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New Integrative Approach in Anti-Aging and Aesthetic Medicine

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ABSTRACT

Aging is manifested in the form of extinction of a number of vital processes, including those reflected in the external appearance of a person. Until recently, anti-aging and aesthetic medicine were considered as different medical specialties. Now they are united in the direction of anti-aging and aesthetic medicine. The popularity of physiotherapy in the practice of modern anti-aging and aesthetic medicine, as well as medicine in general, is significantly lower than pharmacotherapy. Due to the characteristics of innervation, the facial area is one of the most powerful reflexogenic zones. Therefore, physiotherapeutic influences carried out in this area a priori can not only eliminate involutional changes in facial tissues, but also serve the purposes of general recovery, prevention and treatment. One of the physiological physiotherapeutic procedures with a mobilizing effect on the adaptive reserves of the body is dynamic electro neuro stimulation, used in aesthetic medicine. The skin, like the body as a whole, can function normally only within a narrow range of concentrations of essential trace microelements. To prevent and correct various metabolic disorders of microelements involved in all known vital processes, the medical technology of spectral phototherapy is widely used. It has a wide range of indications for use, including aesthetic medicine. The present article substantiates the feasibility of the complex use of dynamic electro neuro stimulation and spectral phototherapy to eliminate aesthetic defects caused by age-related changes in the skin and restore the functional reserves of the body. The relevance of the study is due to obvious tendencies in the increased use of non-surgical cosmetic procedures in aesthetic medicine, as well as the fact that combination of different types of physiotherapy has greater therapeutic efficacy compared to mono factor effects. The article presents the results of a combined method of exposure to dynamic electro neuro stimulation and spectral phototherapy, sequentially realized on the face. As a result of this method, the data were obtained on a complex correction of not only aesthetic defects caused by age-related changes in the skin, but also the restoration of the functional reserves of the body, the state of which is an objective assessment of the individual's health. The results were confirmed by psychometric and instrumental diagnostic methods.

KEYWORDS

Anti-aging and Aesthetic medicine; Integrative medicine; Dynamic electro neuro stimulation; Spectral phototherapy; Facial aesthetic defects; Age-related skin changes; Functional reserves of the body

INTRODUCTION

Aging cannot be considered as a disease; therefore, it cannot be treated, but age-related changes in human adaptive mechanisms can be optimized [1]. Aging is a systemic process, manifested in changes in appearance, impaired activity of various organs and a decrease in the functional reserves of the body. Therefore, anti-aging medicine should be based on an integrative systems

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approach [2,3]. An example of an integrated approach in anti-aging medicine is the consensus statement adopted at the XXI World Congress of the International Association of Gerontology and Geriatrics on the confluence of anti-aging and aesthetic medicine - AA & AM. The measures taken should provide a combination of correction of cosmetic defects with the restoration of human adaptive capabilities, thus eliminating the previously established distinction between aesthetic and anti-aging medicines [4].

In modern practice of both AA & AM and medicine as a whole the use of pharmaceuticals dominates, most of which are characterized by local targeted action, not able to solve the complex problems of an aging organism. According to WHO, iatrogenicity occurs in 20% of patients and makes up 10% in the structure of hospital mortality. A significant proportion of iatrogenic pathology results from side effects of drug therapy, which are recorded in 10% - 20% of hospital patients [5]. The article published in 2013 [6] states that over the past 35 years, patients suffered from mainly hidden epidemic of side effects from pharmacological drugs, which has led to an increase in the number of hospitalizations and deaths. Professor Donald Light claims that 85% of new drugs have a minimum, if any, beneficial effect1. All the above mentioned determine the relevance of the wider use of physiotherapy methods.

Physiotherapeutic methods in modern AA & AM are rather scarce [7]. As of May 12, 2020, only 16 publications were found in the PubMed database at the request “physiotherapy in anti-aging medicine”, 4 of which date back to 2020. In the Russian Federation, besides a number of articles, books and methodological recommendations on the use of physiotherapy in AA & AM were published [8-10]. Modern physiotherapy is focused on the combined use of various factors, which provides a mutual enhancement of the therapeutic effect of each of them [11-14].

Any therapy should correspond to the current state of the patient. Compliance with this principle requires constant correction of the parameters of the physical factors used. Dynamic electro neuro stimulation (DENS) is a method of percutaneous electro neuro stimulation, which consists in exposure to electric current pulses, the shape of which is automatically transformed in accordance with changes in the surface impedance of the skin. DENS influences the neurohumoral and hormonal systems of the body responsible for adaptive-trophic processes. This allows to consider DENS as a personalized activation therapy, which provides a wide range of indications for its use [15,16]. There is a positive experience of DENS use in aesthetic medicine [17].

DENS devices include universal and specialized devices. For cosmetology purposes, the DiaDENS-Cosmo apparatus is proposed, which is a mask internally covered with a conductive layer that connects to a small-sized pulse generator. Under the electrode mask, three types of tissue masks saturated with conductive solutions are applied: nourishing, moisturizing or anti-aging, differing in composition. Thus, two types of physiotherapeutic effects are realized: percutaneous electro neuro stimulation and electrophoresis of biologically active substances contained in a wet mask. DiaDENS-Cosmo apparatus use is limited mainly to the elimination of cosmetic defects. To achieve the combined elimination of age-related or stress-related cosmetic defects of the face and the restoration of the functional reserves of the body, it is advisable to use DENS devices equipped with built-in and remote electrodes that can be used for massage. Thus, three types of therapeutic and prophylactic effects are realized:

1) percutaneous electro neuro stimulation,
2) electrophoresis of physiologically active substances,
3) facial massage.

Correction of manifestations of aging is impossible without the full provision of the body with essential trace elements (ETE). ETE deficiency is a common premorbid

background of a wide range of diseases that accompanies all stages of their pathogenesis [18,19].

The technology of spectral phototherapy (SFT) uses a fundamentally new physical factor for medical practice - the linear spectrum of chemical elements emitted by a hollow cathode discharge lamp. The required composition of the radiation spectrum is formed by introducing the necessary chemical elements into the cathode, as a result spectral lines are always present in the general spectrum. The apparatus complex "SPECTO-R" is a set of light sources with various linear emission spectra. SFT is registered in the Russian Federation and introduced into the State Register of medical devices and medical equipment - registration certificate No. ФСР 2010/09706, there is permission to use this technology - ФС No. 2010/120. Each hollow cathode lamp emits its own strictly defined spectrum in the range from 190 nm to 852 nm. Unlike most physiotherapy methods, SFT is not associated with mechanical and thermal effects on tissues and refers to therapeutic factors of low intensity [20,21].

The results of clinical studies showed that SFT is more or less effective for the regulation of all major homeostatic systems, as a result it can be effectively used for the treatment and prevention of a variety of diseases, especially in cases where it is not possible to correct ETE imbalance using special diets or their per use. A hollow cathode lamp designed for dermato cosmetology is patented. It emits spectral lines in the range of 300 nm - 800 nm, characteristic of 11 chemical elements: K, Ca, Mg, Na, Mn, Cu, Zn, Fe, Si, Se, Pt, necessary to maintain skin normal indicators of the morpho functional parameters and prevent its premature aging. The anti-inflammatory and regenerative effect of SFT allows it to be recommended for use in involutional skin changes [22,23].

The above literature data initiated the hypothesis of the appropriateness of DENS and SFT combined use in AA & AM. To confirm it our own studies were performed.

MATERIALS AND METHODS

90 women within the age from 40 years to 50 years old were examined. They applied for medical aid due to dissatisfaction with their appearance. The study included 2 stages: 1) separate application of DENS and SFT; 2) their combined use. In the first and second stages, 50 women were examined and treated. They were divided into 2 groups of 25 persons each. 40 persons underwent complex DENS & SFT procedures. Complaints of women from all groups were the same: dryness, peeling of the face skin, wrinkles in the eye area, nasolabial folds, forehead, and increased body fatigue. Both in separate and complex DENS & SFT use the duration of the procedures was 15 minutes for DENS and 20 minutes for SFT, the duration of the complex DENS & SFT procedure was 35 minutes. The observation period ranged from 8 days to six months. The effectiveness of separate and combined DENS & SFT use was evaluated using subjective and objective methods.

Subjective assessments of changes in the appearance of the patient's face were done according to the Global Aesthetic Improvement Scale (GAIS) scale, containing 7 points: 0 - no change, and 3 grades of appearance improvement (from +1 to +3) or deterioration (from -1 to -3) [24]. To assess the general condition of the patient, the national questionnaire of well-being, activity, and mood - health activity mood (HAM), containing a scale from 1 - worse than nowhere to 5 - an excellent and Russian-language version of the short questionnaire for general quality of life SF-36 [25] were used.

An objective assessment of the condition of the face skin was carried out with an Aramo SG dermatoscope, which allows to fix 8 main parameters of the skin condition. The apparatus software ranks the measured parameters

and presents them in conventional units in the form of the octagon radii length. The tension levels of the body functional reserves (BFR) of the patients were assessed according to the indicators of cardio intervalography according to Baevsky RM in the modification of the traffic light type health assessment system [26].

3. RESULTS

The comparative effectiveness of DENS, SFT and DENS & SFT separate and combined use according to the subjective assessments of patients is presented in (Table 1 - Table 3).

No. of procedures (number of patients)	GAIS scores in the "DENS" group			
	0	+1	+2	+3
1 (n = 25)	2	4	5	8
2 (n = 6)	-	-	2	4
3 (n = 6)	-	-	2	3
GAIS scores in the "SFT" group				
1 (n = 25)	18	7	-	-
2 (n = 25)	10	13	2	-
3 (n = 25)	6	14	5	-
GAIS scores in the "DENS & SFT" group				
1 (n = 40)	-	8	32	40
2 (n = 20)	-	-	15	5
3 (n = 15)	-	-	5	10

Table 1: GAIS self-assessment of facial enhancement under the influence of DENS and SPT procedures.

Scales	DENS (n = 25)		SFT (n = 25)		DENS & SFT (n = 40)	
	1	2	1	2	1	2
H	3.31 ± 0.12	4.20 ± 0.11*	3.34 ± 0.13	3.94 ± 0.10	3.30 ± 0.15	4.90 ± 0.10*
A	3.06 ± 0.14	4.80 ± 0.10*	3.08 ± 0.14	4.05 ± 0.12	3.05 ± 0.13	4.05 ± 0.12*
M	2.93 ± 0.12	4.86 ± 0.11*	3.00 ± 0.11	3.89 ± 0.13	2.95 ± 0.15	4.59 ± 0.10*

Table 2: Changes in HAM test indicators under the influence of procedures DENS, SFT and DENS & SFT.
Note: Designations - 1: Before; 2: After the procedures, *: Significance of differences ($p \leq 0.05$).

Scales	DENS (n = 25)		SFT (n = 25)		DENS & SFT (n = 40)	
	1	2	1	2	1	2
PCH	45.2 ± 24	48.9 ± 2.0	46.7 ± 2.5	47.8 ± 2.9	46.2 ± 1.9	52.9 ± 1.6*
PF	46.3 ± 29	47.0 ± 2.4	46.8 ± 2.3	47.0 ± 2.5	46.5 ± 2.5	59.1 ± 2.3**
RPF	39.5 ± 35	45.5 ± 2.8*	40.0 ± 2.2	41.9 ± 2.3	39.9 ± 2.7	58.6 ± 4.9**
P	19.6 ± 34	16.2 ± 1.5	18.9 ± 2.9	15.8 ± 2.0	19.2 ± 2.5	10.1 ± 2.1*
GHS	49.5 ± 41	52.4 ± 2.3	50.0 ± 3.9	51.9 ± 1.9	50.2 ± 2.7	58.9 ± 4.2**
PCH	30.0 ± 29	42.5 ± 2.5*	29.8 ± 3.0	32.4 ± 1.7	31.0 ± 3.0	54.2 ± 2.6**
E	50.9 ± 45	53.4 ± 3.1	49.5 ± 3.0	52.3 ± 2.7	51.1 ± 4.0	62.6 ± 4.5**
SF	323 ± 49	46.8 ± 3.0*	33.2 ± 3.5	35.8 ± 2.9	33.1 ± 3.4	65.6 ± 6.5**
REF	357 ± 35	44.2 ± 2.5*	36.0 ± 2.5	39.0 ± 2.8	36.2 ± 5.4	69.7 ± 8.35**
MH	501 ± 37	52.0 ± 1.9	52.2 ± 2.4	53.4 ± 2.5	52.5 ± 5.4	71.7 ± 3.07**

Table 3: Indicators of the general quality of life questionnaire before (1) and after (2) procedures of DENS, SFT and DENS & SFT.
Note: *Significance of differences ($p \leq 0.05$), **($p \leq 0.01$). Scales SF-36; PCH: Physical Component of Health; PF: Physical Functioning; RPF: Role-Playing Physical Functioning; P: Pain Intensity and Its Effect on Daily Activities; GHS: General Health Status; PCH: Psychological Component of Health; E: Energy; SF: Social Functioning; REF: Role Emotional Functioning; MH: Mental Health.

Table 1 - Table 3 shows that the DENS & SFT procedures are more effective than their separate application. This conclusion is confirmed by the results of the objective methods for assessing the condition of the face skin, presented in Figure 1.

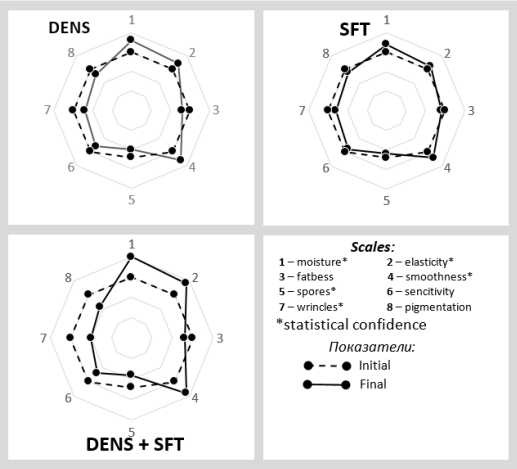

Figure 1: Shows that DENS has a significantly more pronounced positive effect on the facial skin basic characteristics.

At the same time, distinct positive changes in the indices were registered in 13 patients of 25 patients from the DENS group after the first procedure, and in all 25 patients after the second. In the SFT group the tendency for patients' appearance improvement was observed only after three procedures. The same data were obtained when determining BFR tension levels, presented in Table 4.

Points	DENS (n = 25)		SFT (n = 25)		DENS&SFT (n = 40)	
	before	after	before	after	before	after
1	-	4	-	-	-	6
2	-	12	-	4	-	14
3	4	6	3	6	5	5
4	10	2	4	7	9	-
5	6	1	2	3	4	-
6	1	-	1	1	2	-
7	1	-	-	-	2	-

Table 4: Changes in BFR tension levels with DENS and SFT separate and complex use.

Table 4 shows that under DENS procedure influence, in 64% of patients BFR tension levels became optimal (1) and normal (2), in 24% - moderate, pronounced and sharply expressed BFR were recorded in 12%, and BFR overstrain levels ceased to be recorded. In 100% of

patients receiving DENS & SFT procedures, BFR levels were in the optimal to moderate range.

4. DISCUSSION

Over the past 20-years, AA & AM has acquired the status of a separate healthcare sector. There is a tendency to refuse surgical interventions and use minimal or non-invasive cosmetic procedures. Patients of all ages choose soft tissue augmentation, either as a precursor or as a substitution for surgery. There is a tendency to use injectable drugs in younger patients (aged 35 years - 50 years). Patients refer to medical aid beginning from the correction of fine wrinkles in young people to the restoration of tissue volume in the elderly [27]. In modern aesthetic medicine, injection methods are widely used, botulinum toxin introduction is most common. In botulinum therapy, the resulting muscle relaxation occurs after some time and repeated injections are required to correct wrinkles. Also, after the therapy, undesirable effects are possible: headaches, soft tissue ptosis, and blepharospasm. 3% - 5% of the population have botox resistance [28]. Botulinum therapy can be recognized as a pathogenetically substantiated method only regarding facial wrinkles correction.

The injection drugs to restore and maintain skin hydraulic reserve, and restructure extracellular matrix of the dermis is a more pathogenetically substantiated method for the correction of involutional changes in the face. In 2001, the term "biorevitalization" appeared, which implies the intradermal administration of drugs, the only or one of the components of which is native hyaluronic acid. Biorevitalization improves the appearance of the skin by improving its structure and function. Injection methods for the correction of age-related aesthetic deficiencies also include the introduction of dermal filler volumetric based on modified hyaluronic acid. The use of any injection methods is often accompanied by swelling of the soft tissues, hematomas, soreness and erythema at the injection site. Also, the occurrence of inflammatory reactions, granulomas, trophic disturbances and soft tissue necrosis caused by compression or embolization of the vessel in the areas of injection contour plasticity is not excluded. A large number of patients are reluctant to agree to painful injections.

Aging is a systemic process, manifested not only in changes in appearance, but also in impaired activity of various organs and a decrease in the functional reserves of the body. Therefore, AA & AM medical technology must have a polypotent effect and focus not only on improving the appearance of a person, but also on optimizing the functioning of the whole organism. Modern physiotherapeutic technologies correspond to these requirements. The face reflects the individuality of a person and can serve as a source of information about the general condition of the body. A number of facial characteristics can serve to differentiate psychosomatic conditions and prognostic signs of a possible pathology. A mathematical model of the relationship of a number of genetic markers with the characteristic features of an individual’s face has been developed [29]. Structural features of the face correlate with some psychological characteristics of a person [30].

In the 1930s, Wilder Graves Penfield established projection zones of the cerebral cortex, which represent various parts of the body that later became known as the Penfield Homunculi. The largest area of these zones, approximately one third of the territories, is occupied by the face and hands. The neurophysiological mechanisms of somato-visceral interactions at the thalamic and cortical levels began to be actively studied in the middle of the last century. A significant contribution to the development of this problem was made by prof. Durinyan RA and his colleagues, first the employees of laboratories of the subcortical brain structures of the Institute of Normal and Pathological Physiology of the Academy of Medical Sciences, and then the Central

research institute of reflexotherapy. These studies showed that visceral afferent projections in all examined brain structures are located in the area of representation of somatic systems and overlap widely with them. Many trigeminal afferents terminate on the neurons of the vagus and glossopharyngeal nerves which realize the efferent innervation of the internal organs, as well as on the numerous neurons of the reticular formation that form various visceral centers. Activation of these reflex systems results in complex reactions of the body, in which all the main system of the body is involved.

The increased tone of facial muscles is one of the stress manifestations [31]. Neurotic and affective disorders are especially pronounced in hypertonicity m. masseter, m. orbicularis oris, m. depressor anguli oris and m. corrugator [32], on which projections structural changes in the skin are most obvious.

Despite significant differences in the number and localization of topographic representations of body parts and internal organs on the face, it is noted that their stimulation has a positive effect on both the appearance and the state of human health [33]. The existing atlases of biologically active zones and points on the face differ significantly in both number and topography requiring standardization [34]. As like the auricle, the scientific basis for such standardization should be information about the projections of somatic and visceral sensitivity, due to their representation in the structures of the central nervous system. In the aspect of the facial mini-acupuncture system, these are primarily the central connections of the trigeminal and facial nerves, and also the autonomic innervation of the face. It is noteworthy that in many representative areas of the face, negative manifestations associated with diseases of the body or concerning age-related changes in facial tissues are most often located. The information provided is a neurophysiological substantiation of the therapeutic and prophylactic effects of physical factors on the facial area.

In a number of works it was proved that the combined use of various methods of physiotherapy significantly exceeds the effectiveness of their separate use. The combined use of laser biorevitalization and micro currents for the correction of signs of facial skin photo aging is much more effective in improving skin quality characteristics than the isolated use of the components of the method, which leads to a decrease in skin pH, increased moisture and elasticity, normalization of sebum secretion, and determines the restoration of the main skin functions [35]. The publications [36,37] present the positive results of cholinomimetic galantamine electrophoresis in combination with micro current and multichannel electrical stimulation in the treatment of patients with acne and patients after plastic surgery to eliminate cosmetic defects in the form of senile skin atrophy of the II and III degree, including complicated facial neuropathy. This complex technology activates lymphatic drainage, thus enhancing the clinical effect of the treatment, improving microcirculation, humoral and cellular immunity, and optimizing the autonomic regulation and condition of the gastrointestinal tract.

The combined DENS & SFT physiotherapeutic method, the results of which are presented in the article, is an innovative technology that provides an integrative approach in AA & AM. DENS affects smooth muscle of arterioles, normalizes the tone of the vascular wall, improves microcirculation, provides anti-edema and lymphatic drainage effects, and possibility of electrophoresis of substances that have a beneficial effect on the skin and nearby tissues, significantly improving the effectiveness of the procedure [38]. The high efficiency of DENS is indicated for a variety of diseases and pathological conditions, and is considered as a variant of personalized activation electrotherapy [39].

Correction of aging manifestations is impossible without a full supply of essential microelements. Their deficiency

is a common premorbid background of a wide range of diseases and accompanies all stages of their pathogenesis. Replenishment of macro- and micronutrients deficiency in the body is usually solved by their per os use, and in aesthetic medicine by topical application or intradermal injections. However, these ways of administration are not always effective in terms of normalizing their metabolism, which leads to the development of new approaches to its correction. A complementary and sometimes alternative technology for these methods is spectral photopheresis of microelements, which is based on the use of a linear spectrum of chemical elements emitted by a hollow cathode lamp [40].

DENS and SFT combination correspond the principle of an integrated approach to the problem of anti-aging medicine. DENS & SFT complex use is intended both for various types of stress, accompanied by a decrease in the adaptive reserves of the body and the frequent appearance of cosmetic defects in the skin of the face, and for the correction and prevention of functional disorders caused by an age-related decrease in its adaptive capabilities, manifested in the form of a combination of systemic dysfunctions and the appearance of age-related changes in the face.

Modern developments in the field of AA & AM, as well as medicine as a whole, are mainly focused on the study of the molecular and genetic foundations of the etiology and pathogenesis of diseases in order to develop new diagnostic methods and methods for the effective treatment of human diseases. But quotes given in the epigraphs of the publication should not forgotten.

5. CONCLUSION

1. SFT as a mono method provides only a 2 days - 3 days delay in solving cosmetic problems, but does not affect the parameters of the functional reserves of the body. DENS as a mono method provides a complex solution to cosmetic problems and the restoration of the functional reserves of the body. DENS & SFT combination used in one procedure provides a more effective and long-term elimination of aesthetic defects caused by age-related changes in the skin, and restoration of the functional reserves of the body. Complex DENS and SFT effect is advisable to apply both regularly to slow the aging of the body, and occasionally.
2. DENS and SFT complex use is designed to slow down the aging of the body both in terms of correcting cosmetic defects and maintaining overall health through an affordable increase in the adaptive potential of the individual.
3. In future or already existing stressful situations, for example, sport competitions, adverse weather conditions (meteoropathy), desynchronosis, interpersonal conflicts and various frustrating factors.
4. To improve the appearance of upcoming public appearances, business negotiations, receptions. At the same time, improving complexion, eliminating edema and fine wrinkles can be achieved as a result of the first few procedures. However, the achievement of more reliable and significant results should be expected in 10 days course.

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