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### Authors

Vidal, David  
Ruiz-Villaverde, Ricardo  
Alfageme, Fernando  
et al.

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## New technology

### Use of high frequency ultrasonography in dermatology departments in Spain.

David Vidal<sup>1</sup>, Ricardo Ruiz-Villaverde<sup>2</sup>, Fernando Alfageme<sup>3</sup>, Gaston Roustan<sup>3</sup>, Jordi Mollet<sup>4</sup>, Jose Carlos Ruiz-Carrascosa<sup>5</sup>, Silvia Haychein<sup>6</sup>, Juan Gavín<sup>7</sup>, Salvador Arias-Santiago<sup>2</sup>, Antonio Martorell<sup>8</sup>, Manuel Velasco-Pastor<sup>9</sup>.

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<sup>1</sup>Department of Dermatology, Hospital de Sant Joan Despí Moisès Broggi, Sant Joan Despí, Barcelona, Spain. <sup>2</sup>Department of Dermatology, Hospital Universitario Virgen de la Nieves, Granada, Spain. <sup>3</sup>Department of Dermatology, Hospital Universitario Puerta de Hierro de Majadahonda, Madrid, Spain. <sup>4</sup>Department of Dermatology, Hospital Vall d'Hebron, Barcelona, Spain. <sup>5</sup>Department of Dermatology, Hospital Universitario San Cecilio, Granada, Spain. <sup>6</sup>Department of Dermatology, Hospital Universitario Costa del Sol, Málaga, Spain. <sup>7</sup>Department of Dermatology, Estructura Organizativa de Gestión Integrada, Vigo, Spain. <sup>8</sup>Department of Dermatology, Hospital de Manises, Valencia, Spain. <sup>9</sup>Department of Dermatology, Hospital Arnau de Vilanova, Valencia, Spain.

### Correspondence:

David Vidal  
Department of Dermatology  
Hospital de Sant Joan Despí Moisès Broggi, Jacint Verdaguer  
90, Sant Joan Despí, 08970 Barcelona, Spain  
david.vidal@sanitatintegral.org

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## Abstract

**Background:** High Frequency Ultrasonography (HFUS) is a rapid, reliable, and effective diagnostic technique that has become progressively employed within the past years among dermatologists.

**Objective:** To describe the use of HFUS among dermatology departments in Spain.

**Methods:** An observational, cross-sectional descriptive study was conducted in 23 dermatology departments at Spanish public hospitals. Study data was collected during 10 working days.

**Results:** Fifty dermatologists from 11 Spanish regions participated in the study; 659 HFUS procedures were undertaken in 633 patients. HFUS indications were benign tumors (41%), malignant tumors (28%), inflammatory diseases (18%), skin appendage conditions (10%), and cosmetic conditions (1%). HFUS was performed for assessing the clinical differential diagnosis (58% of cases), surgical planning (17%), follow-up (17%), and other reasons (7%). Among the diagnostic group, the scan confirmed clinical diagnosis in 82% of cases and helped to change the clinical diagnosis in 17% cases (10% of total scans). HFUS procedure duration was less than 5 minutes (45%), between 5 and 10 minutes (32%), and more than 10 minutes (21%). Mean patient satisfaction score (range 0 to 5) was 4.8.

**Conclusions:** The use of HFUS in usual practice is increasing, especially among younger dermatologists. This procedure is effective both for confirming and changing diagnosis, as well as for therapy decision making and follow-up. It is also worth remarking that a very high degree of patient satisfaction was recorded. The descriptive results reported in this study support the use of ultrasonography techniques and further reinforce their use in Dermatology.

**Keywords:** High frequency ultrasonography, ultrasound skin imaging.

**Our Institutional review board (Independent Ethics Committee) approved this study.**

## Introduction

High frequency ultrasonography (HFUS) is a reliable, non-invasive and safe procedure that allows the observation of tissues structures, vascularization, and density associated with various dermatological conditions, vascular lesions, and inflammatory conditions. HFUS uses probes with a frequency greater than 15 MHz and is becoming a valid tool both for diagnosis and follow-up visits [1,2].

Owing to the increasing use of HFUS in Dermatology, a group of Spanish dermatologists decided to explore its current level of utilization and to analyze in a descriptive manner the types of diseases in which it was being implemented in real world clinical practice; the practical experiences from physicians involved were assessed.

## Methods

An observational, cross-sectional study was conducted involving dermatology departments at Spanish public hospitals. Owing to the exploratory and descriptive nature of this study, no formal sample size calculation was conducted. Rather, consecutive patients were included during a period of 10 working days in March 2015.

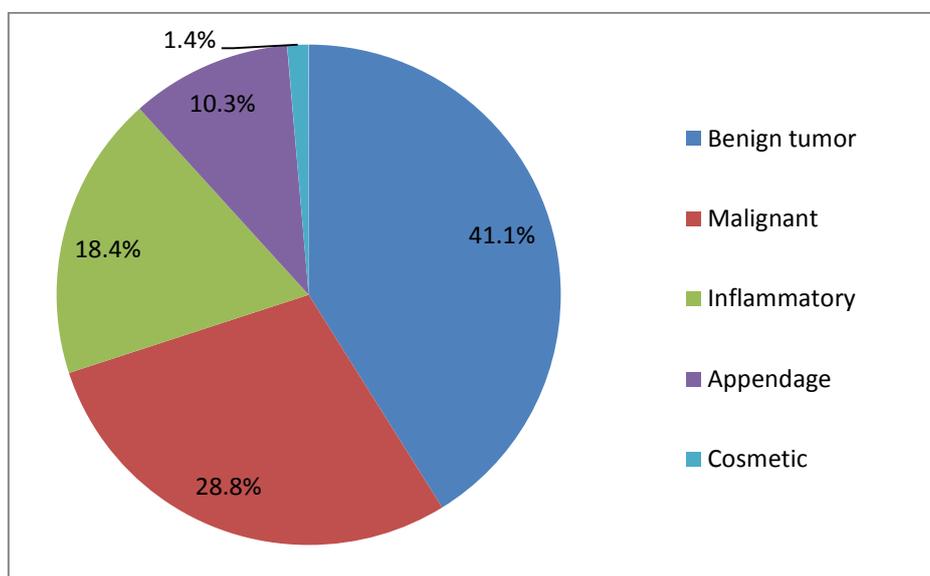
Included patients were attending outpatient dermatology clinics for any reason and HFUS should have been indicated. No age limits were established and all subjects provided written informed consent to participate in the study.

The following data was collected: age and gender of patients and dermatologists, months of experience on HFUS, ultrasonographic equipment (probe's frequency in MHz), type of skin disease (tumor, inflammatory, appendage condition, and cosmetic), reason for HFUS examination (diagnosis, surgical planning, disease follow-up, and other), duration of HFUS procedure (the period of time neither include the time derived from the entrance and exit of the patient from the ultrasound room nor the examination report), and planned specific agenda for HFUS. Patient satisfaction regarding HFUS was assessed through a voluntary 5-point questionnaire: not satisfied at all (1), a little satisfied (2), satisfied (3), pretty satisfied (4), and completely satisfied (5).

All data were recorded in a study-specific case record form at every participating center. Description of continuous variables was done through mean, maximum, and minimum values. Categorical variables were described as total number and percentage of patients for each response category. A descriptive analysis was performed for socio-demographic and clinical variables.

## Results

A total of 659 HFUS procedures were performed in 633 patients by 50 dermatologists from 23 hospitals in 11 Spanish regions in 10 days, with a mean 2.8 scans per site and day. Of the patients studied, 54% of patients were female with a mean age of 48 years old (range 0-90). In addition, 60% of centers performed scans in the pediatric population.



**Figure 1.** Diseases in which HFUS was performed.

HFUS was used in benign tumors (41% of cases), malignant tumors (28%), inflammatory diseases (18%), skin appendage conditions (10%), and cosmetic conditions (1%) (Figure 1). HFUS was done for assessing the clinical differential diagnosis in 58% of cases, surgical planning (17%), follow-up control (17%), and other reasons (7%). Among the diagnostic group, the scan confirmed the clinical diagnosis in 82% of cases and helped to change the clinical diagnosis in 17% of cases (10% of total scans). Regarding time of examination, HFUS was performed in less than 5 minutes in 45% of cases, between 5 and 10 minutes in 32%, and more than 10 minutes in 21%. A patient satisfaction questionnaire was answered by 53% patients and the mean score was 4.8 (range 3-5). Mean age of dermatologists was 37 years (range 26-55 years, SD 6.7). There was large heterogeneity with respect to time of HFUS use experience, which ranged between 1 and 60 months (mean 15, median 8, SD 17.8). Regarding HFUS equipment the most frequently used probe was 18 MHz and a specific agenda for HFUS was available only in 30% of centers.

## Conclusions

The study results show how HFUS is being mainly implemented for diagnostic confirmation of benign and malignant tumors. Notably, the examination helped to change the clinical diagnosis in 10% of the cases without the need of other diagnostic procedures. Furthermore, real life HFUS feasibility was proven by the fact that most procedures were completed in less than 5 minutes and very high patient satisfaction was achieved.

It is worth noting that the observed length of time of previous experience with HFUS among participating dermatologists did not exceed 60 months. Another observation, is the still low percentage of centers with a specific agenda for this type of procedure at their departments, thus reflecting that the technique has been recently implemented in dermatology departments. Regarding this point, the authors support a training period in HFUS technique in order to ensure correct interpretation of the scans and to produce high quality examination reports.

In skin cancer, the most important limitation refers to its sensitivity and specificity in differentiating between benign [3,4] and malignant tumors. However, in basal cell carcinoma lesions the presence and count of hyperechoic spots may help predict the high risk of recurrence histologic subtypes [5]. For inflammatory diseases such as hidradenitis suppurativa [6,7] and psoriasis [8,9] the use of HFUS may aid therapeutic decision-making and it has been shown to be feasible and sensitive for disease activity and treatment response assessment.

In conclusion, the results of this descriptive study provide a global overview on the use of HFUS in real world conditions. The use of HFUS is increasing, especially among younger dermatologists, because it is a reliable procedure useful both for confirming and changing the clinical diagnosis. It is also worth remarking that a very high degree of patient satisfaction was recorded. Further research is deemed necessary to better understand what additional useful information does HFUS provide for diagnosis and follow-up of various dermatology conditions. In addition, further assessments should determine the effect of the use of HFUS on physicians' clinical and therapeutic decisions.

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