I Congresso de Skincare, Estética e Dermocosmética em Oncologia

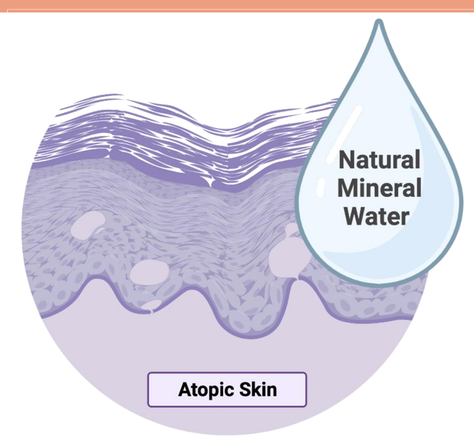
Lisboa, 3 & 4 Março 2023

Cosmetic products for Atopic Dermatitis with natural mineral water from Termas de São Pedro do Sul – Skin Irritation Test

Gama, Ana Rita[1,2]; Jorge, Ana[3]; Gonçalves, Liliana[3]; Campos, Manuel António[3,4,5]; Palmeira-de-Oliveira, Ana[1,2,6]; Palmeira-de-Oliveira, Rita[1,2,6*]

[1] Faculty of Health Sciences, University of Beira Interior, Covilhã, Portugal; [2] CICS-UBI Health Sciences Research Center, University of Beira Interior, Covilhã, Portugal; [3] Termalistur – Termas de São Pedro do Sul, E.M., S.A., São Pedro do Sul, Portugal; [4] Instituto de Investigação e Inovação em Saúde, Universidade do Porto, Porto, Portugal; [5] Escola de medicina, Universidade do Minho, Braga, Portugal; [6] Labfit-HPRD Health Products Research and Development, Lda, Covilhã, Portugal

Introduction



Atopic dermatitis (AD) is a chronic and recurrent inflammatory skin disease, frequently associated with atopy. It is a chronic pruritic and inflammatory dermatosis, which progresses through crises. AD therapy aims to control symptoms, which includes the use of adjuvant products that promote skin hydration and improve its protective barrier function. Numerous studies indicate that moisturizers have beneficial effects on AD clinical symptoms, transepidermal water loss, and stratum corneum hydration [1]–[6].

Bioactive properties of thermal waters have motivated their use in the prevention and treatment of various skin conditions, leading to their commercialization in the form of vaporizers or as ingredients of other cosmetic products [7].

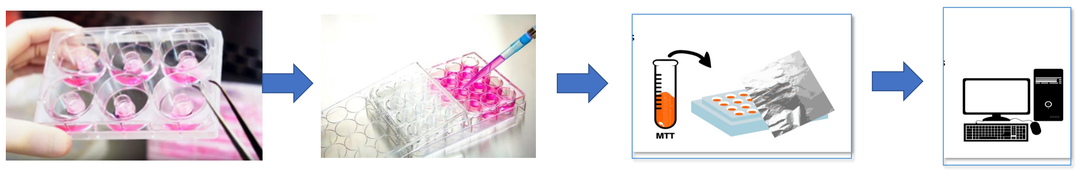
Aim: Develop a range of innovative cosmetic products, including a supplemented thermal water spray, a moisturizer lotion and a cleansing stick through a rational design, by selecting ingredients that may promote well-being and barrier function of skin with atopic dermatitis (AD), using São Pedro do Sul Natural Mineral Water as core ingredient.

Methods

Basic criteria for cosmetics development were: minimalism; eco-friendly; easy to use; innovation in texture or presentation; long lasting; protection of the skin's microbiome (maintain barrier properties)

Product	Active cosmetic ingredients
Cleansing Stick	• Anionic surfactants (Sodium Cocoyl Isethionate) • Emollients (Butyrospermum Parkii (Shea) Butter) • fatty esters of vegetable origin (Capric/Caprylic Triglycerides); • Natural wax (Cera Alba).
Moisturizer Lotion	• fatty esters of vegetable origin (Capric/Caprylic Triglycerides); • actives that repair the skin barrier (Niacinamide); • functional ingredients that mimic natural moisturizing factor (Pentylene Glycol, Glycerin, Fructose, Urea, Citric Acid, Maltose, Sodium PCA, Sodium Chloride, Sodium Lactate, Trehalose, Allantoin, Sodium Hyaluronate, Glucose); • vegetable oils (grape seed oil).
Supplemented Thermal Water	• humectants (Glycerin); • skin repairers (Panthenol); • antioxidants (Tocopherol); • prebiotics (Propylene Glycol, Water, Arctium Lappa Root Extract).

Skin irritation *in vitro* OECD TG 439*:* cell viability (% negative control)**;** MTT test; Reconstructed human epidermis (Mattek Epiderm®)



n= 3 tissues/sample or control: Positive – SDS 5% Negative - DPBS

contact period: 60±1min Direct application and for the stick also dissolved at 10 w/v%

MTT incubation and extraction of formazan salts

Optical density Reading (570 nm)

PREDICTION MODEL OECD TG439:

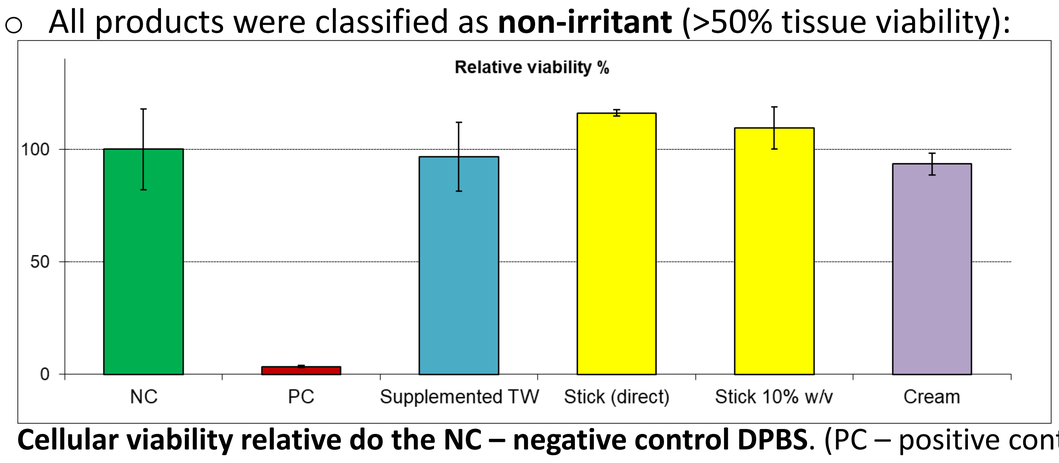
Mean viability results	Classification in vivo
≤ 50 %	Irritant
> 50 %	Non-irritant

Results

- Products were developed with **appropriate skin feel for application in atopic skin**. We The moisturizer lotion has soft emollient composition with an advanced texture in a spray format (easier application); thermal water was supplemented with hydrating ingredients with a soothing and refreshing action, and the stick is made of mild surfactants for gentle, hydrating cleansing action. Microbiome-compatible, hydrating, and emollient ingredients were chosen.

- Safety of formulations is further supported by **safety assessment calculations**, according to the EC Regulation nº 1223/2009 based on each ingredient selected for these formulas and considering a high-risk application (impaired skin barrier function).

- All products were classified as **non-irritant** (>50% tissue viability):



Cellular viability relative do the NC – negative control DPBS. (PC – positive control SDS 5% n=3;samples tested without dilution except the stick thta was further tested dissolved at 10% w/v)

Conclusions

Rational design of three cosmetics for skin care with Sao Pedro do Sul Thermal Water for AD was successfully achieved. Safety results support further *in vivo* testing of these products regarding efficacy.

References:

[1]. J. Ring et al., "Guidelines for treatment of atopic eczema (atopic dermatitis) Part II," Journal of the European Academy of Dermatology and Venereology, vol. 26, no. 9, pp. 1176–1193, Sep. 2012, doi: 10.1111/j.1468-3083.2012.04636.x.

[2] T. Werfel, N. Schwerk, G. Hansen, and A. Kapp, "The Diagnosis and Graded Therapy of Atopic Dermatitis," Dtsch Arztebl Int., vol. 111, pp. 509–520, Jul. 2014, doi: 10.3238/arztebl.2014.0509.

[3]. D. Simon and T. Bieber, "Systemic therapy for atopic dermatitis," Allergy: European Journal of Allergy and Clinical Immunology, vol. 69, no. 1. pp. 46–55, Jan. 2014. doi: 10.1111/all.12339.

[4] M. Lodén, J. von Scheele, and S. Michelson, "The influence of a humectant-rich mixture on normalz skin barrier function and on once- and twice-daily treatment of foot xerosis. A prospective, randomized, evaluator-blind, bilateral and untreated-control study," Skin Research and Technology, vol. 19, no. 4, pp. 438–445, Nov. 2013, doi: 10.1111/srt.12066.

[5] J. D. Lindh and M. Bradley, "Clinical Effectiveness of Moisturizers in Atopic Dermatitis and Related Disorders: A Systematic Review," American Journal of Clinical Dermatology, vol. 16, no. 5. Springer International Publishing, pp. 341–359, Oct. 26, 2015. doi: 10.1007/s40257-015-0146-4.

[6] K. L. Hon, N. H. Pong, S. S. Wang, V. W. Lee, N. M. Luk, and T. F. Leung, "Acceptability and efficacy of an emollient containing ceramide-precursor lipids and moisturizing factors for atopic dermatitis in pediatric patients," Drugs in R and D, vol. 13, no. 1, pp. 37–42, Mar. 2013, doi: 10.1007/s40268-013-0004-x.

[7] A. C. Silva et al., "Anti-inflammatory activity of Portuguese thermal waters," Toxicology Letters, vol. 295, p. S257, Oct. 2018, doi: 10.1016/j.toxlet.2018.06.1045.

Acknowledgements: This work was supported by "AqvaTOPIC – Desenvolvimento de gama de produtos cosméticos com água mineral natural das Termas de S. Pedro do Sul, vocacionados para a dermatite atópica" I&DT Project finantially supported by Portugal 2020 Program (PT 2020) through the Competitiveness and Internationalization Operational Program (POCI) and by the European Union through the European Regional Development Fund (FEDER), with the code POCI-01-0247-FEDER-070908. Financial support was also provided by FCT through PhD fellowship (SFRH//BD/136192/2018) awarded to Ana Sofia Oliveira. The authors acknowledge the Health Sciences Research Center (CICS-UBI) of the University of Beira Inteiror where the work that originated the present poster was developed.