

DEVICE AND TECHNOLOGY FOR DETERMINATION OF INDIVIDUAL SENSITIVITY OF HUMAN SKIN TO IRRADIATION

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KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

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Tasks of the project

- 1) development of approach and equipment for evaluation of factor of individual UV irradiation sensitivity of human and animal skin and body;
- 2) development of evaluation techniques for stimulating influence on melanin synthesis which has radioprotection properties for prevention of DNA damage and epidermis cell apoptosis and cause of carcinogenesis;
- 3) development of medical and nonmedical techniques for correction of changed reactions of self-regulation and self-organization of alive system under damage action of UV, VIS, IR irradiation.

What is the problem



Biological objects, particularly human,
are always under stress of electromagnetic waves

Useful properties of electro-magnetic waves

1. Photosynthesis - agriculture
2. D3 vitamin synthesis – life science
3. Antiseptic - medicine
4. Heating - energy
5. Illumination – energy and ecology
6. Colour – art and life style

Harmful properties of electro-magnetic waves

1. Burn
2. Eye diseases
3. Skin diseases
4. Drought promotion

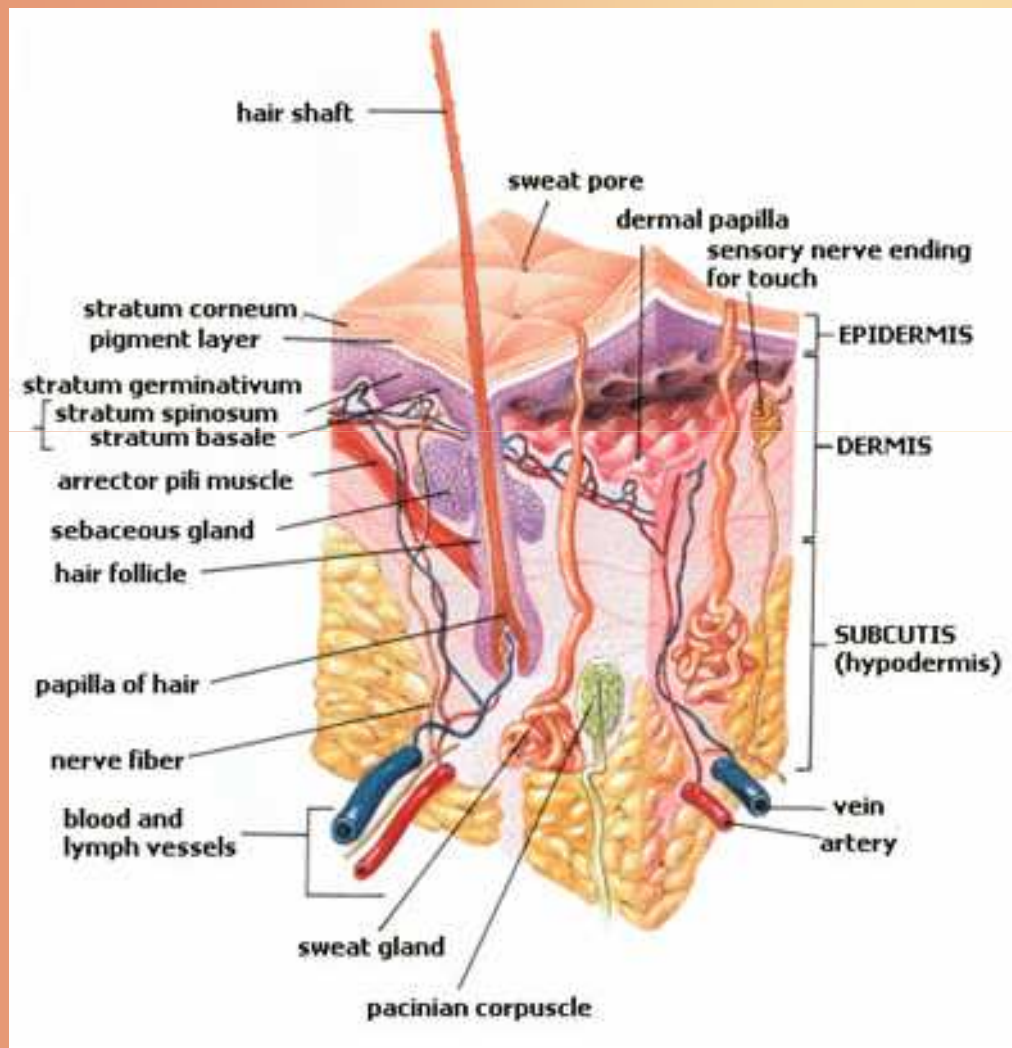
Medical aspect (1)



Type of human skin

Type	Definition	Description
I	Always burns but never tans	Pale, Fair, Freckles
II	Usually burns, sometimes tans	Fair
III	May burn, usually tans	Light Brown
IV	Rarely burns, always tans	Olive brown
V	Moderate constitutional pigmentation	Brown
VI	Marked constitutional pigmentation	Black

Medical aspect (2)



Skin diseases

The most important clinical questions are

- location of the skin lesion (arms, head, legs, etc.),
- symptoms (pruritus, pain, etc.),
- duration (acute or chronic),
- arrangement (solitary, generalized, annular, linear, etc.),
- morphology (macules, papules, vesicles, etc.)
- color (red, blue, brown, black, white, yellow, etc).

Medical aspect (3)

Clinical and histological nomenclature for skin lesions

Macroscopic	Primary lesions	<i>flat</i> (Macule, Patch), · <i>elevated</i> (Papule, Nodule, Plaque), · <i>fluid</i> (Vesicle, Bulla), · Pustule, Wheal, Ulcer, Erosion, Telangiectasia, Burrow
	Secondary lesions	Scale, Crust, Lichenification, Excoriation Induration, Atrophy
Microscopic	Hyperkeratosis, Parakeratosis, Hypergranulosis, Acanthosis, Papillomatosis, Dyskeratosis, Acantholysis, Spongiosis, Hydropic swelling, Exocytosis, Vacuolization, Erosion, Ulceration, Lentiginous	

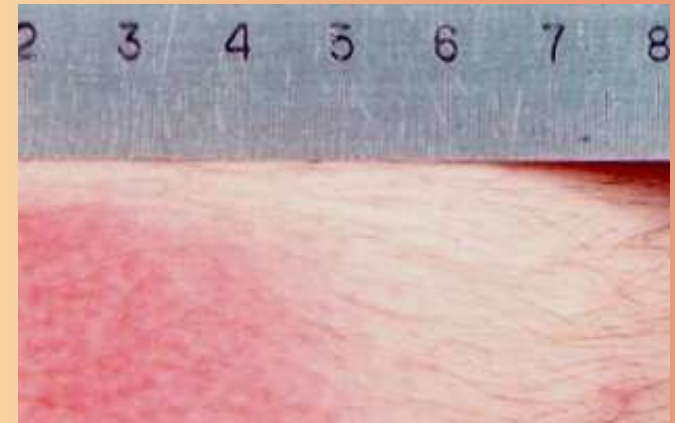
Medical aspect (4)



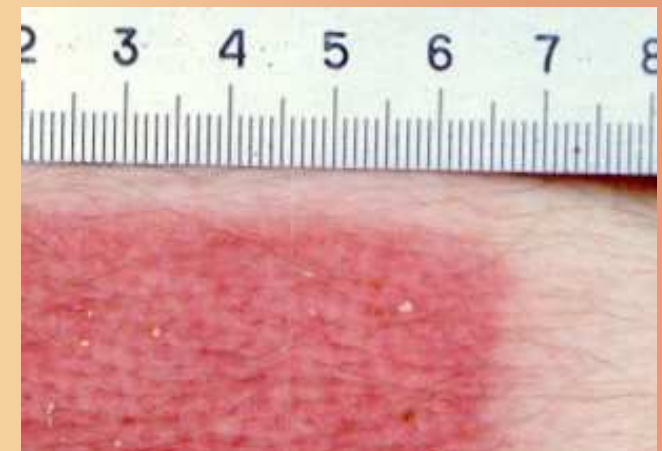
after 1 day



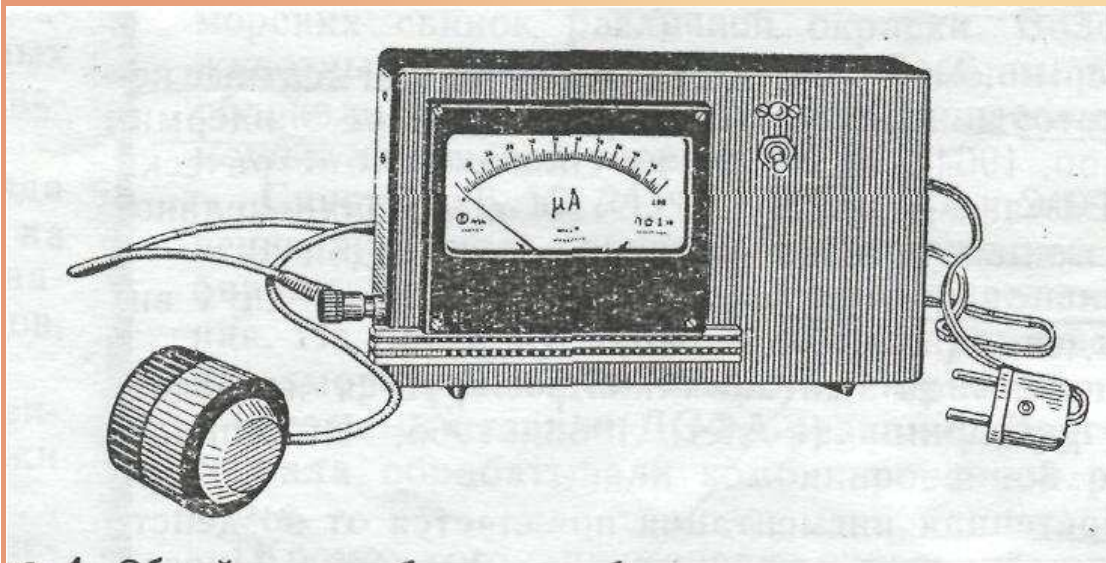
after 2 day



after 4 day



Device development: (1) from pointer-type to digital



Former USSR (1970)



Hamamatsu (2000)

Device development: (2) functional devices



Holtkamp Elektronik (2006)



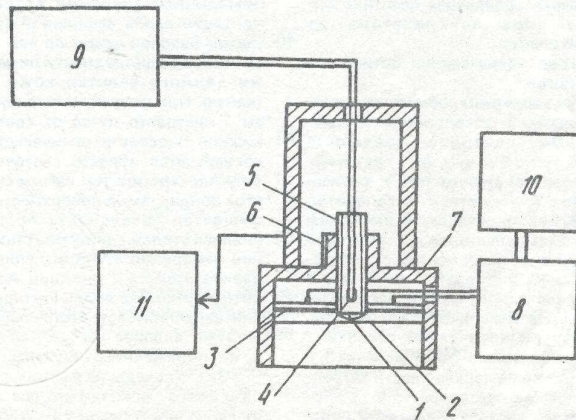
*Sun Tanning
Bed Meter SL-3201 (2007)*

Device development: (3) intellectual property right protection

(12) ОПИСАНИЕ ИЗОБРЕТЕНИЯ к патенту Российской Федерации

(21) 4938515/14
 (22) 24.05.91
 (46) 30.04.95 Бюл. № 12
 (75) Гудзенко Ж.П.; Короткая Е.В.; Мяченко Ю.А.; Поперенко Л.В.
 (73) Гудзенко Жанна Прокофьевна
 (56) Патент США N 3602213, кл. А 61В 5/02, 1971.
(54) УСТРОЙСТВО ДЛЯ ФОТОЭЛЕКТРИЧЕСКОЙ ДЕРМАХРОМОГРАФИИ
 (57) Использование: в медицине, в устройствах для определения динамики региментации кожи при витилиго. Сущность: устройство содержит оптическую головку 7, опорную поверхность которой выпол-

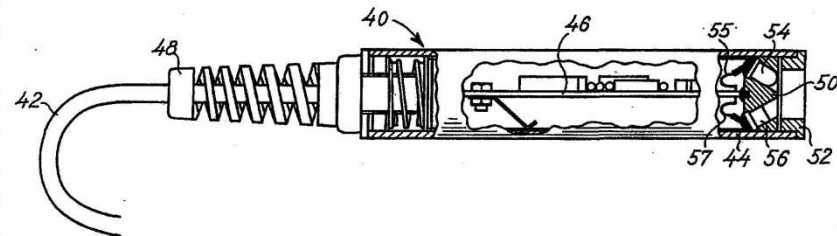
нена с возможностью контакта с кожей, а в полости оптической головки коаксиально установлены источник излучения 4, фотоприемник 3 и на выходе полости установлен поляризатор из поляроидной пленки 2; блок отображения информации и блок питания 9, в корпусе оптической головки после источника излучения установлена фокусирующая линза 1 с возможностью ее перемещения вдоль оптической оси, фотоприемник выполнен в виде кольца, в центре которого размещен тубус с источником света и линзой. Положительный эффект: повышение точности определения динамики региментации в процессе лечения витилиго. 1 ил.



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(71) Applicant (for all designated States except US): CHROMOLIGHT APS [DK/DK]; Bindsbøllsvej 23, DK-2920 Charlottenlund (DK).			Published With international search report.
(72) Inventor; and (75) Inventor/Applicant (for US only): WULF, Hans, Christian [DK/DK]; Bidsbøllsvej 23, DK-2920 Charlottenlund (DK).			
(74) Agent: TH. OSTENFELD PATENTBUREAU A/S; P.O.Box 1183, Bredgade 41, DK-1011 Copenhagen K (DK).			

(54) Title: A METHOD AND AN APPARATUS FOR DETERMINING AN INDIVIDUAL'S ABILITY TO STAND EXPOSURE TO ULTRAVIOLET RADIATION

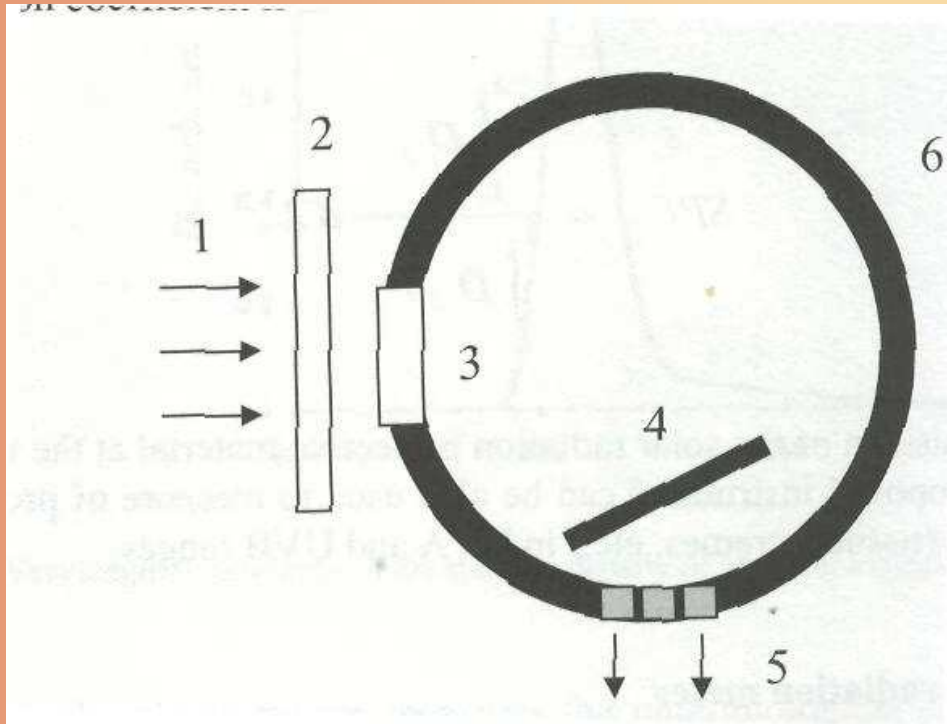


(57) Abstract

A method and an apparatus for determining an individual's ability to become tanned or to stand exposure to ultraviolet radiation without causing a skin reaction, such as skin cancer or erythema. According to the method, at least part of said individual's skin surface is exposed to electromagnetic radiation of first and second wavelengths and of predetermined intensities. The first and second wavelengths at which erythodermic skin reflection is high and low, respectively. The intensity of electromagnetic radiation reflected from the individual's skin surface is measured so as to determine first and second coefficients of reflection of said first and second wavelengths, respectively. The first and second coefficients are compared to sets of coefficients of reflection representing coherent sets of coefficients of reflection of specific states of redness, and the first and second coefficients of reflection are corrected into a set of corrected first and second coefficients of reflection of a specific state of redness. The corrected first coefficient of reflection is further converted into a measure representing the individual's ability to become tanned or to stand exposure to ultraviolet radiation without causing said skin reaction.

Improvement of light meter

1. Optical part



2. Spectral part



Application



Monitoring of the convalescence process of vitiligo



Sunburn monitoring by Engoline

Ukrainian team

1. Physics, optics, electronics – Institute of Semiconductor Physics, Taras Shevchenko National University
2. Medicine – Institute of Health Care
3. Production – JSC MERYDIAN

Looking for partners

1. Science

1.1. Dermatology

1.2. Clinician

1.3. Application in Solaria

2. Business

2.1. Production of device

2.2. Application of device

2.3. Sale of device and technology

Market area

1. Health
2. Medicine
3. Colorimetry

Thank you very much for your attention

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