New 3D Image and Biometric Methods to evaluate cellulite

Pedro Contreiras Pinto[1], Manuel Fitas[2], Joana Pereira[3], Ana Gomes[4], Leonor Girão[5]
1 Scientific director, PhD Trials, Lisboa Portugal
2 R&D department, PhD Trials, Lisboa Portugal.
3, 4 Technical department, PhD Trials, Lisboa Portugal
5 Clinical Director, PhD Trials, Lisboa Portugal

✉e-mail: geral@phdtrials.com

Poster ID 360

Introduction:

Cellulite is a multifactorial topographic and localized skin condition that mostly affects post-pubertal women. Visually is characterized by irregular relief changes to the skin surface in several areas, inducing an "orange peel", "cottage cheese" or "mattress" aspect [1-2]. The affected areas are interlinked with regions where oestrogen is responsible for fat accumulation – specific lipogenesis features. Additionally, cellulite may worsen during high oestrogen states, including menstrual cycle, pregnancy, use of contraceptives, and hormonal treatments. The efficacy testing of cosmetic cellulite targeted products is a key point to support efficacy claims. One of the negative points in the efficacy evaluation relies in the lack of reliability for quantifying and monitor the cellulite, which are reflected in the quality of the results.
The aim of this work is to demonstrate the robustness and effectiveness of several non-invasive methodologies combined with a new 3D imaging technique to assess cellulite and, consequently, to support and strength the efficacy claims of a cosmetic product.

Materials & Methods:

Study design

The present trial is a single-center, blinded and controlled trial. It was conducted in the spirit of Good Clinical Practice Guidelines and general principles of Law 46/2004 of August 19th. The protocol and test conditions were reviewed by the Internal Review Board and it was approved by the proper Ethical Commission.

Subjects

A group of 15 female subjects was enrolled with ages between 18-65 years old, with cellulite stage II or III according with Nurnberger-Muller Grading scale (for women). The panelists were requested to use an anti-cellulite cosmetic product during 28 days. Evaluations were performed at D0 before the product application and at D28

Methodologies

The panelists were selected using the Nurnberger-Muller Grading scale (for women) [2, 3].

To assess cellulite and its evolution several imaging and biometric methodologies were used. 3D images of the skin topography were obtained by a stereo camera combined with a fringe projection system (AEVA-HE, Eotech, France).

An ultrasound device that exhibits a 20 MHz transducer was used, intended to obtain "in-vivo" cross-sectional skin images up to depth of 2.5cm and with this scanner correctly detects structures in the dermis, subcutaneous fat thickness and dermis-hypodermis junction (DERMASCAN C Cortex technology, Denmark).

Regarding biometric measurements, skin firmness and elasticity were obtained using a Cutometer® dual MPA 580 (Courage & Khazaka) using a 8mm probe. This system is used to measure elasticity of the upper skin layers using negative pressure which deforms the skin mechanically. The measuring principle is based on the suction method. Negative pressure is created in the device (450 mbar) and the skin is drawn into the aperture of the probe and after a defined time released again.

All measurements were made performed in the same defined region of interest, hips and thighs area, and also the correspondent analysis. The instrumental data were expressed in numbered data and are submitted to a suitable statistical treatment (t-Student or Wilkoxon Ranks Signs Test for all the continuous data and comparisons). All the calculations were performed using SPSS (IBM). A 95% level of significance was adopted.

Results & Discussion:

Regarding skin topography, the fringe projection system was able to detect significant decreases in roughness parameters (Ra – arithmetic average roughness and Rz – average roughness) by 9.8% and 9.3%, respectively in the 15 subjects panel after 28 days of anti-cellulite product. Also there was a significant decrease in volume, in the cellulite area, by 7.2%. Moreover, using this technique it was shown a significant improvement of the thigh shape definition by 10..5% (Figure 1).

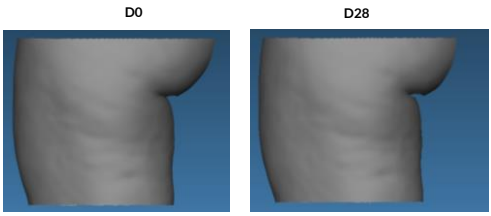

Figure 1 – Illustrative 3D images of the cellulite area with fringe projection technique (AEVA-HE)

At the same time, regarding ultrasonographic evaluation has shown significant decreases of cellulite related edema by 17.5%, fat thickness by 18.1% and dermis-hypodermis junction by 8.8%, after 28 days of product application (figure 2).

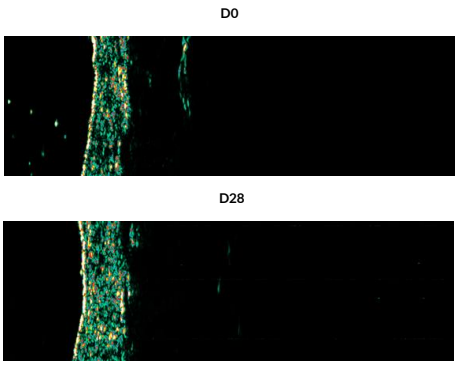

Figure 2. Ultrasonographic images showing cellulite area evolution).

Conclusions:

Cellulite is a complex phenomenon that requires a diversified approach and, in the end, the use of combined and complementary methods with different concepts of action were able to assess and characterize the multifunctional nature of the cellulite skin condition. Moreover, the results obtained were reliable and accurate reflecting the effectiveness of the applied anti-cellulite product.

Acknowledgements:

This study was founded with support of the Portugal2020 and Lisboa2020 3DSKIN project (Project nºLISBOA-01-0247-FEDER-010740)

References:

[1] V. Bayrakci Tunay, T. Akbayrak, Y. Bakar, H. Kayihan, and N. Ergun, "Effects of mechanical massage, manual lymphatic drainage and connective tissue manipulation techniques on fat mass in women with cellulite," *J. Eur. Acad. Dermatology Venereol.*, vol. 24, no. 2, pp. 138–142, 2010.
[2] D. J. Callaghan, D. M. Robinson, and M. S. Kaminer, "Updates in Cellulite Reduction," *Adv. Cosmet. Surg.*, vol. 1, no. 1, pp. 45–53, 2018.
[3] F. Nurnberger and G. Muller, "So-Called Cellulite: An Invented Disease*," *J. Dermatologic Surg. Oncol.*, vol. 4, no. March, pp. 221–229, 1978