



# Surgical & Cosmetic Dermatology

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## Clean beauty - literature review of new trends in cosmetics

*Clean beauty: artigo de revisão sobre a nova tendência em cosméticos*

DOI: <http://www.dx.doi.org/10.5935/scd1984-8773.2022140137>

### ABSTRACT

In recent years, there has been an increasing trend toward the search for nature-friendly cosmetics without chemical or synthetic ingredients, thus boosting sales of products within this market niche. Currently, the term clean beauty refers to products that do not contain ingredients with unknown impacts on our bodies or that are potentially harmful to the environment. However, the definition of green beauty products, as well as vegan, natural, or organic products, is not regulated by ANVISA. Therefore, this study aimed to review these definitions to facilitate the medical understanding of the subject.

**Keywords:** Beauty; Cosmetics; Beauty products; Green chemistry Technology

### RESUMO

Nos últimos anos, cresce a tendência pela busca de cosméticos “amigos da natureza”, sem ingredientes químicos ou sintéticos, impulsionando as vendas de produtos pertencentes a este nicho de mercado. Atualmente, o termo clean beauty refere-se a produtos que não contenham ingredientes sobre os quais não se conhece o impacto que terão em nosso organismo ou seu potencial dano ambiental. Entretanto, a definição do que é um cosmético verde, bem como vegano, natural e orgânico, não é regulamentada pela Agência Nacional de Vigilância Sanitária (Anvisa), sendo o objetivo deste artigo fazer uma revisão das definições para facilitar o entendimento médico sobre o tema.

**Palavras-chave:** Beleza; Cosméticos; Produtos para beleza; Química verde

## Review article

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**Financial support:** None.

**Conflict of interest:** None.

**Submitted on:** 22/02/2022

**Approved on:** 13/06/2022

### How to cite this article::

Kalil CLPV, de-Vargas AS, Grazziotin FPR, Campos VB, Chaves CRP.  
Clean beauty - literature review of new trends in cosmetics.  
Surg Cosmet Dermatol.  
2022;14:e20220137.



## INTRODUCTION

In recent years, a trend has been observed in the search for a skincare routine with products of natural origin and without chemical or synthetic ingredients, boosting sales of products belonging to this market niche.<sup>1</sup> The report “Global Natural and Organic Personal Care Products Industry”, from Ecovia Intelligence (a company specialized in the research, consulting, and training focused on ethical products), projects global sales of natural and organic personal care products at US\$ 12 billion between 2021 and 2026. China represents the largest market in this segment in Asia, while in Germany, in Europe, these products already represent 10% of the market.

The term clean beauty emerged in the 1970s as a reference to clean, makeup-free skin. In the 2000s, the word got a new meaning with the launch of skincare lines products that do not contain ingredients with uncertain long-term impact on human health – whether by ingestion, application, cross-contamination, or because it is a potential environmental pollutant after its disposal. It impacts the entire production chain since, from the raw materials used to the production, distribution, sale, and disposal of waste, they must be within the “clean” concept. These choices can benefit the user’s health and the environment but do not necessarily mean a “cleaner” or even safer product, as natural products can also cause contact dermatitis or even phytophotodermatitis.<sup>2</sup>

In Brazil, the registration of a natural, vegan, or organic product is subject to the same requirements as conventional cosmetics, and there is no distinction between them before the national regulatory body, Anvisa.<sup>3</sup> Thus, most cosmetics companies request national or international certification bodies to validate their product as natural, vegan, or organic. The seal of these certification bodies, given to the products, can generate a false sense of security in the consumer since the product meets their expectations regarding these concepts and visions. However, the selection of ingredients considered “harmful” without adequate scientific support has been confusing both in the medical field and the cosmetic, pharmaceutical, and consumer industries. Thus, it is crucial to analyze what benefits the consumer and the environment within the “clean beauty” nomenclature.

## OBJECTIVE

This study aims to review the definitions of current concepts of “clean beauty”, differentiating natural, organic, and vegan cosmetics, to facilitate the medical understanding of the difference between these products, which are growing market trends.

### Natural, organic and vegan

So far, there is no official regulation in Brazil distinguishing natural products from organic or vegan ones. Thus, the identification of these products is currently made by the presence of seals from certification bodies, such as COSMOS, ECOCERT, Brazilian Vegan Seal (*Selo Vegano Brasileiro - SBI*), and Biodynamic Institute for Rural Development (*Instituto Biodinâmico de Desenvolvimento Rural - IBD*).

### Natural products

A natural cosmetic does not have chemical or synthetic additives in its composition. Raw materials of animal, vegetable, or mineral origins are used to manufacture it, excluding products such as petroleum and silicones or preservatives, dyes, and fragrances of synthetic origin, for example. In addition to its composition, the product packaging must be designed within this concept, using recyclable, biodegradable, or reusable materials. It is a concept that aims to preserve the environment through the use of raw materials that cause less impact on ecosystems and human health. Although certification bodies cover the presence of a certain amount of organic raw materials in natural formulations, they also allow small amounts of synthetic products, which may vary according to the agency (in general, it is required that 95% of the raw materials used are of natural origin; the other 5% of the composition may contain synthetic substances, provided they are released).

### Organic products

The cultivation and use of organic products relate to the attempt to reduce the negative impacts of agriculture on the environment and human health.<sup>4,5</sup> The manufacture of organic cosmetics comprises sustainable raw materials with minimal impact on ecosystems, animals, and humans. Pesticides and synthetic fertilizers are prohibited in the cultivation of raw materials. Organic cultivation is based on crop rotation, cover crops, and appropriate choice of species for crop rotation, in addition to biological and natural pesticides. It has a positive impact on reducing greenhouse gas emissions, improving biodiversity, reducing water consumption, and improving soil, water, and air quality.<sup>4</sup>

For most organic cosmetics certification bodies, at least 95% of raw materials must be of organic origin, and the product must not contain raw materials of synthetic origin to receive organic certification.

### Vegan products

Veganism is a philosophy that aims to abolish the use and exploitation of animals for any human activity, mainly motivated by the increase in health and ethics.<sup>6</sup> Vegan cosmetics do not use ingredients of animal origin, such as beeswax or lanolin. Also, they have a cruelty-free philosophy, prohibiting products from having their efficacy or safety tested on animals.

It is noteworthy that a vegan cosmetic does not have the same definition as a natural or organic one, although they are concepts that can work together. If a cosmetic has 100% synthetic ingredients, it is vegan, as there are no ingredients of animal origin in its formulation. However, it is not considered natural or organic.

### Renewable sources x biodegradable product

Terms such as “produced with raw material from a renewable source” or “produced with biodegradable raw material” are widely applied to packaging as a marketing appeal. However, these concepts are often confusing to those who buy the product.

The concept of a renewable source is related to the time and possibility of renewing this material. As with renewable energies, renewable raw materials have a renewal cycle on a human time scale, that is, they are always available and do not run out. Examples of rene-

wable raw materials are those derived from agricultural plants, such as corn, soybeans, or cassava, unlike those derived from petroleum, which is non-renewable. However, not all plant sources are renewable. The plant's growth time and how extractivism is conducted can make it a non-renewable source since the consumption of the product becomes higher than the amount produced. An example is the exaggerated extraction of jaborandi (*Pilocarpus microphyllus*) in the state of Maranhão, in northeastern Brazil.

Mainly for pilocarpine extraction, the use of the plant is leading to the depletion and threat of extinction of the natural populations of this plant resource.<sup>7</sup>

The concept of biodegradability concerns the decomposition of the product after its use and disposal. Microorganisms can naturally consume the biodegradable product, converting it into biomass, carbon dioxide, and water in a maximum period of six months. It is a great advantage when compared to products that persist in nature for hundreds of years after being discarded. Biodegradable polymers, such as plastics and resins, are produced from natural raw materials, usually from renewable sources.

However, each product must be well analyzed to be characterized as biodegradable or as a renewable source. Polyethylene-type plastic produced from sugarcane ethanol has the same chemical property as polyethylene obtained from petroleum but is not biodegradable. However, it comes from a renewable source, which is sugarcane.

Something crucial to consider is that these products are categorized as biodegradable through laboratory tests, which are often not transferable to the conditions found in the environment. Specific substrate, temperature, and humidity conditions are required for microorganisms to degrade polymers. When these parameters are not ideal, such as when the plastic material ends up in the sea, the disintegration time of the products can be much longer.<sup>8</sup>

Much has been said about the impact of microplastics on the environment and human health. Microplastics are plastic particles measuring between 100 nanometers and 5 millimeters.<sup>9,10</sup> These residues have already been found all over the world, in water, soil, air, and food. These small plastic particles have an irregular shape and a large surface area compared to their small volume. Due to their lipophilic nature, many hazardous pollutants, such as polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and dichlorodiphenyltrichloroethane (DDT), end up binding to the surface of microplastics, making them a source of pollutants in high concentration.<sup>11,12</sup> Microplastics can originate by addition to products (such as personal hygiene products) or by the fragmentation of macroplastics present in the environment.<sup>13</sup> Among the sources of microplastics, cosmetics represent a considerable portion. Products such as exfoliants, soaps, toothpaste, sanitizing gels, sunscreens, and shampoos may contain microplastic in their composition. Usually, these particles are used as an abrasive agent or a decoration, in the case of glitter.<sup>10,14</sup>

Currently, there are many alternatives for microplastic, both as abrasive and exfoliating agents and as decoration, in the case of glitter. Abrasive agents derived from plants, such as ground fruit and cereal seeds, or derived from natural rocks, are a biodegradable, non-polluting replacement for plastic beads. In the case of plastic glitter, there is the

possibility of using natural materials of mineral origin, such as mica, diamond powder, pearl powder, or other mineral derivatives

Another issue of great relevance to consumers is organic sunscreens in photoprotective compositions. Many cosmetics, mainly sunscreens, use organic filters to protect the skin against the damage of ultraviolet radiation (UVR). They are also present in other personal care products, such as oxybenzone, avobenzone, and octocrylene, among others, mainly because of their effectiveness and low cost.<sup>15</sup> These substances have already been detected in inhabited and uninhabited coastal waters and ecosystems, such as the Arctic and Antarctic, contaminating marine animals,<sup>16</sup> thus making its use a concern. In Brazil, benzophenone, ethylhexyl methoxycinnamate, ethylhexyl salicylate, and octocrylene filters have already been identified as contaminating pre- and post-treatment waters.<sup>17</sup> These substances reach the environment by directly rinsing off skin products during recreational activities, mainly on beaches, or indirectly by overflowing from landfills and as effluent from sewage treatment plants, which usually do not efficiently remove them from the water before return to the rivers and seas.<sup>15</sup> This difficulty is mainly due to the chemical characteristics of the filters since they are poorly soluble in water and have high lipid solubility, and because the effluent treatment is mainly developed to remove particulate matter from the water. Many organic filters are considered persistent pollutants with potential for bioaccumulation.<sup>18</sup> A systematic review observed that the risk posed by the contamination of ecosystems by these substances is low when the average concentrations found in the environment are analyzed. However, it becomes high when assessing the maximum concentrations found in some ecosystems. Also, toxicity data to establish predicted no-effect concentration (PNEC) values for the ecosystem are scarce. There is still a lack of data evaluating effects at different trophic levels, what are the toxic mechanisms of action of substances, and what variables, such as temperature, salinity, or acidification, can interfere with toxic effects.<sup>19</sup>

## CONCLUSION

Currently, consumers are increasingly aware of the composition of products consumed in their daily lives. This concern about knowing the composition before purchase is quite consolidated in food, but has been migrating to cosmetics. The main positive point is that clean beauty has been encouraging both the cosmetic and raw material industries to conduct better safety studies of actives and better select the products and packaging used in production. Another essential point is that consumers of clean beauty products demand transparency from manufacturers. It has caused a movement in the global cosmetics market towards more open communication about product components and their impact on the skin and the environment.

As there is no regulation or legal or official definition, each product brand defines clean beauty according to the company's internal policy and marketing. It brings heterogeneity of raw materials and products that may not match the proposal to be a product free of toxic ingredients. Although there are already lists of components not allowed in products with this marketing appeal, the lack of regulation means that these lists are respected within the budget of the manufacturing industry.

The fact is that there are numerous scientific articles demonstrating the toxic potential of cosmetic actives, whether for the environment or even for humans. However, most of these studies are *in vitro*, in small numbers, with high variability of results, or with methodologies that pre-

vent a meta-analysis. Thus, the dermatologist must be careful when prescribing products under a clean beauty appeal since it is not a guarantee that the patient will not have any complications with their use. ●

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