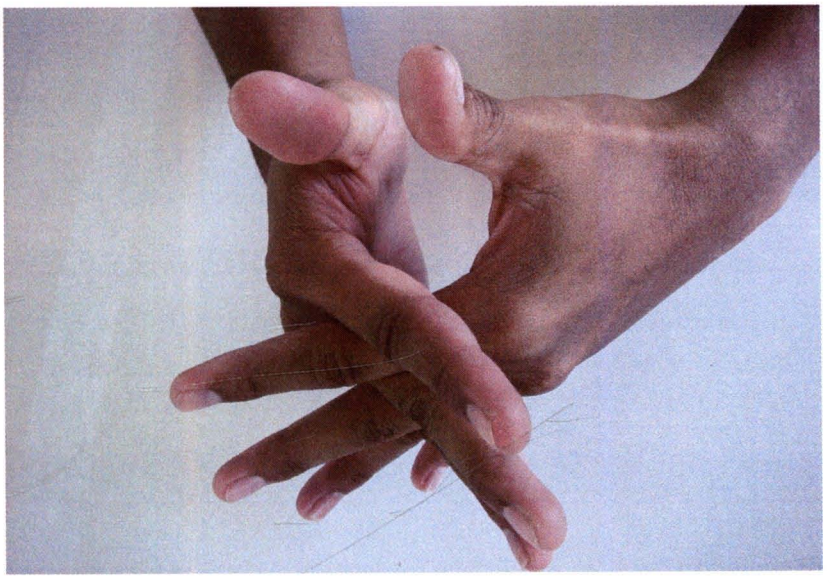

Figure 12 Finger abduction

Figure 13 Volar flexion

Figure 14 Dorsal extension

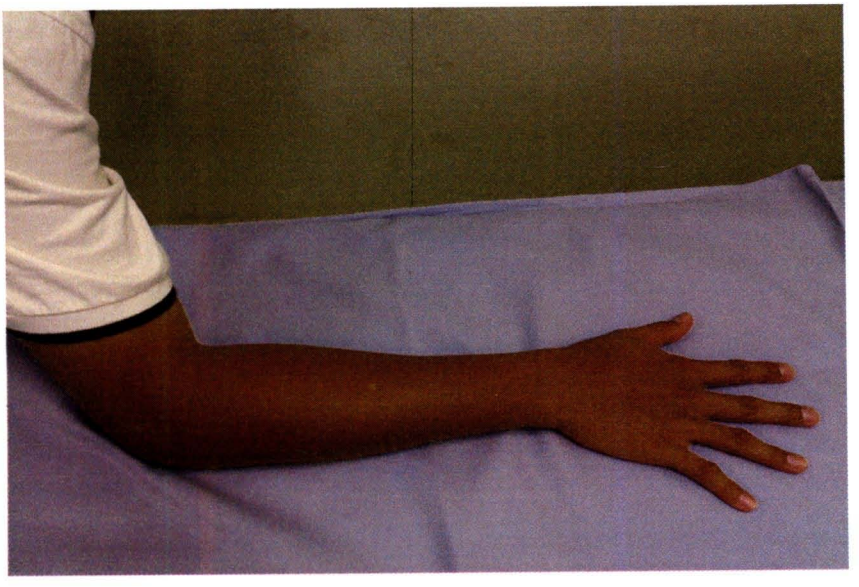

Figure 15 Pronation

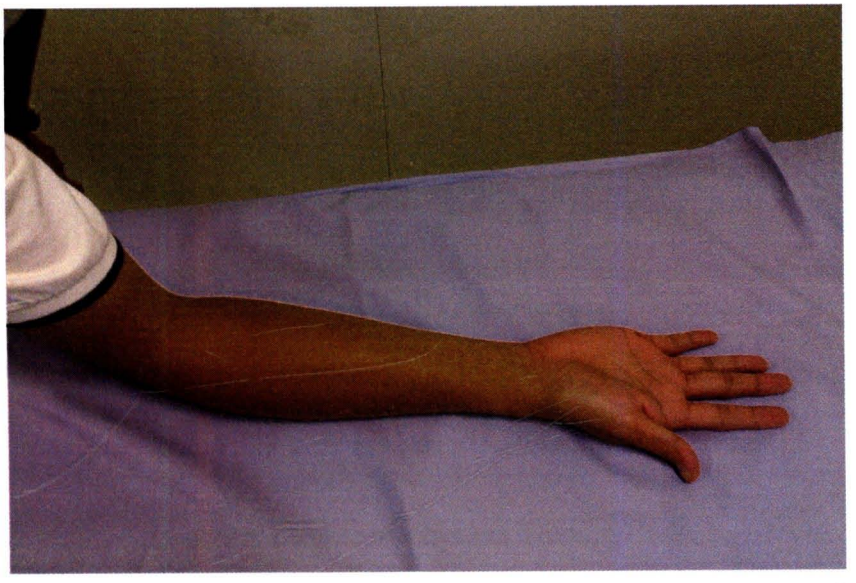

Figure 16 Supination

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