

Sunless tanning

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ABSTRACT

Because there is a possibility of developing skin cancer from UV exposure from tanning beds and natural sunshine, the public has been cautioned for years about the dangers of these activities.

Self-tanning solutions, which are applied directly to the skin via lotions, sprays, foams, and wipes the chemical away, have provided an alternative to getting the sun-kissed effect without being exposed to UV light. The active ingredient in the majority of sunless tanning products is dihydroxyacetone (DHA).

As sunless tanning is more fascinated by the people in foreign countries.

I. INTRODUCTION:

Sunless tanning:

Sunless tanning is the process of producing the effects of a suntan without actually being in the sun.

FDA defines the term sunless tanner it typically refers to product that provides a tanned appearance without exposure to the sun or other source of ultraviolet radiation. One commonly used ingredient in this product is dihydroxyacetone. [DHA] A color additive that darkens the skin by reacting with the amino acid in the skin surface.[1] An alternative to UV tanning is sunless tanning.

Spray-on tans and sunless tanning lotions are examples of sunless tanning agents that are now on the market.

Dihydroxyacetone (DHA), an ingredient in these products, combines with the amino groups in the stratum corneum to cause a brown stain on the skin.

Although DHA protects against UV and UVB [2] is transient and inadequate. As a result, using sunscreen and wearing clothes are essential preventative measures against sunburn. There was a higher chance of sunburn in the previous year among those who used sunless tanning products [3].

Still, further research is needed to understand the temporal link and beliefs around sunburn and sunless tanning (e.g., how often

sunless tanning is a defensive response owing to past sunburn vs.

How often is a sunless tan-induced false perception of photoprotection the cause of sunburn?

For the first 24 hours following application, DHA may momentarily increase the development of UV radiation-induced reactive oxygen species [1], which could accelerate sun-induced damage. Consequently, minimizing sun exposure.

It is recommended to expose yourself to UV light during the first 24 hours after applying DHA. Individuals who only use sunless tanning products have better sun protection practices than those who tan indoors, use both indoor and sunless tanning products, and don't tan [3].

The usage of protective gear and sunscreen is higher among those who tan only in the dark. This is in contrast to past research that linked sunless tanning to sunburn [2].

Nevertheless, the temporal link between sunburn and sunless tanning was not investigated in the previous study.

The relationship between sunless tanning and sunburns could be better understood with a prospective research of exclusive sunless tanners. Additionally, the study did not differentiate between those who used indoor and outdoor tanning, which makes it difficult to determine if the increased incidence of sunburns was caused by indoor or outdoor tanning habits.



Photo 1.

II. REQUIREMENT OR WHEN ESTABLISHMENT [HISTORY]: ^[5,6,7,8]

Tans were originally thought to be lower class. It represented the poverty of people who had to labour outside in the sweltering heat. However, Coco Chanel's fame was sufficient to alter a period of fashion-forward followers. Coco Chanel travelled the Riviera in the Duke of Westminster's yacht "Flying Cloud" and returned tanned, and its appeal as sleek, independent, and modern was immediate. In just thirty years, the medical community changed from advocating sun avoidance to supporting sun exposure, and by the end of the 1920s, Vogue, the bible of beauty, declared that "the 1929 girl must be tan," which she actually was that was 85 years ago, and since then, Tans have arrived.

❖ The Tanning Timeline:

- Before 1920, having a tan was an indication of destitution. Most people want skin that is porcelain-pale.
- 1923: Mistakenly picked up while sailing the French Riviera, Coco Chanel has a bronzed glow as she walks the Cannes red carpet.
- 1923—the day after Cannes—everyone desires a bronzed complexion (cf artesian tan).
- During the Second World War in the 1940s, ladies were able to paint a tan color—achieved using tea bags and gravy mix—to simulate wearing stockings.
- Dr. Eva Wittgenstein, a University of Cincinnati researcher, first discovered DHA and its capacity to cause browned skin in the 1950s. The brown coloring left on the skin of youngsters receiving oral DHA treatment for glycogen storage disorder served as a catalyst for her research. The children's skin turns colored in regions where this concentrated material is splattered on it without causing garment stains. After that, aqueous solutions were directly applied to the skin, replicating the pigmentation.
- The 1960s Since its release to the public, a lot of individuals have chosen to use this instead of tanning beds or exposure to the sun to get their bronzed skin for a long time. Self-tanning lotions are thought to be a secure substitute for exposure to UVA or UVB rays.
- Sales of sunless tanning treatments as a percentage of all sun care products increased dramatically in 1990. Over the past few years, Custom Tan has been voted Australia's Best Fake Tan three times, thanks to numerous advancements

made to the tanning ingredient DHA. In 2014 alone, this was achieved.

- As of December 2014, solarium use is prohibited in New South Wales, however people still want to have bronze skin.

III. CLASSIFICATION ^[9]

Both your health and beauty can be harmed by sun exposure. Sunlight exposure can result in sunburn, early aging, skin cancer, and eye impairment due to ultraviolet (UV) radiation. Even so, a lot of Americans still aim for the ideal tan. Is there a tanning technique that is safe? Options for sunless tanning provide an alternative to basking in the sun's rays.

1) **Sunless Tanning Options:**

Both your health and beauty can be harmed by sun exposure. Sunlight-induced ultraviolet (UV) radiation can lead to sunburn, early aging, skin cancer, and ocular impairment. Even so, a lot of Americans still aim for the ideal tan. Is there a tanning technique that is safe? Dark tanning Options provide a substitute for basking in the sun's rays.

1. **Spray Tanning Booths:**

Spray tanning in booths is the most popular sunless tanning service provided by tanning clinics. Spraying machines housed inside enclosed booths distribute an equal layer of the chemical dihydroxyacetone (DHA) onto your skin. This is how spray tanning booths operate. DHA darkens skin tone and mimics a tan by reacting with dead skin cells on the skin's surface. Usually, the outcomes endure for a few days.

The US Food and Drug Administration (FDA) has approved DHA for cosmetic usage, but only for external application. DHA should not be swallowed or inhaled, and it is not recommended for use near the lips or eyes. In spray tanning booths, it is difficult to avoid this kind of exposure. The FDA recommends inquiring about protection for your lips and eyes as well as protection against spray ingestion or inhalation prior to using a spray tanning booth. Look for another salon if the response is negative.

2. **Airbrush Tan:**

Getting an airbrush tan is a potentially safer—but more expensive—way to get a uniform DHA application. An airbrush tan involves a salon technician covering your lips, eyes, and other mucous membranes before using a spray

compressor to apply a layer of DHA to your skin. In a few hours, a natural-looking tan will emerge, and it will typically persist for a few days. Airbrushing has the advantage of producing a consistent tan while lowering the chance of exposure to the eyes and lips and inhalation.

3. Self-Tanning Lotions:

Drugstores and cosmetic counters sell self-tanning lotions over-the-counter. DHA is present in these self-tanners. Cover your skin evenly with the lotion for a tan that looks natural. The outcomes will take several days to manifest, starting in a few hours.

You will achieve more even results with spray booth, airbrush, and self-tanning lotion applications if you use a scrub brush or loofah to exfoliate your skin prior to applying the tanner.

4. Bronzers:

Brush-on powders and tinted moisturizers are examples of bronzers. Bronzers are useful for giving the skin a transient tanned look. With bronzers, it is hard to get an even, full tan, but they can give pale skin some color. Bronzers can be removed with soap and water, just like makeup.

5. Tanning Pills:

The FDA has not approved and they are dangerous for use in tanning. They include canthaxanthin, a color additive. Canthaxanthin consumption may result in orange or brown skin. Its use has been connected to a number of grave health issues, such as liver and eye damage .

6. Self-tannings Towelettes:

Excellent for on-the-go travel and for achieving the ideal faux tan. If you are not fond of the mess or inconvenience that comes with mousses and lotions, tanning towelettes are ideal. These single-use wipes are the most convenient thing available.

7. Self-tanning Sticks:

If a mess-free face tanner is what you're after. A stick makes the ideal bed. Apply the tanning sticks to your face after washing it. To guarantee a streak-free appearance, thoroughly combine it with your fingertips.

8. Self-tanning Mousse:

Tanning mousses are a type of lightweight, foamy product that tans gradually and evenly. They usually dry rapidly and are best applied using a tanning mitt.

9. The Safest Ways to Tan:

Right now, it appears that airbrush tanning, self-tanning creams, and bronzers are the safest methods for creating a fake tan. Make sure you shield your lips and eyes when using spray tanning booths, and avoid breathing or consuming the spray. And keep in mind that even if your skin gets darker, sunless tanning does not shield you from the sun's harmful rays; instead, you must wear clothes that covers you or apply sunscreen.

IV. FORMULATION^[10]

Because Gelaid CPE is included, Innospec's Secret Subtle Self-Tan, a pleasant self-tanning gel, has a light texture and great lubrication and spread ability.

INGREDIENTS	% w/w	Uses
Phase A		
Dihydroxyacetone	4.0	Self-tanner
Aqua	q. s. to 100	Diluent
Propylene Glycol	10.0	Preservative
Glycerine	22.5	Humectant

Gelaid CPE [Innospec]	25.0	pre-emulsified gelling agent
Euxyl® PE 9010	1.0	Preservative
Fragrance	q. s.	Fragrance
Phase B		
CITRIC ACID	50	Acidulent
Phase C		
Glycerine	q. s.	Humectant

Preparation:

Phase A elements should be added one at a time, mixing in between additions to create a clear, homogenous mixture. If required, adjust pH with a 50% w/w solution of citric acid. In increments of 0.25%, add glycerin until the system is clear.

V. INGREDIENTS: ^[11]

1.Dihydroxyacetone:

DHA is mainly found in sunless tanning products as an ingredient. It is obtained from plant sources including sugar cane and sugar beets as well as by the fermentation of glycerin.

2.Gelaid® CPE :

Dimethicone/Vinyl Dimethicone (and) Cyclopentasiloxane Cross polymer, Hydroxyethyl Acryllate Sodium Acryloyl dimethyl Taurate Copolymer, and Cyclohexasiloxane combination. Innospec's Gelaid® CPE functions as a pre-emulsified gelling agent to produce opulent creams and lotions. It was created specifically for the cold mix method. Its multiphasic characteristics allow the incorporation of functional active substances based on water and oil. Products for skin, body, and hair care contain Gelaid® CPE.

3.Euxyl® PE 9010:

A liquid cosmetic preservative based on phenoxyethanol and ethylhexylglycerin is called Euxyl® PE 9010. Phenoxyethanol's ability to preserve food is enhanced when ethylhexylglycerin is added because it changes the interfacial tension at the cell membrane of microorganisms.

4.Propylene glycol:

Because propylene glycol has a strong affinity for water, it is frequently used at low concentrations to enhance the moisturizing properties of skin care products. For more hydrated, supple skin, humectants draw and hold water in the skin.

5.Glycerin:

Because of its moisturizing qualities, glycerin is a favoured ingredient for skin care products and is widely used in lotions and moisturizers to leave skin feeling soft, smooth, and healthy.

VI. MARKETED FORMULATION: ^[12]

Rich and velvety self-tanning cream gel, marketed under the Seppic brand

Picture no 02


EU07105

**RICH'N SMOOTH
SELF-TANNING CREAM-GEL**

Cream Gel



- White cream-gel
- Compatibility of Sepiplus™ S with DHA.
- Association of Sepiplus™ S with Simulgel™ FL for a stable formula, comfortable over time.
- Glycolic acid allows a slight peeling for an uniform self-tanning.



Formula

A	SEPIPLUS™ S SIMULGEL™ FL	2.00%
	C12-15 Alkyl Benzoate	10.00%
	Dimethicone	5.00%
B	Aqua/Water	60.00%
C	Propylene Glycol	2.00%
	Glycerine	3.00%
	Phenoxyethanol & Ethylhexylglycerin	1.00%
	Tocopherol	0.05%
	Parfum/Fragrance	0.20%
D	DHA	3.00%
	Aqua / Water	Up to 100%
	Glycolic Acid 67%	0.50%
E	Sodium Hydroxide	Up to pH 4

Procedure

Lab trial – Rayneri - 300g

Weigh and homogenize part A.
 Add B under stirring.
 As soon as A+B is homogeneous, add successively ingredients of part C.
 Mix ingredients of D. Add D to A+B+C.
 Adjust pH to 4.

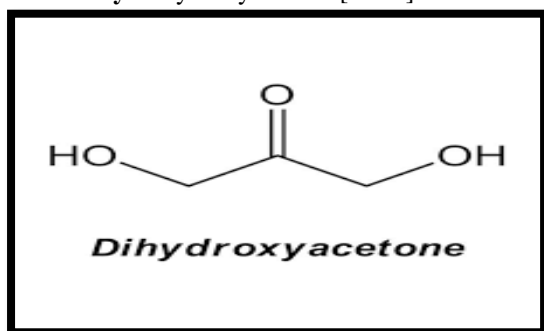
Characteristics

- Aspect: White fluid
- pH: 3.9
- Viscosity 1M at RT: 38,000 cps BROOKFIELD LV M4 sp.6
- Viscosity 1M at 45°C: 41,000 cps BROOKFIELD LV M4 sp.6
- Stability: >1M at RT and 45°C

EU07105 - 1011

VII. PHARMACOLOGICAL ACTIVITY OF ACTIVE INGREDIENT ^[13]

Chemistry: Dihydroxyacetone [DHA]

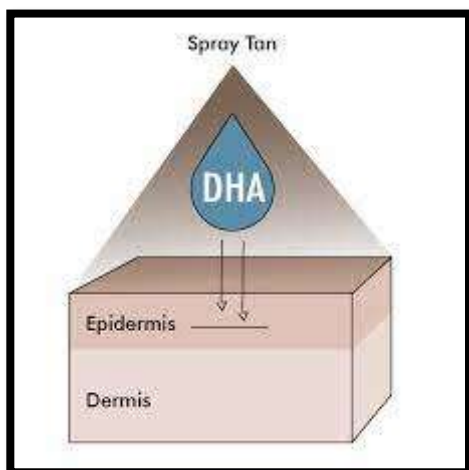


Pictures no 3

DHA (C₃H₆O₃) is a crystalline, white powder that is hygroscopic. This three-carbon sugar reacts to generate a dimer in a newly made water solution. A solution in acetone, ether, or alcohol that is heated returns to the monomer. Though less stable, the monomeric form plays a more significant role in the browning mechanism that causes the skin to change color. Between pH 4 and pH 6, DHA is stable; however, beyond pH 7,

effectiveness is lost as brown-colored molecules start to develop. Most stable is a buffered combination at pH 5. Extended periods of heating exceeding 388C will also impact stability. DHA must be kept dry and cold—ideally at 48 degrees Celsius with low air humidity. The isomer of DHA, glyceraldehyde, is also included in the mixture. ormaldehyde and formic acid are the byproducts of glyceraldehyde breakdown. This isomerization and, consequently, the latter unwanted components are reduced in an acidic solution (pH 4). The interaction between an amino group found in proteins, peptides, or amino acids and the glycosidic hydroxyl group found in sugars is known as the Maillard or browning reaction. In the context of this interaction, DHA can be thought of as a three-carbon sugar. It reacts with free amino groups that are present in amino acids, peptides, and proteins that are provided by the keratin to generate chromophores known as melanoidins. Certain physicochemical characteristics of melanoidins are comparable to those of melanin found in nature. Recent research using electron spin resonance has demonstrated that the Maillard process generates free radicals in vivo.

➤ **Mechanism of action:** ^[15,16]



Picture no: 04

A three-carbon sugar ($C_3H_6O_3$), DHA is often referred to as glycerone or dihydroxy-2-propanone. It is typically obtained from plant sources. In 2016, the National Center for Biotechnology Information released a comprehensive overview of DHA. The chemical and physical characteristics, pharmacology, biochemistry, use and production, toxicity, safety and dangers, and biological test results of DHA were all covered in this synopsis. According to the toxicity data in this research, DHA treatment caused dose- and time-dependent alterations in cells, such as cytoplasmic budding, chromatin condensation, and cell detachment. After being exposed to DHA for 24 hours, there was a noticeable reduction in the growth of the cells. In experimental animals, dermatitis and epidermal thickening were observed after 21 days of exposure to a 5% DHA solution. Moderate inflammatory reactions and hyperplastic and dyskeratotic alterations were observed after 42 days of therapy with the same solution.

The sugars DHA or erythrose used in long-lasting topical tanning treatments trigger a "Maillard reaction" when they come into contact with proteins in the stratum corneum and epidermis' outer layers. In the stratum corneum, free amino acids from skin proteins mix with DHA to cause this reaction. Skin appears tanned as a result of this mixture. After applying, results are usually visible in a few hours. It does not take exposure to UV radiation to start this chemical reaction.

VIII. UNDERSTANDING THE BENEFITS OF SUNLESS TANNING ^[17,18]

- **No Skin Cancer Risk** : Today, it goes without saying that spending a lot of time in the sun can triple your chance of developing skin cancer. You can significantly lower your risk by going for spray tanning instead of frying in the sun. Remember that even with that gorgeous bronze skin, a spray tan does not shield you from UV radiation. You will still need to wear sun protection every day. Self-tanning creams do more for your skin than just make it seem gorgeously browned. In addition to covering up flaws in your skin, these products protect you from the sun by reducing your exposure to the sun .
- **No Early Aging to Worry About:** Frequent exposure to UVA and UVB radiation can prematurely age your skin in addition to raising your chance of developing skin cancer. Exposure to sunlight can cause pigmentation marks, rough, leathery skin, and fine lines and wrinkles. In fact, exposure to the sun can accelerate the loss of natural skin elasticity, leading to loose, drooping skin around the jawline and cheekbones.
- **Even, Natural Tan** : Spray tanning offers a uniform coverage with a significantly lower chance of streaking. A fine mist of spray tan solution is used in this procedure, and it applies more uniformly than other sunless tanning product kinds. Furthermore, spray tans of the past are no longer orange, thanks to new technology, which guarantees that no matter how dark you go, your sunless tanning efforts will result in natural color.
- **Slim and hide** : Your entire body will almost instantly appear slimmer with a hint of color on the skin. Tansight can also lessen the visibility of issues including pigmentation markings, blemishes, and scarring. You may even hide cellulite by adding some color to your buttocks and thighs.
- **Your Skin Will Look Flawless as You will Cover Skin** : A sunless tan or spray tan covers up flaws in your skin and makes your entire body look makeup-free. Sunless tanning products are a great option for people with stretch marks, varicose veins, acne scars, uneven skin tone, hyperpigmentation, blemishes, and other skin defects because they may mask these abnormalities. To put it another way, sunless tanning can give you

immaculate skin. If you like how a good BB cream or skin foundation makes your skin look flawless, you'll enjoy how a spray tan achieves the same thing, only it can last up to a week. Your skin will appear perfect and you will feel gorgeous without makeup if you use sunless tanning solutions.

- **You'll Look More Toned :** Using sunless tanning treatments can give you a more toned, slimmer appearance. Receiving comments saying they appear to have dropped weight is a popular testimonial among fans of spray tanning. This is particularly true if your sunless tanning product is applied to your body by a certified airbrush tanning expert. By focusing the product in specific body parts, they can mold and shape your body to appear more toned and slender. Sunless tanning products do, however, generally make you appear thinner.
- **You'll Feel More Confident :** You should naturally feel more confidence now that you know how sunless tanning solutions work as a skin-perfecting and tone-enhancing product. You'll naturally feel more confident when your skin appears more perfect, more tanned, and more toned. One of the greatest and simplest ways to increase your confidence is through sunless tanning.
- **Fast Results that Last :** After your treatment, results from spray tanning usually start to show within a few short hours. faster than spending hours each day outside in the sun. A spray tan is a great choice for a special occasion because it usually lasts five to ten days. Your tan can remain radiant all year round with regular treatments.

IX. UNDERSTANDING THE RISK OF SUNLESS TANNING ^[20,21,22,23]

Although dihydroxyacetone is one of the main active ingredients in self-tanning products, there are certain hazards associated with it. It's important to follow the instructions and take extreme care not to breathe in any fumes when using self-tanners. DHA inhalation has been linked to an increased risk of developing asthma, cancer, and chronic obstructive pulmonary disease (COPD) (via TIME). Thus, make sure to protect your lips, ears, nose, and eyes when using a self-tanner.

It's also crucial to keep in mind that self-tanners shouldn't be used in place of sunscreen because they can't stop UV damage on their own and actually increase the amount of free radicals

produced in the skin. Researchers were able to measure the impact of inducing free radicals through the use of the radical sun factor method. The Maillard reaction between DHA carbohydrates and keratinocyte proteins causes sugar derivatives to oxidize. Free radicals caused skin damage as a result of a sequence of events triggered by this oxidation. This is the process that creates the look of tanned skin. DNA glycation is the process of reducing carbs that may damage nucleic acids. Glycotoxins are another term for advanced glycation end products, or AGEs. The Maillard reaction is that how they are created.

Naturally occurring DNA AGEs are created when carbonyl compounds, such as DHA, react with one another. Pathogenic quantities of AGEs in the bloodstream or body tissues can alter the structure and function of proteins, causing oxidative stress and inflammation.

A number of chronic degenerative diseases, including diabetes, heart disease, and Alzheimer's disease, have been connected to the AGEs. The alkaline comet test revealed that DHA harmed DNA, according to an examination of its effects on cell survival and proliferation (National Institutes of Health, 2016).

•Use of DHA and Its Impacts Outside the Stratum Corneum :

The FDA's reservations about DHA usage in aerosol spray form. The effects of DHA on skin levels below the stratum corneum or on mucosal membranes are currently the subject of little research. According to FDA hypotheses, 11% of DHA administered topically makes its way to live cells in the dermis and epidermis. Because DHA-containing aerosol products may be administered externally to the eyes, lips, soft tissue beneath the eyes, mucous membranes, or internally through the nose and mouth, the FDA has not approved their usage. Concerns regarding continuous spray tan use raising the risk of lung conditions like asthma and chronic obstructive pulmonary disease as well as cancer have been voiced by certain doctors.

X. LITRATURE REVIEW ^[5,21]

carried out a study on the dangers of tanning and found that topical self-tanners are safe substitutes for UV tanning; however, users should exercise caution since self-tanners do not offer UVR protection and can produce free radicals when exposed to UV light. According to this evaluation of the literature, tanning has become a more risky activity, and skin cancer rates support

these conclusions. After examining every possible way to tan skin, including the sun, indoor tanning, topical treatments, tablets, and injectable melanocyte-stimulating hormone, researchers came to the conclusion that there is no acceptable level of tan and that doctors should advise their teenage and young adult patients accordingly. They advocate for appearance-focused therapies that highlight the negative effects of skin tanning. They also suggest that in order to discourage tanning practices, sunless tanning can be encouraged in addition to the previously mentioned interventions. This study's failure to distinguish between the many ways that sunless tanning products should be applied and the potential risks associated with inhaling DHA-containing sunless tanning products is a significant weakness.

An integrative review of the literature aimed to summarize data on sunburns, protective behaviors, and indoor tanning from behavioral studies conducted by national and state-specific organizations. Online surveys, reference lists, and data obtained from nationwide surveys carried out in 1992, 2004–2005, and 2007–2009 utilizing MEDLINE and Psych INFO were used to collect the data. Among the study's shortcomings were possible recollection errors in the recall tests and the lack of information on children. Researchers concluded that more has to be done in the United States to promote protective behavior, especially for women and youth.

XI. CASE STUDY

• Case Study I: ^[24]

- **Abstract:** Healthy, appealing substitutes for harmful activities are rare. Though it hasn't been well investigated in relation to preventing skin cancer, sunless tanning is a reasonably risk-free substitute for the harmful practice of suntanning.
- The goal of this study was to evaluate the effects of a skin cancer prevention program that encouraged tanning indoors rather than outside.
- The research employs a randomized controlled trial design.
- **Setting:** Massachusetts's public beaches served as the location for the intervention. Participants: During their visit to a public beach, 250 women were enlisted to take part in the study.
- **intervention:** The intervention consisted of skin cancer education, UV imaging, enticing photographs of women with sunless tans,

instructions for using sunless tanning products properly, and motivating messaging to use sunless tanning as an alternative to UV tanning. It also included a free trial of sunless tanning products. Surveys were finished in the control condition.

- **Principal Outcome Measures:** Sunbathing at two and one year after the intervention was the main result. Sun protection, sunless tanning, and sunburns were secondary results.
- **Results:** After two months, intervention participants reported much fewer sunburns and increased use of protective equipment, while also significantly reducing their sunbathing compared to controls. Compared to control participants, intervention participants reported significantly fewer sunburns and more sunless tanning at a year's end, but no differences in other outcomes.
- **Conclusion:** There was a brief increase in sunbathing following the promotion of sunless tanning as an alternative to UV tanning.

❖ CASE STUDY II ^[25]

- **Goal:** There is strong evidence that UV radiation exposure raises the risk of melanoma. Measurement error has the potential to misrepresent the amount of observed effects in epidemiologic investigations. While numerous studies have previously documented the reliability of self-report for various sun exposure parameters, the self-report for using artificial tanning equipment and self-tanning products has not been as well examined.
- **Research Design and Approaches:** A follow-up survey was mailed to 76 randomly chosen participants in a case-control research on melanoma, two to four weeks after the first survey was completed. Those with 1999 and 2000 diagnoses who were identified from the Iowa Cancer Registry in 2002 served as cases and controls. We evaluated sun sensitivity, sunburn history, and self-reported consistency in using sunlamps and self-tanning products.
- **Findings:** When reporting the usage of sunlamps or self-tanning creams, there was a significant degree of dependability (cases: Kappa (κ) = 1.0 for both exposures; controls: κ = 0.71 and 0.87, respectively). We discovered that the overall dependability of numerous sun sensitivity factors ranged from 0.62 to 0.78 in terms of κ .
- **Conclusion:** In summary, the survey instrument showed significant repeatability for

characteristics pertaining to sun sensitivity, self-tanning cream use, and the use of sunlamps or tanning beds.

CASE STUDY III ^[26]

- **Goal:** A 2013 case study provided fresh information on the skin damage that occurred after surgery in a 34-year-old patient who had gotten a spray tan before to the procedure. Following the patient's surgery, a myomectomy, endometriosis vaporization, and robotically assisted adhesion lysis
- **Method:** - Where sticky tape was used, surgeons saw erythema and disturbance of the deep dermal skin layer (Krause, Bohler, & Nakajima, 2013). Following the patient's appointment with a wound care specialist, it was concluded that the patient had been exposed to chemicals from the presurgical antiseptic treatments, the adhesive tape, and the sunless tanning cream.
- **Conclusion :** The authors recommended that healthcare professionals be informed about the possibility of interactions between sunless tanning chemicals and the surgical goods mentioned earlier. Additionally, patients should be counseled against using sunless tanning products just before surgery.

XII. DIRECTION OF USE: ^[27]

Before using, shake well for optimal results. Use on freshly exfoliated skin. Apply evenly around the body and massage until completely absorbed. Apply sparingly to hairline, elbows, knees, and ankles. Hands should be quickly washed with soap and water after application. Let skin air dry before applying makeup. Don't take a bath or swim for at least three hours. If necessary, reapply to preserve or intensify color.

XIII. SIDE EFFECT: - ^[28]

- rashes.
- coughing.
- dizziness.
- fainting.
- increased risk of pulmonary diseases like asthma and COPD, from inhaling spray tanners.
- contact dermatitis.
- rosacea.
- DNA damage and cell death to healthy.

15)Contraindication: - ^[29]

- skin conditions such as bacterial, fungal, viral, and parasitic infections - Severe skin illnesses such as psoriasis or eczema
- Severe asthma or breathing issues with spray tanning.
- Extremely sensitive skin or a history of product allergies
- Severe inflammation during radiation or chemotherapy;
- Heat treatments (electric epilation, waxing) should not be done afterward because the tan pigment gathers in the open pores. It is recommended to give the skin a full day to rest before applying self-tanning.

XIV. SPECIAL WARNING & PRECAUTION FOR USE: ^[30]

- Self-tanning products should not be inhaled or come into contact with mucous membranes. A doctor's advice should be sought before treatment if a patient has asthma, sensitive skin, or wounds and scrapes.
- During treatment, keep your mouth shut and use lip salve to protect your lips.
- Self-tanning products in spray booths should not be used by expectant mothers or nursing moms.
- Considering how little is known about DHA, consistent weekly use for an extended length of time is not advised.
- Sunscreen should always be used while exposed to the sun; self-tanning creams do not provide sufficient protection against the sun's rays.
- Extraction mechanisms should be installed in booths to prevent spray from accidentally spreading into the surrounding area and exposing staff and customers needlessly.

XV. CONCLUSION: -

The best method to tan your skin without spending time in the sun is through sunless tanning. Although harmful UV rays tan the skin, they also cause skin damage. So, it is preferable to use sunless tanning techniques to achieve healthy-looking tan skin. Products that include DHA, such as lotions, creams, and sprays, are the finest for sunless tanning. The active ingredient in sunless tanning products, dihydroxyacetone, has potential danger in addition to advantages. If you want tanned skin, using sunless tanning solutions could be a practical, safer option. A completely approved product with little potential hazards. acceptable and a product that people from other countries use. fulfills the function of tanning

without using UV radiation as a trigger for the synthesis of melanin provides the skin a uniform tone and conceals the discolored regions. The main advantage of sunless tanning is that it can cover up skin flaws.

increases the self-confidence of those who are self-conscious about their boring white appearance. Gives the skin a more organic appearance and radiance.

18)Future Scope: ^[31]

Global Self-tanning Products Market size was valued at USD 877 million in 2021 and is suppose to grow from USD 909.2 million in 2022 to USD 1.31 billion by 2030, growing this a CAGR of 4.5% in the forecast period (2023-2030).

The market for skincare products that promote self-tanning is rising globally along with consumer income and awareness of the risks to one's health posed by prolonged exposure to sunshine. In addition, the rise in skin cancer cases has led to a rise in the demand for and usage of self-tanning products, which indicates a notable growth in sales over the course of the projection period. Additionally, products come in a range of formats, such as lotion, serum, drops, and crème, for the convenience of the customer. These numerous options have increased demand for that goods.

The market for self-tanning products has grown substantially over the last few years. The market is growing as a result of the growing demand for naturally derived self-tanning products, rising public awareness of sun protection, and the growing popularity of spray tans. Similarly, consumer preferences for radiant skin—especially among women—have increased the cost of self-tanning products.

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