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Facial expressions and the mental status of patients receving cosmetic treatment

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ABSTRACT

Objectives. This study explores changes in facial expression and the mental status of patients after cosmetic procedures, specifically after the facial injection of *Botulinum* toxin type A.
Materials and methods. The research sample includes 40 females and each was offered a questionnaire form individually before and after the cosmetic procedure (on 14-21 day follow-up, the full-effect period). The standard dose of botulinum A toxin was injected intramuscularly into the muscles of the upper third of the face to smooth out the forehead wrinkles, frown lines, and the crow's feet.
Outcome. The Prokhorov's Mental Health Inventory in this study identifies the mental status of patients and data are processed using the Wilcoxon signed-rank test. Higher doses of *Botulinum* toxin type A relax muscles and thus, smooth out the wrinkles. However, female patients experience problems with eyebrow contraction afterwards. After the cosmetic procedure, the patient's true feelings and emotions became difficult to determine. As revealed, the given cosmetic intervention has a negative impact on the mental state of a female patient. The survey demonstrates changes in mood towards sadness, sorrow, drowsiness, negative intentionality and generally heavy feelings.
Conclusions. Facial expression not only transmit the subject's experiences into the external environment (communicative message) but also influences mental processes and personal states through feedback. In the second case, it is the key to sensory cognition and emotional self-monitoring. The language of facial expression prevents the pathological effects of psycho-emotional stress from developing and contributes to person's adaptation.

Keywords: facial expression, mental health profile, sensory cognition, *Botulinum* toxin type A, personality, communication, paramimia, emotions

INTRODUCTION

Today, emotional expressions as the outward signals of inner feelings are of interest to not only psychologists and psychiatrists but also cosmetologists who apply new techniques of facial rhytids effacement. One of such procedures is the botulinum toxin type A (BT-A) injections for correction of facial wrinkles. Recent statistics show that these injections account for 3.2 million of all cosmetic procedures per year. According to the United States, BT-A injections make up 81% of all anti-aging procedures (1). Botulinum toxin type A injection is the most common cosmetic procedure globally. Surveys from core aesthetic specialty organizations consistently rank it first on lists of member-reported, nonsurgical aesthetic procedures. In 2014, the American Society for Aesthetic Plastic Surgery reported more than 3.5 million botulinum toxin procedures (2). The International Society of Aesthetic Plastic Surgery survey reported more than 4.8 million procedures worldwide in 2014 (3) and the 2013 American Society for Dermatologic Surgery survey found a 20 percent increase compared with 2012 (4). Similar trends are reported in Europe and Asia (5).

Drugs with BT-A are muscle relaxants and belong to the group of peripherally acting agents. The BT-A is a protein molecule with a heavy (molecular weight of 100.000 Da) and light (molecular weight of 50.000 Da) chain held together by a heat-labile disulfide bond. A heavy chain has a high affinity for binding to specific receptors located on the surface of target

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neurons. The light chain is a Zn2+ dependent protease, which activity is specific to cytoplasmic sites of a synaptosomally bound protein (molecular weight of 25.000 Da; SNAP-25, protein of exocytosis). At the first stage of action, BT-A forms a specific bond between the molecule and the presynaptic membrane. This process takes 30 minutes. The second stage is the penetration of the bound toxin into the neuronal cytosol through endocytosis. The intracellular light chain acts as a Zn2+ dependent cytosol protease – selectively breaks down SNAP-25, which at the third stage, results in a blockade of acetylcholine release at presynaptic terminals of cholinergic neurons. The process is completed with persistent chemodenervation (6).

The intramuscular administration of BT-A interferes with the extrafusal muscle fibers through the inhibition of alpha-motoneurons at the neuromuscular synapse; and with the muscle spindles through the inhibition of gamma-motoneuron cholinergic synapse on the intrafusal fiber. The reduction in gamma activity leads to the relaxation of intrafusal fibers that constitute the muscle spindle and reduces the activity of 1a-afferents. This leads to a decrease in the activity of muscle receptors of stretching, as well as to the efferent activity of alpha and gamma motoneurons. Clinically, this manifests as the pronounced relaxation of the injected facial muscles (7; 8).

Hence, the BT-A-induced chemical denervation in mimic muscles disturbs the transmission of impulses from the central to the peripheral nervous system and vice versa. Technically, this is a manifestation of distress (9).

The demand for this procedure among patients can be explained by:

1. an artificial need for BT-A injections, formed through advertising. An advertisement draws the attention of women to a negative attitude towards facial wrinkles and lines and then offers an easy way to remove them. This strategy is simply a manipulation. Fifteen years ago, many patients in Russia did not consider mimic wrinkles important and knew nothing about the botulinum toxin or the so-called "elixir of youth" (10);

2. a desire to "fit in"; passive agreement with the opinions and attitudes that exist in society, since botulinum toxin injections are associated with "the state of being young", as well as with a successful and happy life (11);

3. a visible effect of mimic wrinkles being smoothed out (12).

In parallel to the demand for BT-A treatment, many questions arise. Is there a necessity to remove facial wrinkles? Is it safe? How will this affect facial expression?

In cosmetology, there are many studies devoted to the safety of botulinum toxin type A (13). Researches focus on the blepharoptosis, brow ptosis, systemic effects of botulinum toxin on the body, etc. However, they draw very little attention to changes in facial expression that occur in patients after the BT-A injections.

Indications for BT-A treatment are facial wrinkles, located mainly in the upper third of the face (for the lower third, cosmetologists may use other drugs) – on the frown line, crow's feet (lines around the outer corners of the eyes), and on the forehead lines. The treatment procedure is as follows: a solution of botulinum toxin is administered intramuscularly with an insulin syringe into the muscles under the wrinkles. These dynamic expression lines form perpendicular to muscle fiber contraction (14).

Cosmetologists and patients believe that generally, botulinum toxin does not affect the emotional state of a person or, more specifically, the emotion facial expression, in spite of its movement-restricting effect on facial muscles (15). The current results show that the size of the negative effect of treating the crow's feet appears to be similar in size to the positive effect of treating the frown lines and so for people having both treatments there is no net drop in mood (16, 17).

Volov (18) states that "*facial expression is a unique psycho-physiological phenomenon that reflects both sensual and cognitive experience and the person's character through a simple psychomotor action*" (18, 211). Thus, facial expression supervenes on the mental content. Facial mobility as an instrument to express emotions relates to most crucial mental processes, as compared to gestures, because people do facial expressions both inside and outside communication (e.g. when reflecting upon past events; when resonating with passing situations or meaningful memories. The bodily sensations that originate from the contraction of facial muscles are associated with specific psycho-emo-

tional reactions. Facial expression patterns linked to the emotional response provide information about the status of an individual during the passing event and thus lay ground for sensory cognition (18, 213). Occasionally, distressed patients with a sympathetic drive are able to something within themselves that subsequently causes damage to their state of emotions.

Silvan Tomkins, G.N. Gellhorn and Carroll Ellis Izard emphasize the mimic origin of emotions. The muscular system of the face is unique - it is well-differentiated and the speed of its responses is close to that in which emotions appear. Thus, Izard states that the facial feedback is responsible for the introspective awareness of emotions and changes in the facial muscles have a strong encouraging effect on mental functions (19, 90).

Tomkins indicates that facial expressions following a specific emotion provoke the formation of a specific feeling and transmit it in the form of a mimic code (communicative message) (20). Facial expression is undoubtedly important for human communication. It helps to create an emotional context of communication, to identify the emotional status of another partner in conversation, his/her attitude towards the fact of communication, real motives and hidden intentions.

Labunskaya rises the matter of facial expression as a form of self-approval. According to her, emotions and their external manifestations are a "form of existence", a part of mental phenomena, which largely agrees with the Russian tradition of considering emotional expression a link between self and non-self (21).

Facial expression is indisputably one of the factors of female attractiveness (22).

Despite the adaptation significance of facial expression, recent years are fraught with evidence on the negative effect of cosmetic wrinkle correction on the natural emotional expression. In the search to remove facial wrinkles, patients ignore the role of expression muscles in the formation and expression of emotions, in sensory cognition, communication, and in adaptation.

A face without an expression is considered a beauty standard. The credibility of this statement and the ultimate price of following it are matters yet to be resolved. With this regard, analyzing features of facial expression in females after BT-A injections is of interest because the mechanism of BT-A action is associated with the chemical muscle denervation.

This study attempts to answer the following: Do patients change in mental status after BT-A injections?

Therefore, the purpose of this article is to study changes in facial expression and the psychological status of women, who underwent cosmetic treatment, specifically the BT-A administration.

MATERIAL AND METHODS

The mental status assessment was conducted among women interested in BT-A wrinkle correction, with their consent, before and after BT-A injections to muscles of the upper third of the face. The assessment was performed using the self-report Prokhorov's Mental Health Inventory (hereinafter referred to as the Inventory; Appendix 1). This is a 40-item staple scale questionnaire survey that covers four domains of psychological state: mental processes (10 questions), physiological reactions (10 questions), feelings (10 questions), and behavior (10 questions). Indicators within each category range from "-5" to "5".

The Inventory is designed to evaluate the psychological experience of a subject from the perspective of individual components (i.e., behavioral and cognitive characteristics) within the mental health profile. Prokhorov believes that any psychological or mental status can be described through the person's functioning.

The research sample includes 40 females and each was offered a questionnaire form individually before and after the cosmetic procedure (on 14-21 day follow-up, the full-effect period). The standard dose of botulinum A toxin was injected intramuscularly into the muscles of the upper third of the face to smooth out the forehead wrinkles, frown lines, and the crow's feet.

This research has been approved by the IRB of the authors' affiliated institutions.

DATA ANALYSIS

Data were double-entered into Origin 9.1. The analysis was performed using STATA 12.0 (StataCorp LP, USA). The statistical data analysis were carried out using the Wilcoxon signed-rank test.

Data processing procedure

Once the questionnaires are filled out, that is initially, scores for items within domain are converted to an 11-point scale so that the scores "-5", "-4", "-3", "-2", "-1", "0", "1", "2", "3", "4", "5" become as follows: "1", "2", "3", "4", "5", "6", "7", "8", "9", "10", "11", respectively. The domain-average score relates to the extent to which behavioral and cognitive characteristics within the mental health profile are expressed. The obtained results form a framework for the graphical representation of the mental status of patients in the form of histograms (Figure 1).

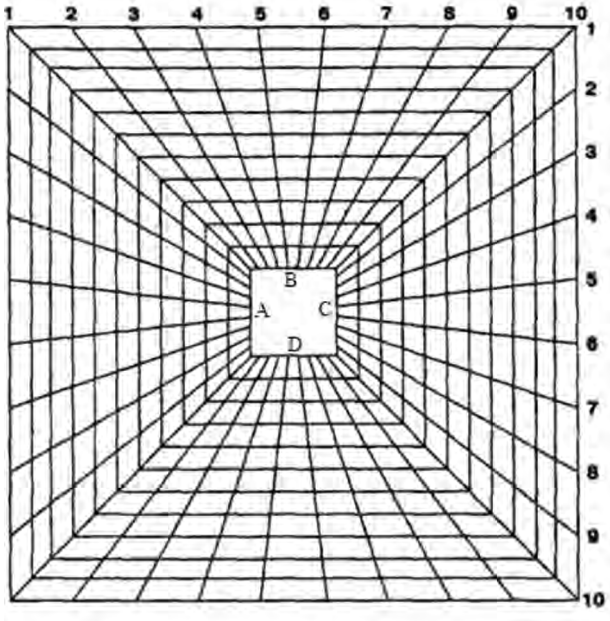

FIGURE 1. *Mental Status Matrix: edges - scores; isohypses - severity degrees (on the I-point scale).*
Note: A – mental processes; B – physiological reactions; C – feelings; D – behavior.

RESULTS

Correlation between facial expression and BT-A treatment

To treat vertical wrinkles in the glabellar area, BT-A is injected into the *corrugator supercilii* (Figure 2a). The effect from BT-A (muscle relaxation) makes the wrinkles smooth out. When this happens, the patient becomes restricted in the ability to contract her eyebrows (Figure 3a). This suggests the impairment of a muscle function by corrugator supercilii, which draws eyebrows downward and medially thus enabling the expression of emotions like fear, anger, interest, dissatisfaction, etc.

In another case, BT-A is injected into the *venter frontalis musculi epicranii* (or the frontal belly of epicranius muscle, also known as the frontalis muscle) to correct horizontal forehead wrinkles (Figure 2b).

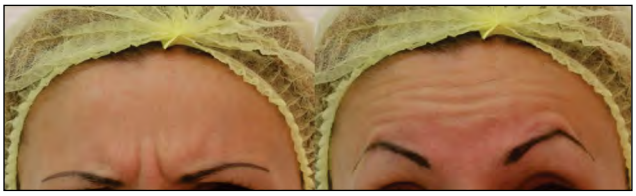

FIGURE 2. *Female Patient X before BT-A Injection: a) corrugator supercilii muscle contraction (frown photo); b) frontalis muscle contraction (eyebrow raising photo)*

This intervention interferes with the function of the frontalis muscle, which, when contracts, raises the eyebrows up and enables the expression of surprise, joy, interest, fear, etc. Figure 3 shows facial expression photos of a female patient after the administration of the Botulinum A toxin. The patient can neither lower her eyebrows nor raise them. Accordingly, this patient will have problems expressing emotions and the cause of these problems is the BT-A-induced chemical denervation of muscles.

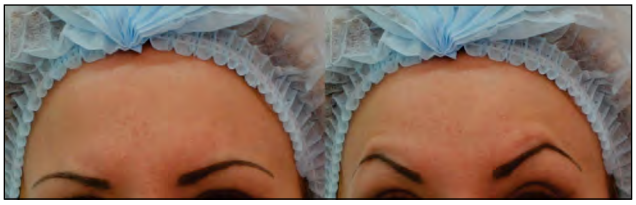

FIGURE 3. *Female Patient X after BT-A Injection: a) corrugator supercilii muscle contraction (frown photo); b) frontalis muscle contraction (eyebrow raising photo)*

From the before photo of a frowning patient (Figure 4a), one can identify her emotional state without difficulty, as the view of her lowered eyebrows is distinct. From the after photo (Figure 4b), it is rather difficult to determine the true feelings of the patient. The patient attempts to move her eyebrows downward but the medial brows, unlike the lateral brows, do not move and so that the eyebrow curves look unnatural. The activity in the frontalis muscle also changed alongside the activity in muscles around the eyes and in muscles of the middle third of the face (compensatory increment).

FIGURE 4. *Frown Lines: a) before photo (natural expression); b) after photo*

The above examples demonstrate changes in the facial expression of patients after the mimic wrinkle correction using the Botulinum toxin type A.

The research claim is that aside from changes in the facial expression, patients may experience a change in their emotional state. Below are the Prokhorov's Inventory findings.

Correlation between psychological status and BT-A treatment

On the "mental processes" scale, statistically significant differences are found in items, such as:

- perception (shift towards lower susceptibility to external influences);
- memory (shift towards memory recall/retrieval difficulties);
- imagination (shift towards difficulty in producing ideas, towards caged imagination);
- emotions (the emergence of anxiety, fear, hopelessness, and despair) (Figure 5).

On the "physiological reactions" scale, statistically significant differences are found in the status of oral mucosa (Figure 6): "dry feeling in the mouth" drops a few points after the cosmetic procedure.

Most of statistically significant differences are found on the "feelings" scale: sadness/optimism, sorrow/fervency, drowsiness/vivacity, negative/positive intentionality, heavy feelings/light feelings ($p < 0.01$).

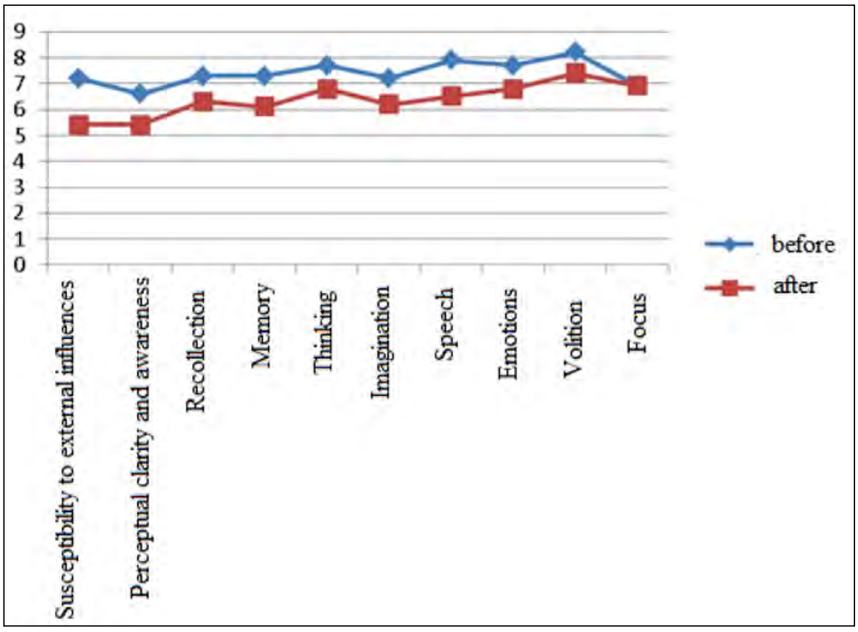

FIGURE 5. *Ratings on Mental Processes Scale Before and After BT-A Treatment*

Note: Significance values show the simple comparisons before and after treatment (p<0.01).

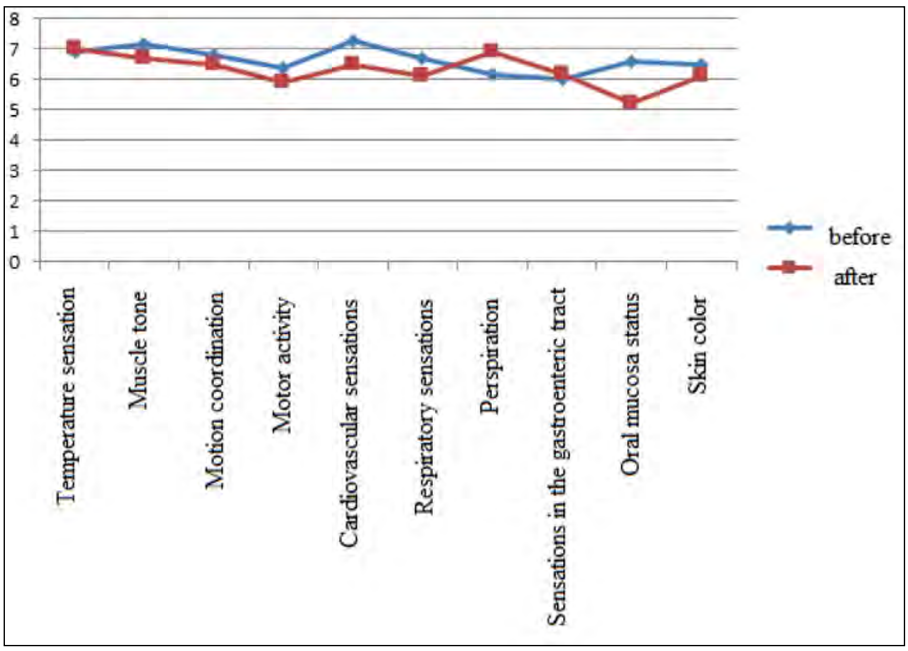

FIGURE 6. *Ratings on Physiological Reactions Scale Before and After BT-A Treatment*

Note: Significance values show the simple comparisons before and after treatment (p<0.01).

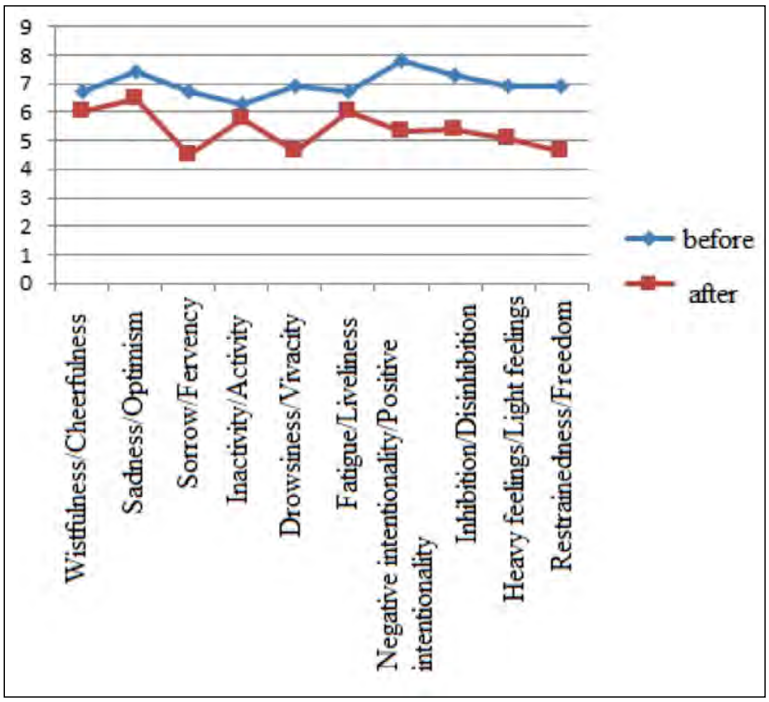

FIGURE 7. *Ratings on Feelings Scale Before and After BT-A Treatment*

Note: Significance values show the simple comparisons before and after treatment (p<0.01).

The survey demonstrates changes in mood towards sadness, sorrow, drowsiness, negative intentionality and generally heavy feelings.

Statistically significant differences on the "behavior" scale (non-driven/driven, spontaneous/deliberate, insecure/confident) also demonstrate a negative correlation (p <0.01). Changes can be observed towards non-driven, impulsive, and insecure behavior.

Thus, findings show a change in the core items of the mental health profile among women after the administration of botulinum toxin type A into the facial muscles of the upper third of the face. Subsequent to the procedure, females have the experience of emotional tension, hesitation, etc. From the viewpoint of the cosmetologist, however, the procedure outcome meets the requirements and is not fraught with complications.

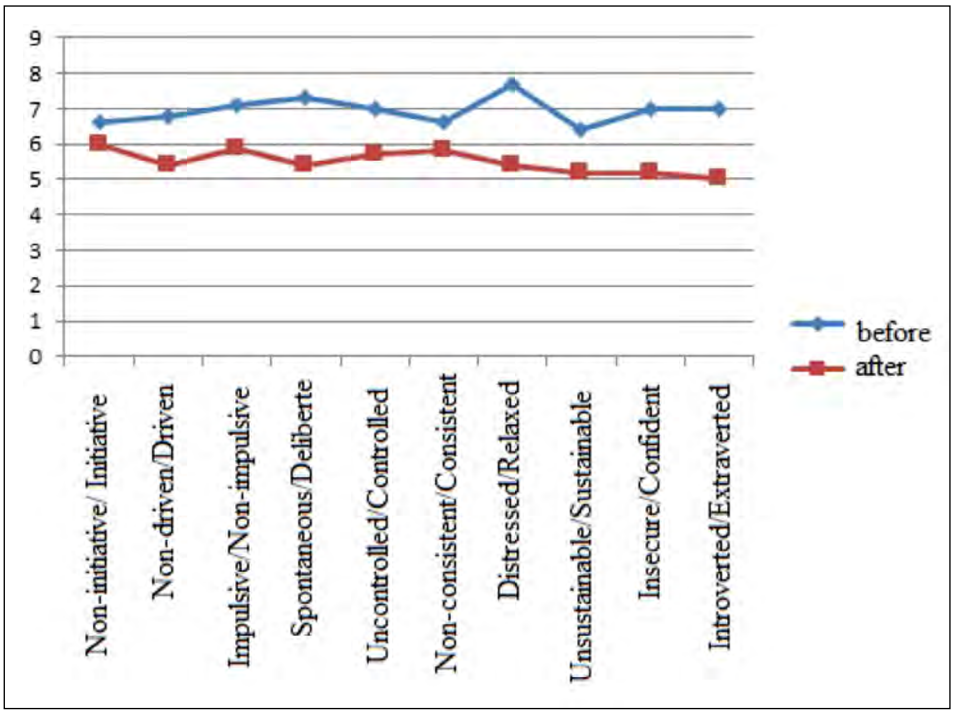

FIGURE 8. *Ratings on Behavior Scale Before and After BT-A Treatment*

Note: Significance values show the simple comparisons before and after treatment (p<0.01).

DISCUSSION

Changes in the mental status of women who received BT-A treatment, as well as before and after pictures of facial expression, indicate a correlation between inner experiences and their embodiment.

Lewis explores the emotional state further by looking at the effect that BT-A treatment of crow's feet has on the mood. This treatment involves injections into the orbicularis oculi muscles and leads to a reduction in facial lines, also called as laughter lines. Based on embodied emotions, it was predicted that treating the laughter lines would lead to a lowering of a person's mood. It happened that all of the participants who were BT-A treated for crow's feet were also BT-A treated for frown lines. The contrast between those people who received BT-A for frown lines and those people who received the treatment for both frown lines and crow's feet shows that the effect of having a treatment for crow's feet is to increase depression and anxiety scores relative to those who had only received the frown lines treatment (16). The most attention driven change is the effect of crow's feet treatment using BT-A injections in the orbicularis oculi muscles. Such an intervention leads to a chemical denervation of the palpebral portion of orbicularis oculi muscle responsible for a Duchenne smile (20). At that, a patient reaches a long-lasting effect but loses the ability to smile using the eye muscles (23). Thus, BT-A interferes with the process of embodying feelings like joy and interest by leaving undisturbed only the muscles of the middle and lower third of the face to make a smiling facial expression (24).

The immobilized facial muscles restore through 3- to 6-month reinnervation. Until then, facial expression remains unnatural to varying extent.

The facial expression muscles do not have fasciae, which often contribute to BT-A diffusion to the adjacent muscles. Therefore, facial mimicry here is somewhat simplified. Of course, emotional expression involves more than one mimic muscle and thus detriment in the function of some muscles entails the activation of other muscles to compensate this change, which reduces the negative effect but dos not remove the consequences completely.

Another feature worth mentioning is paramimia.

According to the glossary of psychiatric terms, paramimia refers to facial mimicry inadequate to or not congruent with patient's emotions or the situation (25). Paramimia may be a symptom of brain pathology or mental illness (e.g., schizophrenia).

The examples of non-consistency between what the BT-A treated patient is experiencing and what her face expresses after chemical denervation are also known in the cosmetic practice. However, this non-consistency is clearly not a symptom of disease but a result of medical intervention. The theory explaining why treating crow's feet lowers mood is the same as that explaining why treatment of glabellar frown lines improves it. The strength of the facial feedback that a person would get when smiling would therefore be reduced relative to an untreated person and hence they feel less happy even when smiling (26; 27). The current results show that the size of the negative effect of treating the crow's feet appears to be similar in size to the positive effect of treating the frown lines and so for people having both treatments there is no net drop in mood (16).

From the perspective that facial mimicry is important in emotional expression decoding, the current study shows that a loss of mobility in the face as a result of BT-A injections is related to a loss in emotional-expression recognition ability. This effect had been shown previously but in an experiment that only assessed emotion recognition from the mouth region. Therefore, it remained unclear as to whether whole face emotion recognition would be similarly affected.

The current study demonstrates that the cosmetic effects from BT-A can also include a wide array of psychological effects. Results reported by other researchers demonstrate that BT-A treatment leads to a decreased mood in cosmetic patients (14; 12; 28). The mental status here includes, by contrast, a broader range of effects, including physiological reactions, feelings, behaviors, and emotions. At that, facial expression of emotions plays a role in the transmission of personal experience (communicative message) and the facial feedback influences mental processes and adaptation abilities of a person thereby leaving an imprint on personality.

CONCLUSIONS

The current study reveals that a BT-A treated patient has problems with the emotion expression due chemodenervation. Findings demonstrate negative changes in the mental state of women after the admin-

istration of BT-A into the mimic muscles of the upper third of the face. Most of statistically significant differences are found on the "feelings" scale: sadness/optimism, sorrow/fervency, drowsiness/vivacity, negative/positive intentionality, heavy feelings/light feelings ($p < 0.01$). Changes in mood are found to be towards sadness, sorrow, drowsiness, negative intentionality and generally heavy feelings. Least of statistically significant differences are found on the scale "physiological reactions". Among them, the dry feeling in the mouth after the procedure.

Appendix 1

The Prokhorov's Mental Health Inventory

Put a name to what you are experiencing at the time of filling out the questionnaire (e.g., joy or anxiety, etc.). Afterwards, rate your experience on the scale from very low level (-5) to very high level (5), with "0" representing the normal (unchanged) mental status. You may cross out no more than one number and remember - there are neither good nor bad answers.

MENTAL PROCESSES	
1. Perception. Susceptibility to external influences	
Decreasing to not susceptible	Increasing to elevated
-5 -4 -3 -2 -1 0 1 2 3 4 5	
2. Perception. Clarity and perceptual awareness	
Decreasing, blurred, with poor clarity and low awareness	Conscious, with high clarity
-5 -4 -3 -2 -1 0 1 2 3 4 5	
3. Perceptual recollection	
Recollection difficulty	Clear, with the ease of retrieval effect
-5 -4 -3 -2 -1 0 1 2 3 4 5	
4. Memory	
Poor, with difficulty in remembering, recall/retrieval problems	Enhanced; better remembering and recall skills
-5 -4 -3 -2 -1 0 1 2 3 4 5	
5. Thinking	
Slow, with difficulty in understanding and reasoning	Fast; enhanced understanding and reasoning skills
-5 -4 -3 -2 -1 0 1 2 3 4 5	
6. Imagination	
Caged, with difficulty in producing ideas	Good, beyond boundaries, with the ease of association
-5 -4 -3 -2 -1 0 1 2 3 4 5	
7. Speech	
Impaired (broken up with pauses, stammered, cluttered, quite, stuttered, etc.)	Improved, but with a volume control problem (loud) and a rapid rate
-5 -4 -3 -2 -1 0 1 2 3 4 5	
8. Emotions	
Anxiety, fear, hopelessness, and despair	Happiness, delight, cheerfulness, excitement
-5 -4 -3 -2 -1 0 1 2 3 4 5	
9. Volition	
Weak, fraught with self-motivation problems, insecurity, and inactivity	Strong, fraught with self-confidence, commitment to succeed, and self-management
-5 -4 -3 -2 -1 0 1 2 3 4 5	
10. Focus	
Decreasing to low, with the ease of distraction effect	Increasing to high, implies resistance to distraction and enthusiasm
-5 -4 -3 -2 -1 0 1 2 3 4 5	
PHYSIOLOGICAL REACTIONS	
11. Temperature sensation	
Cold sensation in extremities, chills	Warm sensation in extremities, general raise in body temperature
-5 -4 -3 -2 -1 0 1 2 3 4 5	
12. Muscle tone	
Significant tension, hand tremor, twitching and tics (on the face, around the lips, in the eyelids)	Moderate muscle tone and tension
-5 -4 -3 -2 -1 0 1 2 3 4 5	

13. Motion coordination	
Coordination impairment (non-smooth movements, deformed handwriting, hand dexterity problems)	Coordination improvement (smooth movements at the high rate)
-5 -4 -3 -2 -1 0 1 2 3 4 5	
14. Motor activity	
Decreasing due to the lack of motivation to move and apathy (limitation in movement)	Increasing to abnormal, which includes fast and energetic, to the extent of feeling inner restlessness, movements
-5 -4 -3 -2 -1 0 1 2 3 4 5	
15. Cardiovascular sensations	
Unpleasant sensations in the heart (pain, feeling of squeezing in the chest)	Non-disturbing changes in heart rate (heartbeat increase)
-5 -4 -3 -2 -1 0 1 2 3 4 5	
16. Respiratory sensations	
Shortness of breath, feeling of lump in the throat, feeling of not being able to intake enough air	Non-disturbing increase in respiratory rate and depth
-5 -4 -3 -2 -1 0 1 2 3 4 5	
17. Perspiration	
Cold sweats, excessive sweating of the hands, palms, armpits, back, etc.	Insignificant sweating, relatively dry skin
-5 -4 -3 -2 -1 0 1 2 3 4 5	
18. Sensations in the gastroenteric tract	
Pain, the loss of appetite, nausea, thirst	Sensation of moderate hunger, occasional rumbling noises
-5 -4 -3 -2 -1 0 1 2 3 4 5	
19. Oral mucosa status	
Dry feeling in the mouth	Moderate increase in saliva secretion
-5 -4 -3 -2 -1 0 1 2 3 4 5	
20. Skin color	
Skin blanching (on the face, hands, and on the neck); change of color to marble in a mottled pattern	Skin redness on the face, hands, on the neck; slight change in skin color
-5 -4 -3 -2 -1 0 1 2 3 4 5	
FEELINGS	
Depression – Optimism	
21. Wistfulness	Cheerfulness
-5 -4 -3 -2 -1 0 1 2 3 4 5	
22. Sadness	Optimism
-5 -4 -3 -2 -1 0 1 2 3 4 5	
23. Sorrow	Fervency
-5 -4 -3 -2 -1 0 1 2 3 4 5	
Activity – Passivity	
24. Inactivity	Activity
-5 -4 -3 -2 -1 0 1 2 3 4 5	
25. Drowsiness	Vivacity
-5 -4 -3 -2 -1 0 1 2 3 4 5	
26. Fatigue	Liveliness
-5 -4 -3 -2 -1 0 1 2 3 4 5	
Intentionality	
27. Negative	Positive
-5 -4 -3 -2 -1 0 1 2 3 4 5	
Stress – Relaxation	
28. Inhibition	Disinhibition
-5 -4 -3 -2 -1 0 1 2 3 4 5	
29. Heavy feelings	Light feelings
-5 -4 -3 -2 -1 0 1 2 3 4 5	
30. Restrainedness	Freedom
-5 -4 -3 -2 -1 0 1 2 3 4 5	

BEHAVIOR	
31. Non-initiative	Initiative
-5 -4 -3 -2 -1 0 1 2 3 4 5	
32. Non-driven	Driven
-5 -4 -3 -2 -1 0 1 2 3 4 5	
33. Impulsive	Non-impulsive
-5 -4 -3 -2 -1 0 1 2 3 4 5	
34. Spontaneous	Deliberte
-5 -4 -3 -2 -1 0 1 2 3 4 5	
35. Uncontrolled	Controlled
-5 -4 -3 -2 -1 0 1 2 3 4 5	
36. Non-consistent	Consistent
-5 -4 -3 -2 -1 0 1 2 3 4 5	
37. Distressed	Relaxed
-5 -4 -3 -2 -1 0 1 2 3 4 5	
38. Unsustainable	Sustainable
-5 -4 -3 -2 -1 0 1 2 3 4 5	
39. Insecure	Confident
-5 -4 -3 -2 -1 0 1 2 3 4 5	
40. Introverted	Extraverted
-5 -4 -3 -2 -1 0 1 2 3 4 5	

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