

МЕТОДИЧЕСКИЙ ПОДХОД К ПЕРСОНАЛИЗИРОВАННОЙ НЕИНВАЗИВНОЙ КОРРЕКЦИИ ВОЗРАСТНЫХ ИЗМЕНЕНИЙ ЛИЦА В ЭСТЕТИЧЕСКОЙ КОСМЕТОЛОГИИ

Илюшина Оксана Юрьевна
BEAUTY LAB OXY, г. Розвилл, штат Калифорния, США

A METHODOLOGICAL APPROACH TO PERSONALIZED NON-INVASIVE CORRECTION OF AGE-RELATED FACIAL CHANGES IN AESTHETIC COSMETOLOGY

Oxana Ilyushina
BEAUTY LAB OXY, Roseville, CA, United States of America

АННОТАЦИЯ

В статье разработан методический подход к персонализированному выбору средств и методов неинвазивной коррекции возрастных изменений лица. В основу подхода положена оценка семи групп признаков по десятибалльной шкале, а именно дегидратации и нарушения барьерных свойств кожи, снижения эластичности, морщин и изменений рельефа, пигментации, отечности, изменений мягких тканей и овала лица, мышечного тонуса. Предложено формирование индивидуального косметологического профиля с выделением ведущих изменений и приоритетных направлений воздействия, что соответствует особенностям персонифицированного подхода в эстетической косметологии. Рассмотрено место глутатиона в антиоксидантно ориентированных и пигмент-корректирующих программах. По итогам исследования сформирован алгоритм выбора программы, включающий диагностику, проверку противопоказаний, оценку признаков, подбор методов и повторный контроль результата.

ABSTRACT

This article develops a methodological approach to the personalized selection of products and methods for non-invasive correction of age-related facial changes. The approach is based on the assessment of seven categories of age-related features on a

ten-point scale, namely, dehydration and impaired skin barrier properties, decreased elasticity, wrinkles and changes in skin texture, pigmentation, puffiness, changes in soft tissue and facial contour, and muscle tone. The proposed approach involves the development of an individualized cosmetological profile, highlighting key changes and priority areas of intervention, which corresponds to the specifics of a personalized approach in aesthetic cosmetology. The role of glutathione in antioxidant-focused and pigment-correcting programs is discussed. Based on the study's results, a program selection algorithm was developed, including diagnostics, contraindication screening, symptom assessment, method selection, and follow-up monitoring of results.

Ключевые слова: эстетическая косметология, старение кожи, возрастные изменения лица, персонализация, неинвазивная коррекция, глутатион, антиоксидантная система, косметологический профиль.

Keywords: aesthetic cosmetology, skin aging, age-related facial changes, personalization, non-invasive correction, glutathione, antioxidant system, cosmetological profile.

Introduction. Age-related facial changes develop under the combined influence of intrinsic aging, ultraviolet (UV) exposure, lifestyle factors, and individual biological characteristics. These changes typically affect the skin barrier, regenerative capacity, cellular interactions, and the structural components of the dermis, resulting in considerable interindividual variability in the severity of wrinkles, pigmentation, dehydration, edema, and facial contour changes, even among patients of the same chronological age [1]. It should be emphasized that selecting cosmetic procedures solely on the basis of age group or the patient's primary complaint limits the effectiveness of the correction strategy. A more rational approach involves a sequential process consisting of identifying the specific age-related feature, assessing its severity, establishing treatment priorities, selecting the appropriate therapeutic target, choosing a suitable non-invasive intervention, and evaluating treatment

outcomes. This framework makes it possible to address the combined effects of multiple age-related changes while ensuring that each intervention is aligned with a clearly defined corrective objective.

The aim of this study is to develop a methodological approach to the personalized non-invasive correction of age-related facial changes based on an individualized cosmetological profile of the patient.

Methodology. This study is primarily theoretical and methodological in nature. The research methodology included the analysis of scientific literature, the systematization of age-related facial changes, the classification of non-invasive methods according to their therapeutic targets, and matrix-based matching of age-related features with correction objectives. It should be emphasized that the proposed approach is intended for cosmetological assessment and does not replace the medical diagnosis of skin diseases or other pathological conditions.

To construct the individualized cosmetological profile, seven assessment parameters were identified:

- S_1 – dehydration and impaired skin barrier function;
- S_2 – reduced skin elasticity;
- S_3 – wrinkles and skin texture changes;
- S_4 – pigmentation changes;
- S_5 – edema and signs of microcirculatory impairment;
- S_6 – changes in the soft tissues and facial contour;
- S_7 – changes in muscle tone.

Each parameter is assessed on a scale from 1 to 10, with higher scores consistently indicating greater severity of the corresponding age-related feature. The overall severity of age-related facial changes is calculated using the following formula:

$$S^- = \frac{\sum_{i=1}^n S_i}{n},$$

where S_i is the score assigned to the i -th assessment parameter; n is the total number of assessed parameters, $n=7$.

The composite score S^- is used to evaluate the overall condition and monitor changes over time. Priority areas for correction are determined based on the individual values of S_i , thereby preventing situations in which the mean score masks the presence of one or more markedly pronounced age-related features.

Following completion of the treatment course, the relative change in the composite score is calculated as follows:

$$D = \frac{S_{before}^- - S_{after}^-}{S_{before}^-} \times 100\%,$$

where D is the relative change in the severity of age-related features (%), S_{before}^- is the mean score before implementation of the treatment program, and S_{after}^- is the mean score after its completion.

Results and discussion. Facial aging is accompanied by changes in the skin, subcutaneous tissues, and the functional state of facial muscles. At the skin level, the most significant alterations include dehydration, reduced elasticity, wrinkles, and changes in skin texture and tone, whereas the condition of the soft tissues largely determines the definition of the facial contour. Differences in the age-related changes affecting the skin, fascial structures, and muscles support the need to assess these components separately [2]. Consequently, visually similar manifestations in different patients may arise from distinct underlying mechanisms.

Therefore, for the purposes of aesthetic correction, age-related facial changes should be considered across several distinct domains. This approach makes it possible to assess the severity of each individual feature and determine its place within the patient's individualized cosmetological profile.

Age-related changes in the dermis are primarily associated with fibroblast dysfunction, cellular senescence, alterations in the extracellular matrix, and the effects of reactive oxygen species. Oxidative stress contributes to the disruption of collagen synthesis and degradation, thereby affecting skin firmness, texture, and overall skin quality [3]. A simplified representation of this process is shown in Figure 1.

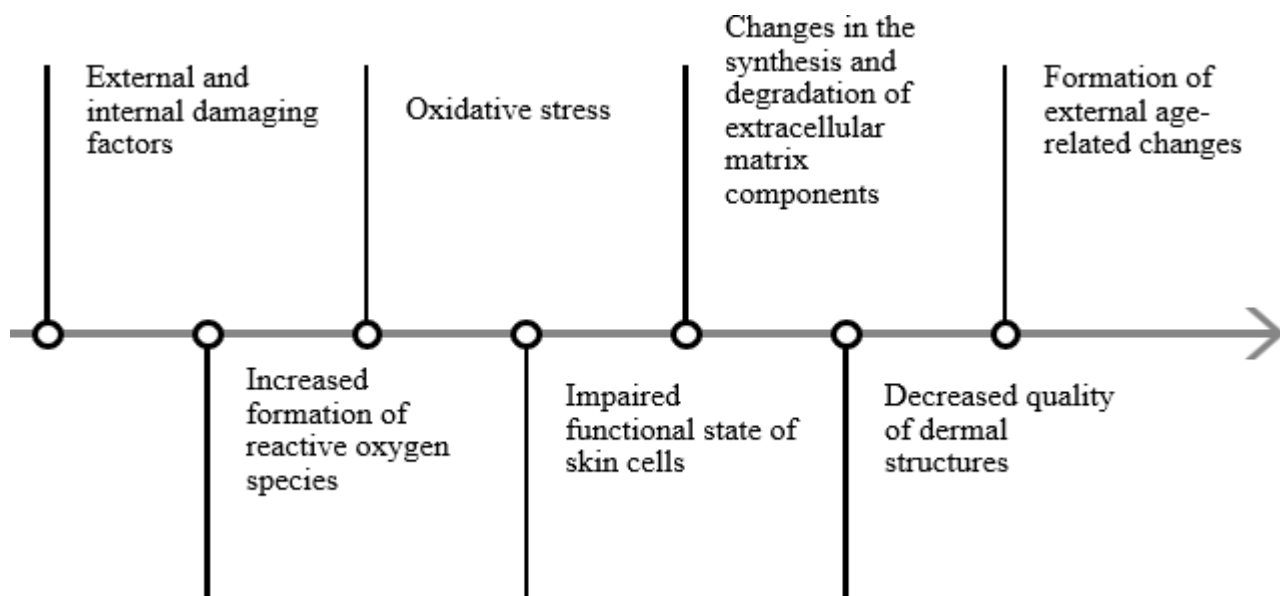


Figure 1. Process of age-related dermal changes.

It should be emphasized that the antioxidant defense system plays an important role in this process by limiting the damaging effects of free radicals and maintaining the cellular redox balance. One of its endogenous components is glutathione, which is of particular interest in aesthetic cosmetology because of its antioxidant properties and its involvement in processes associated with melanogenesis.

Glutathione contributes to the antioxidant defense of cells and the maintenance of intracellular redox homeostasis. A clinical study evaluating the reduced and oxidized forms of glutathione assessed the melanin index together with selected biophysical skin parameters. Changes observed in several of these parameters support the potential inclusion of glutathione in antioxidant support strategies and in the correction of selected visible signs of skin aging [4].

The potential effect of glutathione on pigmentation disorders is also noteworthy. A systematic review of glutathione use for hyperpigmentation and melasma indicates that evidence is available for both topical and oral formulations, while also highlighting the heterogeneity of the existing evidence base [5]. Therefore, the inclusion of glutathione in a treatment program should be based on careful consideration of the clinical indications, route of administration, safety profile, and expected therapeutic outcomes.

Within the proposed methodological framework, glutathione should primarily be considered in patients with a pronounced pigmentation component, signs of photoaging, and a need for antioxidant support. It represents one of the possible elements of a comprehensive treatment program and should be selected based on the patient's overall individualized cosmetological profile.

It should be noted that the selection of specific procedures should be guided by the intended therapeutic target. Therefore, each identified age-related feature should be linked to a corresponding treatment objective (Table 1).

Table 1. Classification of non-invasive methods for the correction of age-related facial changes.

Treatment direction	Primary objective	Examples of treatment methods
Barrier restoration and hydration	Reduction of dehydration and maintenance of skin barrier function	Topical moisturizers and barrier-repair products; skincare programs
Antioxidant therapy	Reduction of the effects of oxidative stress	Topical antioxidant products; glutathione-containing formulations
Pigmentation correction	Reduction of hyperpigmentation	Depigmenting agents; approved light-based therapies
Dermal stimulation	Improvement of the condition of dermal structures	Radiofrequency, light-based, laser, and ultrasound technologies
Microcirculatory support	Reduction of tissue congestion and edema	Device-based and manual techniques in the absence of contraindications
Muscle tone correction	Improvement of the functional state of facial muscles	Microcurrent therapy and other approved electrophysiological modalities

Energy-based technologies differ in their depth of tissue penetration and the magnitude of the thermal effect they produce. Careful control of thermal exposure is essential to achieve the desired therapeutic outcome while minimizing the risk of tissue damage [6]. Therefore, a high score for a particular age-related feature indicates the priority of the corresponding treatment direction but should not, by itself, serve as the basis for selecting an energy-based procedure.

When developing an individualized treatment program, consideration is given to the patient's chronological age, skin type and phototype, skin sensitivity, the severity of wrinkles, pigmentation, dehydration, and edema, the condition of the soft tissues, facial contour characteristics, and muscle tone. In addition, previously performed procedures, tolerance to cosmetic products, the presence of contraindications, and the patient's expected treatment outcomes are also taken into account.

The patient's age is considered a background characteristic, as primary importance is assigned to objectively identified age-related features and their severity. This approach is consistent with the concept of skin quality as a combination of independent characteristics, including the uniformity of skin tone and surface, elasticity, and overall visual appearance [7]. To provide a quantitative assessment of age-related facial changes, the following grading scale was developed (Figure 2):

Score	Severity	Assessment criterion
1	Minimal	The sign is absent or can be detected only during a targeted examination; it has virtually no effect on appearance
2	Minimal to mild	Manifestations slightly exceed the minimal level and are noticeable upon careful examination
3	Mild	The sign is consistently detectable, localized to a limited area, and has a minor effect on appearance
4	Mild, approaching moderate	The change is noticeable under normal conditions but is not yet considered one of the leading signs
5	Moderate	The sign is clearly detectable and requires separate consideration when developing the correction program
6	Moderate to significant	Severity exceeds the average level; the change begins to substantially influence the selection of priority procedures
7	Pronounced	The sign is clearly visible and is considered one of the leading factors when developing the correction program
8	Highly pronounced	The change has a substantial effect on appearance and requires priority correction
9	Severe	The sign approaches the maximum level of severity and substantially determines the patient's cosmetological profile
10	Maximally pronounced	The change is extremely pronounced, has a significant effect on appearance, and requires careful assessment of its causes, the appropriateness of correction, and safety considerations

Figure 2. Reference criteria for assessing the severity of age-related facial changes using a 1–10-point scale.

The same scale orientation is used for all assessment parameters, with a score of 1 indicating minimal severity of the age-related feature and a score of 10 indicating its maximum severity.

The composite scores are interpreted as follows:

- 1.0 – 3.0 points: low overall severity of age-related changes;
- more than 3.0 up to 5.0 points: moderate severity;
- more than 5.0 up to 7.0 points: considerable severity;
- more than 7.0 up to 10.0 points: pronounced severity.

The composite score is used to characterize the patient's overall condition. The priority of treatment procedures is determined based on the individual scores of parameters $S_1 - S_7$.

Thus, the proposed methodological approach comprises a sequence of several stages (Figure 3).

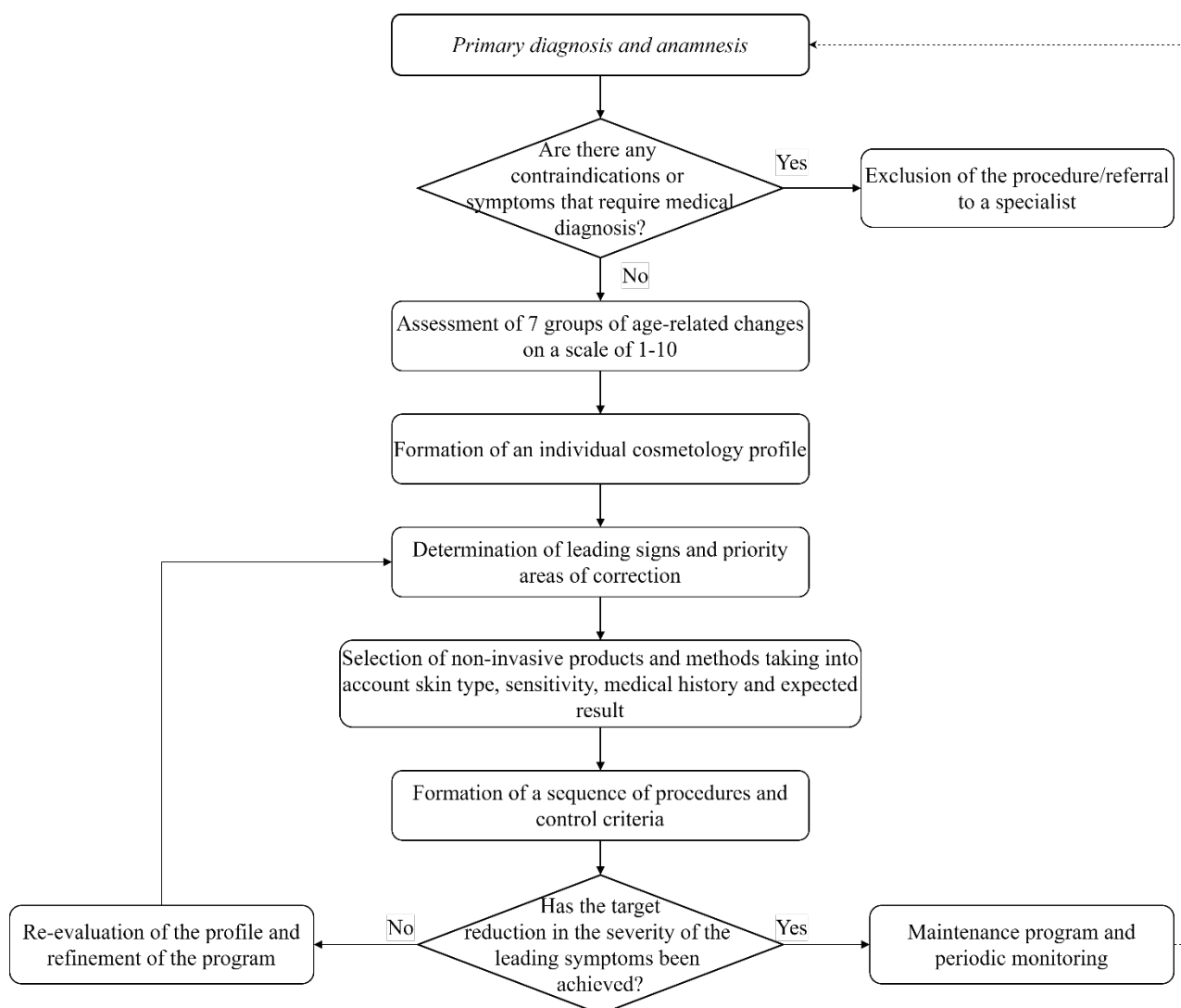


Figure 3. Algorithm for the personalized selection of a non-invasive treatment program for age-related facial changes.

Within the proposed algorithm, the patient's medical history is collected and an initial assessment of the condition of the facial skin and soft tissues is performed. Information regarding previously performed procedures, cosmetic products used, skin sensitivity, and potential contraindications is also obtained. Subsequently, the seven identified categories of age-related changes are evaluated using the established grading scale. The resulting scores form the patient's individualized cosmetological profile (Figure 4).

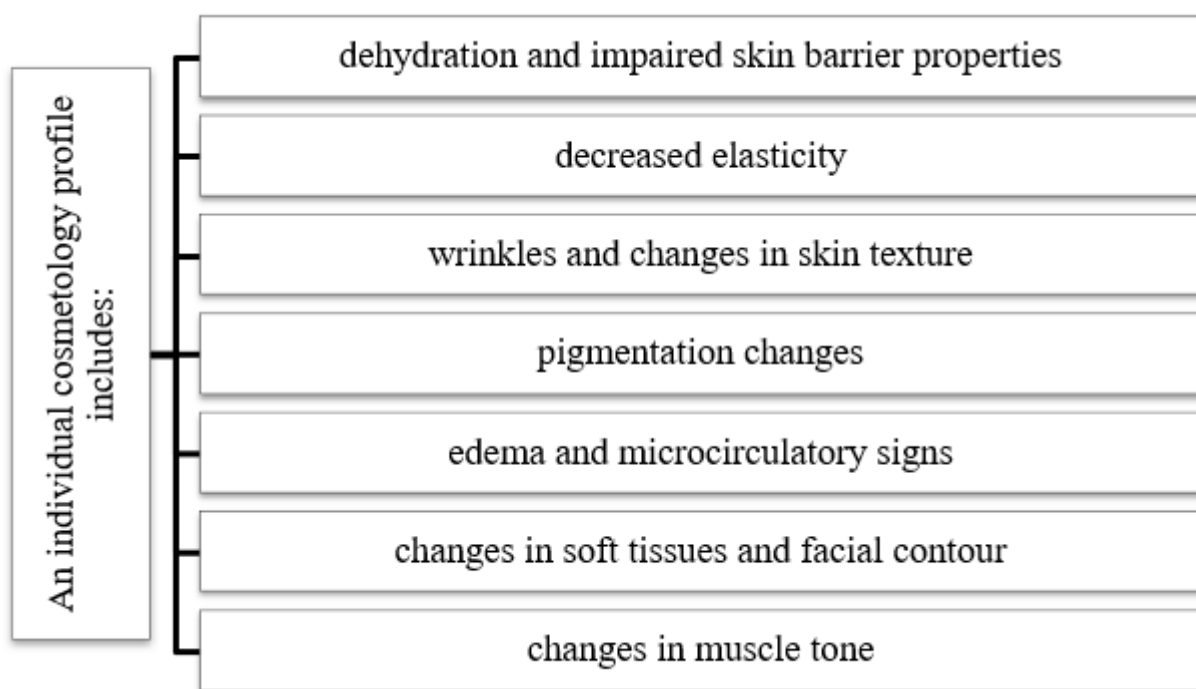


Figure 4. Formation of the patient's individualized cosmetological profile.

Subsequently, the identified age-related changes are prioritized. Parameters with the highest scores are considered the primary treatment priorities, whereas if several features demonstrate the same level of severity, multiple priority treatment directions are established. A corresponding therapeutic objective is assigned to each primary age-related feature, followed by the selection of appropriate treatment methods and procedures. The individualized treatment program is then implemented. Upon completion of the prescribed treatment course, a repeat assessment is performed using the same grading scale and under comparable conditions. If the target outcomes

have been achieved, a maintenance program and a follow-up schedule are developed for the patient. If the observed improvement is insufficient, the individualized cosmetological profile is reassessed, after which the selected treatment methods or their sequence are refined.

An essential requirement for the personalized selection of treatment methods and procedures is their safety. Contraindications are assessed before the final treatment program is established. Particular attention should be paid to the route of administration of active ingredients.

Conclusion. The present study substantiated a methodological approach to the personalized non-invasive correction of age-related facial changes based on the sequential assessment of the condition of the skin, soft tissues, and muscle tone, taking into account the individual severity of the identified age-related features. This approach makes it possible to develop an individualized cosmetological profile for each patient, identify the primary age-related changes, and establish priority treatment directions.

References:

1. Li R. Skin aging: mechanisms, evaluation, and rejuvenation / R. Li, J. Zhang, K. Mao, D. Meng, J.-D. J. Han // *The EMBO Journal*. – 2026. – Vol. 45. – P. 4792–4819. – DOI 10.1038/s44318-026-00810-3.
2. Frank K. Understanding the Interplay Between Skin, Fascia, and Muscles of the Midface in Facial Aging / K. Frank, N. Moellhoff, N. Engerer [et al.] // *Aesthetic Plastic Surgery*. – 2024. – Vol. 48, No. 18. – P. 3568–3576. – DOI 10.1007/s00266-024-04070-6.
3. Shin S. H. Skin aging from mechanisms to interventions: focusing on dermal aging / S. H. Shin, Y. H. Lee, N.-K. Rho, K. Y. Park // *Frontiers in Physiology*. – 2023. – Vol. 14. – Art. 1195272. – DOI 10.3389/fphys.2023.1195272.
4. Weschawalit S. Glutathione and its antiaging and antimelanogenic effects / S. Weschawalit, S. Thongthip, P. Phutrakool, P. Asawanonda // *Clinical*,

Cosmetic and Investigational Dermatology. – 2017. – Vol. 10. – P. 147–153. – DOI 10.2147/CCID.S128339.

5. Sarkar R. Glutathione as a skin-lightening agent and in melasma: a systematic review / R. Sarkar, V. Yadav, T. Yadav, P. Janaani, I. Mandal // International Journal of Dermatology. – 2025. – Vol. 64, No. 6. – P. 992–1004. – DOI 10.1111/ijd.17535.

6. Jia X. Energy-Based Skin Rejuvenation: A Review of Mechanisms and Thermal Effects / X. Jia, Y. Feng // Journal of Cosmetic Dermatology. – 2025. – Vol. 24, No. 2. – Art. e16657. – DOI 10.1111/jocd.16657.

7. Goldie K. Skin Quality – A Holistic 360° View: Consensus Results / K. Goldie, M. Kerscher, S. G. Fabi [et al.] // Clinical, Cosmetic and Investigational Dermatology. – 2021. – Vol. 14. – P. 643–654. – DOI 10.2147/CCID.S309374.