

3/2010

Organ Sekcji Farmakologii Klinicznej Polskiego Towarzystwa Dermatologicznego
Official Organ of Clinical Pharmacology Section, Polish Dermatological Society
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DERMATOLOGIA KLINICZNA

Clinical Dermatology



Oczekiwania chorych dermatologicznych wobec
członków zespołu terapeutycznego i opieki
sprawowanej w placówkach ochrony zdrowia
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kwartalnik/quarterly • numer/number 3 • tom/volume 12 • rok/year 2010

Czasopismo objęte międzynarodową rejestracją w Excerpta Medica/EMBASE, Index Copernicus, SCOPUS, DOAJ, EBSCO, PBL
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Combined techniques in aesthetic dermatology in treating hyperpigmentations

Leczenie przebarwień skóry za pomocą łączonych technik dermatologii estetycznej

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ABSTRACT The work is aimed at combined therapy of hyperpigmentations on the face, neck, and décolleté, which are still a therapeutic problem. The final efficacy of the therapy may be potentiated by varying combined techniques. These are performed in a given order, at the therapists discretion, for example: 1. Microdermabrasion + depigmenting agent, 2. Hydroabrasion + depigmenting agent, 3. Peeling + depigmenting agent, 4. Laser treatment + depigmenting agent. When using combined techniques, it is necessary to define which method shall be used as the primary one. In combining more techniques the order in which they will be performed must be clearly set and followed!!! In the interest of the patient do not over-combine and remember that less is sometimes more.

Key words: combined techniques, hyperpigmentations, therapy

STRESZCZENIE W pracy przedstawiono możliwości terapeutyczne leczenia przebarwień skóry na twarzy, szyi, i dekolcie. Autorzy zwrócili uwagę, że wciąż zagadnienie to stanowi problem terapeutyczny. Ostateczna skuteczność terapii może być zwiększona przez dobieranie technik łączonych. Mogą być wykonywane następujące zabiegi wg poniższej listy: 1. Mikrodermabrazja + środek odbarwiający, 2. Hydroabrazja + środek odbarwiający, 3. Peeling + środek odbarwiający, 4. Terapia laserowa + środek odbarwiający. W przypadku stosowania technik łączonych ważne jest, aby poszczególne zabiegi były wykonywane wg określonej kolejności. Dla dobra pacjenta należy unikać łączenia zbyt wielu zabiegów i pamiętać o zasadzie, że „mniej, nierzadko znaczy lepiej”.

Słowa kluczowe: techniki łączone, przebarwienia, leczenie

Introduction

Aesthetic dermatology is the fastest growing sub-specialisation of dermatology, which has undoubtedly faced enormous development within the past 15 years. It is therefore necessary to distinguish between medical and aesthetic techniques. Attractive, healthy, and youthful appearance has become the imperative of our times. Various rejuvenation methods remain the gold standard among the most frequently used types of treatments applied not only in women, but nowadays also in men (1-5). Apart from the quite sophisticated treatments taking advantage of a whole range of specialised devices (electrocautery, various types of lasers or IPL), new methods are being sought and developed, that would be as little aggressive as possible and advantageous for the patient (not money and time consuming). Home care techniques are also well elaborated, since it is necessary to continue with the care also after a professional treatment session at the clinic (2).

The aim of aesthetic dermatology is to achieve the appearance and condition of healthy skin, and to treat the manifestations of various skin diseases or the resulting changes thereof (such as hyperpigmentations or scars). While correcting aesthetic problems (which are usually caused by ageing) it is necessary to consider the fact that the changes are systemic and affect not only the epidermis, but also the dermis and the subcutis (6).

What is equally important for the patient is professional consultancy aimed at determining the type of skin, including

clinical examination, anamnesis (especially targeted at smoking and drinking habits, sun exposure, UV exposure, photo protection, etc), physical, and laboratory examinations. It is necessary to perform the diagnostics using specialised devices – which are nowadays part of every informed specialist's basic portfolio and to perform non-invasive examinations (to determine the level of skin hydration, elasticity, and phototype, corneometry, sebumetry – for example with all sounds of the Multi Skin Test Center® by Courage+Khazaka, and measure the amount of collagen with a 20 MHz sound, PRIMOS 3, TEWL, digital dermatoscopy, RCM, digital trichogram device and others).

The therapist recommends the desired corrections and suitable treatments (such as the application of fillers or botulinum toxin to improve the appearance of wrinkles, various types of peels, and others) as well as a complex anti-ageing programme (3, 6-10).

Clients often require the therapy of hyper- or hypopigmentations. Of course therapists should always recommend further usage of modern cosmetic and dermatocosmetics products enriched with antioxidants, photoprotective agents, phytohormones, camouflage systems, or systemic antioxidants with endogenous effects on the mechanisms of pigmentations and ageing (6, 7, 11-13).

Every therapist should act according to the high benefit/low risk principle

The first step towards patient satisfaction should be adequate information on the possibilities of the clinic, and the

elaboration of high quality complete documentation and photodocumentation.

In case of a patient with an allergic anamnesis, epicutaneous testing must be performed (also for possible forensic cases). Many clients require or request more types of treatments. Due to that various combinations are becoming more and more popular, some of them well proven and very efficient, each potentiating the final synergistic effect. Other therapeutic combinations are disputable or even inappropriate, either because of the used materials or methods and the time of the onset of their effects, or considering the individual response of every patient. **It is necessary to elaborate a therapeutic plan and consider the optimum indications as well as contraindications (4).**

In combined techniques it is necessary to define which method is the main and bearing one, and which methods are supplementary, employed to potentiate the final effect.

Any of the combined techniques may be considered the main one, but if we opt for a combination of various techniques, the sequence in which those are performed is of extreme importance – also as regards the expectations of the client.

In order to achieve an excellent final effect in combining techniques it is necessary to have extensive knowledge of the mechanism of action of all included methods and optimise the time factor between the treatments.

The therapist can practically choose from the following two options:

1. to achieve a short term but significant cosmetic and aesthetic effect,
2. to achieve a long term effect with a somewhat slower onset, but a very satisfactory effect in the long run.

The possible pitfalls of such treatments include:

- possible undesired effects or adverse effects,
- unrealistic patient expectations,
- patients underestimating the fact that treatments must be repeated due to their temporary effects,
- patients underestimating the importance of adequate home care and changing their habits and lifestyle.

The presented combined techniques are aimed at the therapy of hyperpigmentations, and should rather serve as the basic survey of the issue (verified in practice) and not be considered a rigid methodology to be followed. The treatments and methods are defined and targeted at the area of the face, neck, décolleté, and hand dorsae.

Skin pigmentation

The colour of human skin is determined by genes, melanin pigmentation, haemoglobin in oxygenated and reduced form, carotene, exposure to UV rays, hormones (produced by the pituitary gland – alfa-MSH, beta-MSH, ACTH, gamma-MSH, estrogen, progesterone – with questionable impact) and many other factors. It is not known if in humans pigmentation is influenced by the pineal gland hormone melatonin (14-17).

Skin pigmentation anomalies and melanin

Skin pigmentation anomalies are an extensive subchapter of dermatology. They are manifested in a localised or diffuse form of:

- hypopigmentations (such as vitiligo, leucoderma, naevus anemicus, etc.),
- hyperpigmentations (such as chloasma, melasma, lentigines, lentigo senilis melanocytary naevi, systemic diseases).

Pigmentation changes may be caused by (14, 15, 18, 19):

- altered number of melanocytes,
- functional disturbances of melanin synthesis and the maturation and transport of melanosomes,
- disturbed melanosome transfer.

Both of the mentioned changes in pigmentation may be either **hereditary or acquired**. In acquired changes there are many various mechanisms that play a role, such as physical influences (UV rays, traumas with subsequent colour pigmentation, tattoos).

We distinguish between the following types of pigments in the human skin:

- dark brown to nearly black **eumelanin**,
- yellow, brown, or red **phaeomelanin trichomes** – a number of chemically well defined intensely coloured variants with a content of a certain amount of sulphur.

Other pigments present in the human body include haemoglobin and carotene (14-17, 19).

What is interesting here is that in black skin melanin is released in the upper epidermal layer, in Indo-Europeans in the central layer and in Asian skin in between the two layers. The number of epidermal melanogenesis units is practically the same in all individuals. Ethnical differences result from the size of melanosomes and their distribution.

Table I: Hyperpigmentations in general

Tabela I: Przebarwienia – podział

	Epidermal – melanin in epidermis <i>Naskórkowe – melanina w naskórku</i>	Cerulodermis – melanin in dermis <i>Ceruloderma – melanina w skórze właściwej</i>
<i>Hypermelanoses (melanoderma, ceruloderma)</i> <i>Hipermelanozy (melanoderma, ceruloderma)</i>	↑ number of melanocytes ↑ liczba melanocytów	↑ amount of melanin ↑ ilość melaniny
<i>Hyperchromia (blood)</i> <i>Hiperchromia (krew)</i>	Anomalies cells synthesising melanin <i>Zaburzenia funkcjonowania melanocytów</i>	
<i>Hyperchromia (hyperkatotinia)</i> <i>Hiperchromia (hiperkatotinia)</i>	Damaged vessel walls result in erythrocyte leakage, their haemoglobin is deposited in the skin <i>Ucieczka erytrocytów przez uszkodzone ściany naczyń, hemoglobina odkłada się w skórze</i>	
	Metabolic disease or increased carotene absorption due to elevated carotene levels in the blood Yellow-orange coloration (always stronger in palmar-plantar area) Risk of prolonged carotenoid therapy – deposition in retina <i>Choroba metaboliczna lub zwiększone wchłanianie karotenu w wyniku zwiększonego stężenia karotenu we krwi</i> <i>Żółto-pomarańczowe zabarwienie (zawsze mocniejsze na dłoniach i podszewach)</i> <i>Przedłużona terapia karotenem niesie ryzyko odkładania się karotenu w siatkówce</i>	

Melanosomes are:

- big and isolated in Aborigines and Africans,
- small and present in lysosome vacuoles in Caucasians medium sized in Asians (who have more eumelanin than Indo-Europeans).

Pigmentation may be regulated – the skin tans under sunrays – whereas how much it tans is determined genetically. Every individual is present with specific, familial and ethnical differences. According to the sensitivity to light, we distinguish between 6 skin phototypes (phototypes I-IV and phototypes V-VI typical of skin of colour).

Of course, there also are external conditions that have influence on melanogenesis, with the most important role played by the sun. UVA and UVB rays cause oxidative stress resulting in an inflammatory reaction, which, in turn, induces the production of cytokines acting as a signal to stimulate the pigmentation mechanism (14-17).

The therapy of local pigmentation anomalies requires a specific approach, including adequate knowledge about the issue on the side of both the therapist and the patient.

Basic information on hyperpigmentations

In the **clinical assessment** of hyperpigmentations and **differential diagnostics** it is necessary to consider predominantly the genetic, the race-related, and the endocrine changes as well as other serious cofactors, such as the:

- usage of certain topical and systemic agents (hydantoin, minocycline and others),
- application of various external agents causing skin coloration (mineral oils, tar, cosmetics, etc.),
- various diseases characterised by specific skin pigmentations – Melanosis Riehl, Poikiloderma Civatte, Erythrosis péribuccale pigmentaire Brocq, etc.,
- post-inflammatory hyperpigmentations in various localities,
- usage of oral contraceptives in women.

Hyperpigmentations – especially the acquired ones – have their exact clinical characteristics (15, 16, 19, 20).

Examining hyperpigmentations

Hyperpigmentations on the face (and other localities) are clinically assessed and examined using various devices (dermatoscope, digital dermatoscope, confocal microscope, special photo sound and Multi Skin Center® by Courage+Khazaka, Wood's lamp), colorimetry and histology. In practice, we most often distinguish between **four types of pigmentations** visible under a source of light or Wood's lamp. The results of examining melanin deposits under Wood's lamp correlate well with the results of the performed histological examinations (15, 16, 18-21).

Types of hyperpigmentations (clearly visible in phototypes I-IV)

1. **Epidermal type** – mostly light brown hyperpigmentations that show when illuminated with Wood's lamp.
2. **Dermal type** noticeable ash coloured hyperpigmentations accentuated when illuminated with Wood's lamp.
3. **Mixed type** mainly deep brown Wood's lamp irregularly accentuated when illuminated with Wood's lamp.

In skin phototypes V-VI the lesions are visible in daylight, but disappear when illuminated with Wood's lamp!!!

As regards the histopathology of the hyperpigmented lesions, we **distinguish between two types of pigmentations:**

A. Epidermal type with melanin deposits localised predominantly in the basal and suprabasal epidermis layer,

B. Dermal type with macrophages containing melanin.

In a single patient heterogeneous topographic distribution of melanophages from one to another region in melasma may be present (15, 17, 19).

Therapy of hyperpigmentations

The therapy of hyperpigmentations is lengthy, difficult, and usually conservative, whereby we basically distinguish between **physical, chemical and surgical** treatment modalities. Popular surgical methods include **cryotherapy**, but its application brings about the risk of obtaining the opposite result in some sensitive patients, namely permanent depigmentation of the treated areas (22, 23).

Good results may be obtained applying **various types of peels** (superficial, medium deep, and deep), containing for example phenol, TCA (30% trichloroacetic acid, however, also connected with the risk of post inflammatory hyperpigmentations!), 50-70% glycolic acid, other AHAs, salicylic acid, or lipoic acid, LHA and others (8, 9, 18, 24-26).

In many patients good effects are obtained with **microdermabrasion, hydrabrasion, classic dermabrasion, laser treatments**, (lately, laser treatments have been widely used and their therapeutic modalities elaborated into detail, however, laser treatments are most expensive) or **combined techniques** (1, 4, 8, 9, 22, 23, 27-30).

Topical preparations are still very popular, including **ointments, creams, gels, and lotions**, however, this kind of therapy often is lengthy, money consuming and not always delivering significant effects. First results show only after 4-5 weeks of continuous regular application of two doses a day. Moreover, it is inevitable to combine the therapy with the application of high SPF sunscreens during the whole year in many cases, since individuals with hyperpigmentations show higher sensitivity to UV rays (4, 5, 7, 11, 12).

The **depigmenting ingredients used in topical preparations** include **hydroquinone derivatives**, lead (both hydroquinone and lead are forbidden in Slovakia, the Czech Republic and some other countries), **hydroquinone derivatives of plant origin** such as such as Arbutin – (Uva-Ursi extract), retinoids and the combinations thereof, such as plant hydroquinone combined with retinoids; procysteine, azelaic acid, phytic acid, kojic acid, beta-carotene, corticosteroids, tyrosinase inhibitors; stabilised vitamin C, arctostaphylos uva-ursi extract, Glycyrrhizinic acid, morus alba propylene glycol; niacinamide and rucinol (the application of which is very interesting) (11, 15, 16, 20).

The effect of the used therapeutic modalities is assessed clinically and objectively within clinical trials (photodocumentation, dermatoscopy, histological examination before and after therapy, Wood's lamp, colorimetry, Multi Skin Testers with photo sound and cameras, PC models) and statistically evaluated.

The aim of treating hyperpigmentations of the affected exposed parts of the skin (face, neck, décolleté, hand dorsae) is to eliminate or significantly reduce the undesired aesthetic and cosmetic problems. It is necessary that the procedure is minimum time consuming for the client. The selected method must be efficient, but at the same time comfortable, tolerable, non-painful, and must also improve the mental comfort of the

client, and have no undesired socioeconomic impact on their life (high price, inability to work).

The therapy plan to treat the affected localities is as follows:

- determine the aetiology of the hyperpigmentations,
- elaborate the individual therapy programme,
- choose the type and frequency of treatment sessions,
- make sure possible internal diseases are properly treated,
- change or discontinue contraceptives (in female patients).

Combined techniques in treating hyperpigmentations

It has been stated that the final efficacy of treating hyperpigmentations is potentiated by various combined techniques. These are performed in a sequence determined by the therapist, for example:

1. Microdermabrasion + depigmenting agent,
2. Hydroabrasion + depigmenting agent,
3. Peel + depigmenting agent,
4. Laser treatment + depigmenting agent.

Microdermabrasion combined with the application of a depigmenting agent

Main principle of the method

When treating hyperpigmentations, such as lentigo solaris or chloasma faciei, microdermabrasion is performed first on the day of applying the depigmenting agent, followed by another session every 10 days, altogether 4 to 6 times according to patient response. The depigmenting agent is applied from the first day of therapy 2 times a day at least during the period of 3 months. It is necessary to apply sunscreens not only during, but also after the application of the depigmenting agent.

Complications and adverse effects of combining microdermabrasion with a depigmenting agent are not known. It is recommended that a thorough anamnesis of the patient is determined, aimed at possible allergies and that epicutaneous testing is performed to test the depigmenting agent prior to long term application. In practice, great effects have been achieved with a product containing the extracts of Glycyrrhiza Glabra, Arctostaphylos Uva Ursi, and Aloe Vera (20).

Hydroabrasion combined with the application of a depigmenting agent (4, 20)

Main principle of the method

In treating hyperpigmentations such as chloasma faciei or lentigo solaris hydroabrasion is performed first on the first day of applying the depigmenting agent, followed by another session every 7 to 10 days, whereby 6 or 10 sessions must be performed according to therapeutic response. The depigmenting agent is applied from the first day of therapy 2 times a day at least during the period of 3 months. It is necessary to apply sunscreens also after the application of the depigmenting agent has been terminated.

Complications and adverse effects of combining hydroabrasion with a depigmenting agent are not known. It is recommended that a thorough anamnesis of the patient is determined, aimed at possible allergies and that epicutaneous testing is performed to test the depigmenting agent prior to long term application. Similarly to the previous method, great effects

have been achieved with a product containing the extracts of Glycyrrhiza Glabra, Arctostaphylos Uva Ursi, and Aloe Vera (20).

Chemical peel combined with the application of a depigmenting agent (4, 20)

Main principle of the method

When treating hyperpigmentations such as chloasma faciei or lentigo solaris a fine superficial peel is performed (for example with LHA or glycolic acid 70%) during the first treatment session. The depigmenting agent is applied always on day 4 to 6 post peel, after erythema and scaling have resolved, 2 times a day for at least 3 months. The peel is then reapplied at a 14 day interval altogether 3 to 5 times according to therapeutic response. It is necessary to apply sunscreens not only during the therapy, but also after the application of the depigmenting agent has been terminated.

No complications or undesired effects of combining superficial peels with the application of a depigmenting agent are known. In sensitive patients erythema may persist for up to 6 days post peel. It is therefore recommended to determine a thorough anamnesis of the patient aimed at allergies or perform a targeted epicutaneous testing of the planned depigmenting agent before long term application.

Laser treatment combined with the application of a depigmenting agent (1, 4, 20 26, 30)

Main principle of the method

Considering the fact that skin pigment absorbs the light of various wavelengths, there is a whole range of lasers effectively used to remove pigmentations or tattoos. Pigment specific lasers use the principle of selective photothermolysis – destruction of specific skin chromophores (melanin, haemoglobin) with minimal destruction of the surrounding structures. For a successful pigmentation reduction it is necessary to define its depth and select the appropriate type of pigment specific laser. Lasers with a shorter wavelength are suitable to treat superficial epidermal pigmentations, while long wavelength lasers are more effective in case of dermal pigmentations. Whereas in ephelides, lentigines, and café au lait spots the therapeutic effect of applying lasers (pulse dye, copper vapor, krypton, KTP, frequency-doubled Nd:YAG, QS ruby, QS alexandrite, QS Nd: YAG) the effect is described as good or very good, however, in treating melasma (apart from the mentioned lasers also with a CO₂ laser) the final effects are minimal. Pigmentations (especially melasma) removed with laser often repigment, the following application of sunscreens and long-term application of depigmenting agents is therefore inevitable, and so is the usage of some other therapeutic modalities (1, 3, 26-28, 30).

Combined techniques are used in aesthetic dermatology also in other indications such as rejuvenation, wrinkle reduction, and the reduction of atrophic and hypertrophic scars. Other very popular combinations include the application of botulinum toxin A, fillers, carboxytherapy, lipolysis, mesotherapy, PRP and others (5, 10).

Conclusion

Hyperpigmentations occurring especially on the face, neck and décolleté represent an unpleasant aesthetic problem and

in many cases also a mental burden to the patient. In case of unsatisfactory therapeutic results it is necessary to offer the patient appropriate counselling and instruct them in using camouflage products (13). In some cases substitution therapy is surprisingly effective, including the systemic administration of antioxidants (such as Pycnogenol, Coenzyme Q 10, flavonoids, vitamin C, etc.). The said antioxidants (if administered at least during 3 months) satisfactorily improve the quality of skin, which helps improve the mental comfort of the patient (6, 7, 11).

The stated possibilities of combining various techniques in reducing some types of hyperpigmentations are usable predominantly in Caucasians. The recommended therapeutic approaches (especially the application of depigmenting agents) are disputable in skin of colour. It is known that many Africans try to whiten their skin without medical supervision, using topical preparations containing lead, hydroquinone, or steroids,

which results in severe local and systemic complications ranging from contact dermatitis, nephropathy, mucocutaneous hyperpigmentations, exogenous ochronosis, and extensive fungal and bacterial infections, skin atrophy, depression, and even to immunotoxicity (8, 31-34)

It is the therapist to select the optimum method in order to achieve the desired therapeutic effect

Resume: In applying combined techniques it is very important to define which method must be performed first in order to achieve the desired final effect. When combining multiple techniques on the same day those must be performed in the right sequence!!! The main principle is that less is sometimes more and we should not select too many methods in the best interest of the patient.

Photodocumentation



Documentation: combined techniques – effects of microdermabrasion + depigmenting agent.

Patient 1 – lentigo senilis ramus madibularis l. sin

Fig. 1. Histological examination: slight papillomatosis, proliferated melanophores under the epidermis, striped lymphocyte infiltrate, basophilic corium degeneration (Pictures provided by M. D. Nejdakova)

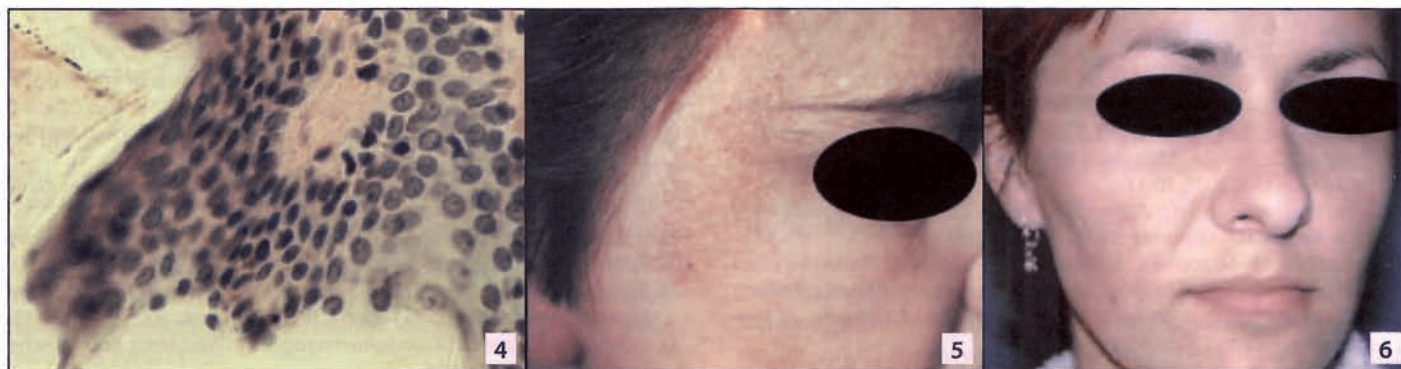
Ryc. 1. Badanie histologiczne: nieznaczna papilomatoza, proliferacja melanoforów pod naskórkiem wypełniona melaniną, pasma limfocytów, zasadochłonna degeneracja skóry właściwej (ryc. dzięki uprzejmości dr Nejdakovej)

Fig. 2. Condition before the application of combined techniques

Ryc. 2. Stan przed zastosowaniem terapii łączonej

Fig. 3. Condition after 6 microdermabrasion sessions (aluminium oxide crystals) and three months of applying the depigmenting agent

Ryc. 3. Stan po 6 zabiegach mikrodermabrazji (aluminium oxide crystals) i 3 miesiącach stosowania środka odbarwiającego



Documentation: combined techniques – effects of microdermabrasion + depigmenting agent.

Patient 2 – melasma faciei

Fig. 4. Histological examination: proliferated melanocytes present in the basal layer of the epidermis (Pictures provided by M. D. Nejdakova)

Ryc. 4. Badanie histologiczne: proliferujące melanocyty obecne w warstwie podstawnej naskórka (ryc. dzięki uprzejmości dr Nejdakovej)

Fig. 5. Condition before the application of combined techniques

Ryc. 5. Stan przed zastosowaniem terapii łączonej

Fig. 6. Condition after 7 hydroabrasion sessions and 3 months of applying the depigmenting agent

Ryc. 6. Stan po 7 zabiegach hydroabrazji i 3 miesiącach stosowania środka odbarwiającego



Documentation: combined techniques – effects of superficial peel + depigmenting agent.

Patient 3 – melasma faciei

Fig. 7. Histological examination: proliferated melanocytes present in the basal layer of the epidermis (Pictures provided by M. D. Nejdková)

Ryc. 7. Badanie histologiczne: proliferujące melanocyty obecne w warstwie podstawnej naskórka (ryc. dzięki uprzejmości dr Nejdkowej)

Fig. 8. Condition before the application of combined techniques

Ryc. 8. Stan przed zastosowaniem terapii łączonej

Fig. 9. Condition after three sessions of superficial chemical peel (LHA) and 3 months of applying the depigmenting agent

Ryc. 9. Stan po 3 zabiegach powierzchownego peelingu chemicznego (LHA) i 3 miesiącach stosowania środka odbarwiającego

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