

# VIRTUAL TOUCH IMAGING AND QUANTIFICATION: IS IT POSSIBLE TO DISTINGUISH “UNAFFECTED” SKIN IN SCLERODERMA PATIENTS FROM HEALTHY SKIN?

PS47

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## 1 Background

Skin involvement is a fundamental clinical feature in systemic sclerosis (SSc), often considered the primary outcome in clinical trials. Nonetheless, it remains orphan of a fully validated, sensitive and reliable quantitative assessment technique. Virtual Touch Imaging and Quantification (VTIQ) is a new ultrasound elastography imaging method that provides qualitative and quantitative information about absolute skin stiffness.

The purpose of this study was to compare absolute skin stiffness values of clinically unaffected scleroderma skin and the skin of healthy controls, using VTIQ.

## 2 Methods

Absolute skin stiffness was measured on the basis of shear-wave velocity (in m/s) using a using a Siemens ACUSON S3000™ ultrasound system with VTIQ application at Rodnan skin score anatomical sites

Skin thickness was evaluated by Rodnan Skin Rodnan score at: anterior chest, abdomen, upperarms, forearms, fingers, hands, thighs, legs and feet, bilaterally.

- 26 patients (13 limited SSc, 13 diffuse SSc)
- 17 age- and gender-matched healthy controls
- Inclusion of anatomical sites with clinically unaffected skin (local mRSS=0)
- Comparison between groups was performed through Mann-Whitney test p<0.05 considered significant

## 3 Results

Absolute skin stiffness measurements were higher in all SSc “unaffected” areas than in HC, reaching statistical significance in 8/16 measurements sites (table 1).

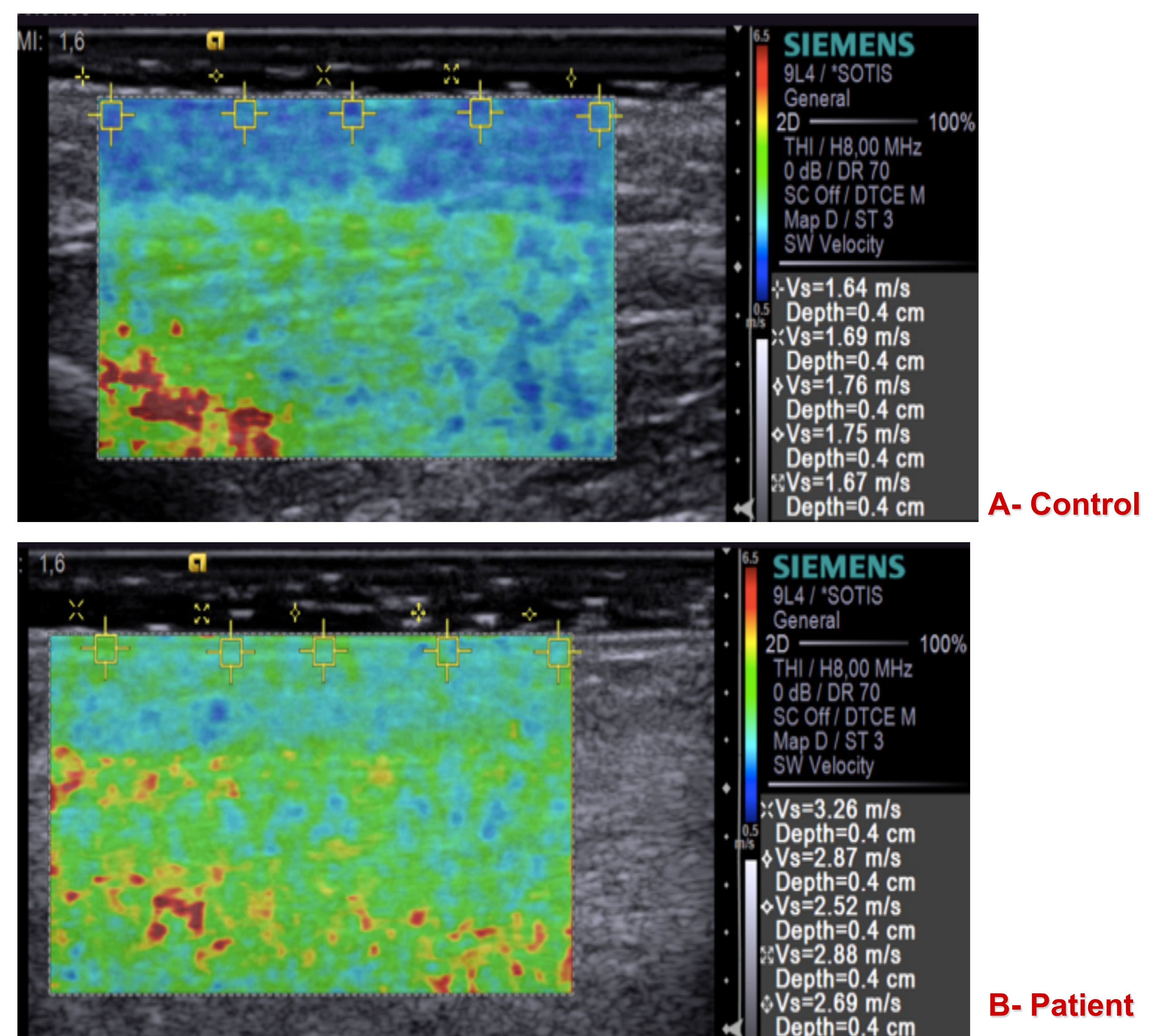
**Table 1 - Shear-wave velocity values (m/s) in SSc patients and controls in sites with mRSS=0.**

	Patients	n (*)	Controls	Differences between patients and controls (p value)
Anterior chest	2.8 (0.7)	17*	2.3 (0.7)	0.05
Abdomen	2.5 (0.4)	21	2.0 (0.6)	0.016
Upperarm left	2.7 (0.5)	19	2.3 (0.4)	0.004
Upperarm right	2.4 (0.4)	18	2.2 (0.5)	NS
Forearm left	2.5 (0.3)	14	2.1 (0.4)	0.008
Forearm right	2.5 (0.4)	13	2.3 (0.3)	NS
Hand left	2.6 (0.4)	7	2.2 (0.5)	NS
Hand right	2.7 (0.4)	7	2.2 (1.1)	0.011
Phalanx left	2.7 (0.4)	1	2.3 (0.4)	-
Phalanx right	3.1 (0.8)	3	2.2 (0.4)	-
Thigh left	2.3 (0.6)	23	2.1 (0.3)	NS
Thigh right	2.4 (0.4)	23	2.1 (0.2)	0.004
Leg left	3.1 (1.0)	19	2.4 (0.4)	0.012
Leg right	2.6 (0.5)	18	2.5 (0.5)	NS
Foot right	2.9 (0.7)	14	2.2 (0.3)	0.003
Foot left	2.6 (0.6)	15	2.3 (0.4)	NS

Shear wave velocities values (m/s) are shown as mean (standard deviation).

p<0.05 was considered statistically significant. NS, not significant;

n (\*) Number of sites from 26 SSc patients with local mRSS = 0. \*Of the 17 patients with mRSS=0, 16 had a limited SSc, and one had a diffuse SSc.



**Figure 1** VTIQ of the dorsal aspect of the hand. Absolute shear-wave velocities (in m/s) within the sample gate (yellow box) are shown quantitatively on the right side. The colour scale depicts graphically the absolute stiffness of all tissues within the region of interest. (red=hard tissue; and blue=soft tissue).

## 4 Discussion

Our results indicate that VTIQ is capable of identifying significantly increased stiffness in skin from SSc sites considered clinically “unaffected”.

Possible reasons:

- Recent microarray gene expression studies suggested that clinically unaffected skin shares the particular gene signatures ant the pathology of clinically affected skin in SSc
- May increase sensitivity to markers of the early stage of skin involvement.

Requires further evaluation and may represent a valuable contribution to clinical assessment and to research in pathogenesis and treatment of SSc.

## 5 Conclusions

- a) VTIQ adds sensitivity to the assessment of skin stiffness in SSc
- b) What appears to be “unaffected” skin in SSc may be “sub-clinically involved”, as shown by increase shear-wave velocity
- c) VTIQ may help in the identification of patients in an early phase of the disease an d assist in the evaluation of novel therapies.