

# Proposal for an Assessment Training Program in Dermatologic Ultrasound by the DERMUS Group

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**D**ermatologic ultrasound has been growing rapidly in line with the development of more potent machines and high-frequency probes. So far, this application has covered a wide and common range of dermatologic conditions that include benign and malignant tumors, vascular anomalies, inflammatory diseases, nail and scalp disorders, and cosmetic conditions.<sup>1-6</sup>

To date, several training programs for other areas of ultrasound have been reported, such as in the musculoskeletal,<sup>7-11</sup> emergency,<sup>12-14</sup> cardiology,<sup>15</sup> and anesthesiology<sup>16</sup> fields. Nevertheless, dermatologic ultrasound as a new application still lacks international formal training programs or accreditation.

Thus, the increasing number of reports on this new field of ultrasound allow us to predict that in the near future, formal guidelines and training assessment programs or courses with quality and accredited educational standards should be developed. Moreover, the spreading of this technique may require a joint effort of physicians from different specialties who can contribute with their views and experience to create a minimum curriculum with a basal level of expertise for training future generations in the dermatologic ultrasound field.

In 2015, the Spanish Society of Ultrasound (Sociedad Española de Ecografía), a member of the European Federation of Societies for Ultrasound in Medicine and Biology, organized a level 1 accreditation program in dermatology and aesthetics for Spanish physicians, with 8 theoretical topics mainly based on ultrasound basics, normal anatomy of the skin, nail, and hair, inflammatory diseases, common skin tumors, fillers, and basic vascular exploration in dermatology and aesthetic medicine. This program also has a workshop on normal anatomy of the skin and adnexa, a theory test that should be passed by the participants with a minimum of 80% correct answers, and a workshop test that evaluates the competence for identifying the normal dermatologic ultrasound anatomy.<sup>17</sup>

A core international task force group called the DERMUS (Dermatologic Ultrasound) group has been formed by 15 physicians from 11 countries (Spain, Italy, Chile, Denmark, United States, India, Israel, Brazil, Colombia, Romania, and Germany) in 3 continents

(Europe, America, and Asia) who have published on this topic in peer-reviewed journals and work in daily practice in this field of ultrasound. Of these members, 53% (n = 8) are radiologists, and 47% (n = 7) are dermatologists.

So far, the DERMUS group has developed the first guidelines for performing dermatologic ultrasound examinations,<sup>18</sup> and now this group has worked on the proposal of an assessment training program based on 3 levels of complexity that can be used for teaching in formal courses by accredited international institutions or organizations. This proposal is a recommendation based on the experience of the members and a collaborative work that included discussions on the content; however, it may be the subject of optimization according to future developments in technology and advances in knowledge. Also, these 3 levels might possibly be fused into 2 levels, maintaining the main contents.

The 3 stages were designated basic, intermediate, and advanced levels with a range of 8 to 10 hours of lectures and hands-on workshops per level. The programs included main topics for each category, which could be subdivided or extended into more specific subjects according to the complexity and duration of the sessions.

The proposal for these training levels covered a wide range of anatomy of dermatologic and adjacent structures, technical considerations, and relevant conditions as well as anatomic variants and some interventional procedures related to the dermatologic field (Tables 1–3). All levels require tutoring from physicians with expertise in the field, and they should be consecutive over time according to their complexity.

The contents for level 1 include basic ultrasound knowledge, normal dermatologic ultrasound anatomy, and common pathologic conditions. Levels 2 and 3 gather more complex dermatologic conditions and workshops. This program also includes theory and workshop tests for each level, which must be approved by the participant. Among other proposals of the members were the creation of a database catalog as a teaching file and the generation of standardized reports of the examinations for the wide range of dermatologic conditions, separated by categories (eg, tumors, inflammatory diseases, nail lesions, and cosmetics).

The development of an assessment training program in dermatologic ultrasound seems to be a critical need for the establishment of minimum quality standards in the educational process of this application. To our knowledge, this program is the first attempt to create such a scientific program in dermatology based on what the physician should or must know for performing the examinations.

The fusion of knowledge of specialties such as radiology and dermatology in the creation of this training program, in an international setting, seems to be of benefit for the development of a more solid and practical minimum

**Table 1.** Level 1: Basic Competence Assessment in Dermatologic Ultrasound

**Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
**Affiliation:** \_\_\_\_\_ **Trainer Signature:** \_\_\_\_\_

- Basic ultrasound concepts
  - Echogenicity and artifacts
  - Color and power Doppler
  - Spectral curve analysis
- Buttons
- Basics of other imaging techniques in dermatology
- Clinical, imaging, and histologic correlations
- Normal anatomy
  - Skin
  - Nail
  - Hair
  - Adjacent structures
  - Anatomic variants
- Examination technique
  - Skin
  - Nail
  - Hair
- Basic pathology
  - Benign skin lesions
    - Hemangiomas
    - Vascular malformations
    - Epidermal cysts
    - Pilomatrixomas
    - Lipomas
  - Benign nail lesions
    - Glomus tumors
    - Fibromas
    - Subungual exostosis
    - Ungual psoriasis
    - Myxoid cysts
  - Benign scalp and hair lesions
    - Trichilemmal cysts
    - Subgaleal lipomas
  - Malignant skin lesions
    - Basal cell carcinoma
    - Squamous cell carcinoma
    - Melanoma
  - Inflammatory skin lesions
    - Plantar warts
    - Psoriasis
    - Superficial fluid collections
    - Granulomas and foreign bodies
  - Cosmetics
    - Fillers: basics
- Hands-on
  - Normal anatomy of the skin, nail, hair, and adjacent structures
  - Basics on ultrasound buttons and dermatologic technique

curriculum, which could be of paramount importance in the application of this information in the real world. Ideally, these training levels would be adopted by international ultrasound organizations to ensure quality standards and

create accredited programs and centers of excellence for the training and research fields in dermatologic ultrasound.

The 3-level format of assessment training has been previously adopted by other ultrasound applications, such

**Table 2.** Level 2: Intermediate Competence Assessment in Dermatologic Ultrasound

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**Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
**Affiliation:** \_\_\_\_\_ **Trainer Signature:** \_\_\_\_\_

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Advanced ultrasound imaging optimization for dermatology  
 Panoramic views  
 3-dimensional imaging  
 Vascularity software  
 Contrast and elastography  
 Skin tumors  
 Benign tumors  
     Dermatofibromas  
     Neurofibromatosis  
 Malignant tumors  
     Dermatofibrosarcoma protuberans  
     Merkel cell carcinoma  
     Liposarcoma  
     Locoregional staging and lymph node morphology in skin cancer  
 Nail congenital and location alterations  
     Onychocryptosis  
     Onychomadesis  
     Reitronychia  
 Inflammatory skin diseases  
     Morphea-scleroderma  
     Dermatomyositis  
     Cutaneous lupus  
     Acne and rosacea  
     Hidradenitis suppurativa  
     Lipedema-scleredema  
     Mycetomas and myiasis  
 Scalp and hair  
     Alopecia  
     Perifolliculitis capitis abscedens et suffodiens  
     Folliculitis decalvans  
 Cosmetics  
     Fillers: advanced  
     Tensor threads  
     Photoaging  
 Dermatologic ultrasound report  
     Reporting dermatologic ultrasound examinations  
 Monitoring dermatologic entities  
 Hands-on/workshops  
     Advanced technology for dermatologic applications  
     Locoregional staging  
     Reporting dermatologic ultrasound examinations

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**Table 3.** Level 3: Advanced Competence Assessment in Dermatologic Ultrasound

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**Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
**Affiliation:** \_\_\_\_\_ **Trainer Signature:** \_\_\_\_\_

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Congenital hemangiomas  
     Rapidly involuting congenital hemangioma  
     Noninvoluting congenital hemangioma  
 Vascular tumors  
     Glomangiomas  
     Angiokeratomas  
     Verrucous hemangioma  
     Pyogenic granuloma  
     Angioma  
     Angiosarcoma  
 Congenital diseases of the skin  
     Pits, fistulas, and sinuses  
     Congenital cysts  
 Malignant skin diseases  
     Cutaneous lymphomas  
     Postoperative ultrasound imaging in skin cancer  
 Inflammatory diseases  
     Panniculitis  
     Odontogenic fistula  
     Ultrasound monitoring of inflammatory skin diseases  
     Giant cell temporal artery and Takayasu arteritis  
 Cosmetics  
     Ultrasound imaging of nonfiller cosmetic alterations  
     Ultrasound anatomy of the face for cosmetic purposes  
 Dermatologic ultrasound-guided procedures  
     Vascular malformations, percutaneous ultrasound-guided therapy  
     Percutaneous ultrasound-guided injection of fillers  
     Ultrasound-guided lymph node cytologic analysis or biopsy  
     Ultrasound-guided management of superficial varicose veins  
     Ultrasound-guided infiltration in inflammatory diseases of the skin  
     Presurgical ultrasound marking of skin lesions  
     Ultrasound-guided drainage of fluid collections  
 Hands-on  
     Dermatologic ultrasound-guided procedures

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as the musculoskeletal programs for rheumatology, which are currently presented in accessible international ultrasound organization Web pages.<sup>7,8,19</sup> This successful educational experience may be replicated in the dermatologic field; moreover, in dermatology, the curriculum should include the morphologic characteristics of a broad range of common conditions and severity assessments of the diseases, as well as a topographic anatomic methodology. This practical approach has also been used in the development of ultrasound curricula for medical students<sup>20</sup> and the development of guidelines for ultrasound applications by several societies.<sup>21</sup>

As proposed in the DERMUS guidelines, the training assessment levels should be combined with continuous practice in this application. Thus, at least 300 dermatologic ultrasound examinations per year have been proposed as the minimum number for assessing competence in this field.<sup>18</sup>

As suggested by other ultrasound modality groups,<sup>19</sup> the programs must be designed for covering both theoretical and practical skills; therefore, they should include hands-on workshops for each level. The recommended percentage between theoretic activities and workshops and/or live demonstrations may vary according to the complexity of the level and type of activity but should be around 60% theoretic and 40% workshops and/or live demonstrations for a 3-day course. However, these percentages may be inverted at advanced levels with more invasive procedures in their programs, or focused hands-on activities can be organized as separate courses but still attached to the main course.

One of the challenges of the dermatologic training programs is the difficulty of creating hands-on workshops with pathologic conditions or ultrasound-guided procedures. Nevertheless, this process can be done with the strong support of local medical teams, the use of phantoms, or live and virtual educational tools. Another possibility is the use of cadavers in the workshops, which may improve the learning of anatomy, a tool that has been previously included in musculoskeletal courses.

The process of selection of the faculties may also present some geographic difficulties because so far, the DERMUS members are dispersed in different countries and continents. However, under the support of local and international organizations, universities, or sponsors, this initial issue may be solved progressively. In latter stages, the selection of faculties probably will consider local and international faculties according to the location of the courses; therefore, a worldwide task force can be developed. Another point to consider is that even though the current members of DERMUS are actively working with derma-

tologic patients and publishing on the topic, a teach-the-teacher course may be needed to homogenize the background and teaching skills of the faculties.

A topic for discussion is the requirement of publishing for the trainees of these programs. For example, in some rheumatologic training programs, there is a requirement of publishing at least 1 publication in a peer-reviewed journal every 5 years and teaching endorsed courses for passing the levels and accrediting the maintenance of skills.<sup>19</sup>

The creation of these training levels has required several years of experience of the members of this group, which has been supported by the continuous and growing flow of publications in this field.<sup>1-6,18,22,23</sup> These facts have contributed to proving the strong support of ultrasound to the dermatologic field, which now seems to be a first-choice imaging modality for the study of frequent dermatologic conditions and a first-line imaging technique in dermatology, such as dermoscopy or confocal microscopy. Last, the creation of an organized minimum curriculum in the dermatologic ultrasound field seems to be of paramount importance to stimulate the solid growth of this application.

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