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# Experience of treatment of chronic migraine with botulinum toxin type A among aesthetic medicine professionals in Poland

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## ABSTRACT

**Introduction.** This study aimed to evaluate the knowledge and standard of treatment of chronic migraine with botulinum toxin by Polish aesthetic medicine professionals.

**Rationale for the study.** Onabotulinum toxin A injections are used as a preventive treatment for chronic migraine. Besides neurologists, healthcare professionals of multiple specialisms can offer this treatment. Aesthetic medicine professionals commonly use the treatment to extend the scope of their practice. This may bring about a situation wherein physicians with different levels of experience and training are providing botulinum toxin injections for chronic migraine.

**Material and methods.** An online survey asking about patient qualification procedures, the level of adherence to the PREEMPT paradigm, product-, technique-, dosing-, and treatment intervals-related aspects of the treatment, efficacy evaluation practices and concerns about the use of botulinum toxin in chronic migraine was sent to 110 Polish physicians practicing aesthetic medicine.

**Results.** The response rate was 73.6%. The results of the survey revealed multiple deviations from the current paradigm of treatment of chronic migraine with botulinum toxin, from improper patient qualification through treatment procedure to the evaluation of the efficacy. Only around one-third of professionals evaluated the observed effectiveness of therapy as very good. Most respondents wanted to expand their knowledge and skills in chronic migraine treatment.

**Conclusions.** There is a considerable willingness among aesthetic medicine specialists to treat patients with chronic migraine with botulinum toxin. The current levels of knowledge and skills in this treatment are limited, and multiple physicians declared deviations from the diagnostic criteria and the therapeutic protocol. Transferring aesthetic medicine practices to neurology treatment is common and may result in a lack of effectiveness of treatment or even intensification of symptoms. An appropriate educational programme should be implemented for all physicians authorised to administer BoNT-A in Poland.

**Key words:** aesthetic medicine, chronic migraine, onabotulinum toxin type A, PREEMPT protocol

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## Introduction

Onabotulinumtoxin A (OnaBoNT-A) was registered in Poland for the treatment of chronic migraine (CM) in 2010 [1]. Many randomised clinical trials have assessed its effectiveness and safety [2–7]. OnaBoNT-A is the only botulinum toxin type A (BoNT-A) registered for this indication. The drug has been reimbursed in Poland since July 2022 for patients with CM after previous failures of at least two oral prophylactic treatments [8, 9].

For 13 years, OnaBoNT-A therapy has been available to patients mainly in the private healthcare sector. Even so, many individuals who do not qualify for the reimbursed treatment due to lack of oral treatment failures, or those who prefer treatment in private clinics, receive OnaBoNT-A commercially as part of their out-of-pocket expenditure.

Both neurologists and aesthetic medicine professionals (AMPs) perform BoNT-A injections in CM. AMPs are involved in this treatment for several reasons. Firstly, the

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initial observations about the effectiveness of BoNT-A in the treatment of migraine came from the AMP. By treating glabellar and forehead wrinkles, they reduced migraine pain in their patients. This observation launched successful clinical trials of OnaBoNT-A in CM. Secondly, AMPs have extensive BoNT-A treatment experience and full access to this therapy. Thirdly, the aesthetic medicine sector is heavily commercialised, with extensive internet marketing, which means that patients quickly find a clinic offering BoNT-A migraine treatment and often go there first without waiting for an appointment with a neurologist.

After searching for a term, e.g. "treatment of migraine with botulinum toxin" in a browser, the patient is directed to the websites of aesthetic medicine clinics offering migraine treatment services with BoNT-A. Unfortunately, reading the information about this therapy available on the websites of some medical centres, one may suspect that these services have little to do with CM management according to the current standards and the PREEMPT protocol. This shows that BoNT-A treatment is offered to all migraine sufferers, not only those with CM, and the drug is administered mainly intramuscularly and at trigger points, which is supposed to cause muscle relaxation and thus relieve headache. Inadequate qualifications and treatment techniques result in a lack of therapeutic effect and discourage the patient from continuing.

The indication for the treatment of OnaBoNT-A is CM, which is defined as the presence of headache (tension and/or migraine type) for at least 15 days a month in the last three months, and which headache for at least eight days a month meets the criteria for the diagnosis of migraine with or without aura, and at the onset of the disease had a migraine character and responded to triptans or ergotamine derivatives [10].

The technique of OnaBoNT-A administration according to the PREEMPT protocol was described in detail in a document published in 2017 by Blumenfeld et al. [11, 12]. For years, Polish neurologists have had the opportunity to participate in practical workshops on treating CM with OnaBoNT-A, conducted by, among others, the author. AMPs do not have such a possibility and mainly explore how to administer BoNT-A in CM from the literature. Incorrect treatment may result in a lack of effectiveness of therapy [12]. An administration technique not following the PREEMPT protocol may also expose the patient to side effects. The effectiveness of therapy of CM is important also in the context of a high burden of disease and its undertreatment in Poland, which occurs despite relatively good access to physicians [13].

### Objectives

This study's primary aim was to analyse the state of knowledge about CM and the technique of BoNT-A administration among Polish AMPs. The secondary objective was to analyse the educational needs of this group of physicians in CM treatment with BoNT-A.

## Material and methods

This pilot study among AMPs was conducted between December 2022 and January 2023. A self-developed online questionnaire with 40 questions aimed to evaluate: the professional experience of practitioners; the level of knowledge about BoNT-A treatment in CM and its source; patient qualification procedures; the type of BoNT-A and dose used in CM treatment; the technique of drug administration with particular emphasis on injection sites, single dose, depth of BoNT-A administration and direction of needle insertion; evaluation of the effectiveness of BoNT-A treatment in CM; concerns related to BoNT-A treatment in CM; and interest in, and willingness to expand knowledge of, the field of BoNT-A treatment in the treatment of CM. The supplementary material contains the original survey and its translation.

The questionnaire was created in Google Forms, a survey software included in Google LLC's free, web-based Google Docs Editor. The author personally sent by e-mail the questionnaire to 110 AMPs with a detailed explanation of the purpose of the study and an assurance of data anonymity. Each physician was informed that the purpose of the analysis was not to indicate their possible errors in the procedure, but only to assess the state of knowledge and educational needs in this area. Personal contact with the author emphasised the problem's essence and ensured the survey's anonymity. This also served to eliminate the possibility of completing the questionnaire by unauthorised persons.

Respondents had the opportunity to omit questions that, in their opinion, did not apply to them (e.g. because they do not use BoNT-A in the treatment of CM) or which they did not want, or were unable, to answer. Therefore, a different number of answers were given to each question, which was considered in analysing the results. The results were presented as percentages of respondents.

## Results

### Participants

Eighty-one physicians completed the questionnaire; 67 women (82.7%) and 14 men (17.3%) aged from 26 to 60. None of the surveyed AMPs was a neurologist, and 21 (25.9%) of the respondents were dentists. The rest of the clinicians had a different medical specialism.

The respondents differed in terms of years of professional experience: 1–2 years or 3–5 years of work experience were declared by 11 respondents (13.6%) each, 6–10 years by 17 (21%), 11–15 years by 20 (24.7%), and over 15 years of work by 22 (27.2%).

### Eligibility for botulinum toxin treatment of chronic migraine

Among all the doctors who completed the questionnaire, 37 (45.7%) confirmed that they perform BoNT-A injection procedures in treating CM.

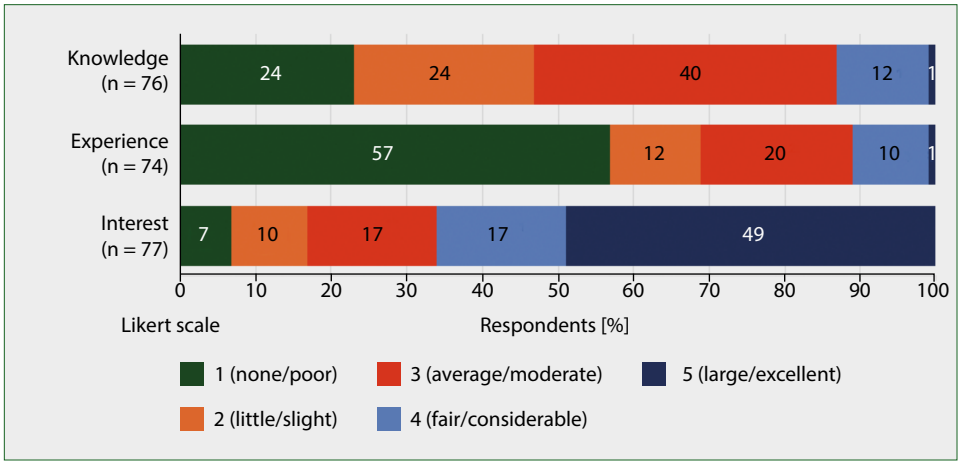


**Figure 1.** Level of knowledge, experience, and interest in botulinum toxin treatment for chronic migraine among aesthetic medicine professionals

Thirty-eight clinicians answered the question "For which patients do you use BoNT-A for migraine?" Most professionals (n = 30, 78.9%) confirmed that they use BoNT-A in patients diagnosed with CM, 12 (36.1%) declared that they used it in patients with many years' migraine, 13 (13.2%) indicated that they used it in patients with migraine regardless of whether they had been diagnosed with CM, and two (5.3%) indicated that they used it in all patients, regardless of the frequency of migraine attacks.

The question: "Do you verify the diagnosis of migraine before treatment with BoNT-A?" was answered by 56 physicians. Of them, 27 (48%) stated that they administered the drug based on the patient's medical history and declaration of being treated for migraine. Twelve clinicians (21.4%) stated that they did not verify the diagnosis because they knew nothing about migraine. Some physicians (n = 8, 14.3%) verified the diagnosis and independently confirmed the CM diagnosis. A few AMPs (n = 6, 10.7%) required a referral from a neurologist before the procedure, and one (1.8%) needed a referral from a pain medicine specialist. Only 17 of 74 surveyed AMPs (23%) cooperated with a neurologist in treating CM.

Most physicians use BoNT-A in migraine patients concomitantly with the same medication for wrinkles (22/40, 55%), bruxism (12/40, 30%), or other indications (11/40, 27%).

## Knowledge of criteria for diagnosis of chronic migraine

Seventy-four respondents answered the question "Do you know the criteria for the diagnosis of CM?" Most clinicians confirmed they did (45/74, 60.8%). Only 17/31 respondents (54.8%) presented an accurate definition of CM.

## Physicians' experience in botulinum toxin therapy for chronic migraine

In the last 12 months, 36 of 77 AMPs (46.8%) said they did not perform any procedure, 22 respondents (28.6%) treated ≤ 5 patients, and 10 (13%) treated 6-10 patients. The treatment of multiple patients (> 50 patients/year) was declared by only three physicians (3.9%). The question about their experience and knowledge about CM treatment with the use of BoNT-A was answered by 74 physicians, assessing them on a scale of 1 (poor) to 5 (very good) (Fig. 1). 68/78 of the surveyed physicians were interested in expanding their knowledge and skills in CM treatment using BoNT-A (Fig. 1).

## Knowledge and experience of PREEMPT protocol

Of 47 physicians who answered the question about the type of BoNT-A used to treat CM, 42 (89.3%) indicated using OnaBoNT-A, but as many as 32 (68.0%) also used other BoNT-As. Only 16 of 55 respondents (29.1%) declared that they always used a toxin according to the PREEMPT protocol, and 17 (30.9%) of the respondents modified the paradigm depending on the patient's needs. Many physicians (16/55, 29.1%) admitted that they did not know the PREEMPT protocol, and six (10.9%) administered BoNT-A only in the forehead and temples. Knowledge of the PREEMPT protocol came mainly from the internet, e.g. Google and YouTube searches (27/47 and 44.7%), their peers or medical representatives, and a summary of product characteristics (9/47, 19.1% each).

Only 22 of 38 physicians (57.9%) indicated the correct dose of OnaBoNT-A, a fixed dose in line with the PREEMPT protocol. Sixteen specialists (42.1%) gave an incorrect dose of BoNT-A, including 10 (26.3%) selecting a fixed dose but different from the PREEMPT protocol, and six (15.8%) who adjusted the dose individually.

Most physicians (35/38, 94.6%) used an amount of 0.9% saline other than 2 mL to dilute BoNT-A, using 1–2.5 mL of solvent. Only three clinicians (8.1%) declared that they diluted the medication correctly using 2 mL of 0.9% saline. Two physicians (5.3%) mixed BoNT-A with lidocaine.

Out of 40 doctors who answered the question about the depth of drug administration, as many as 35 (87.5%) injected

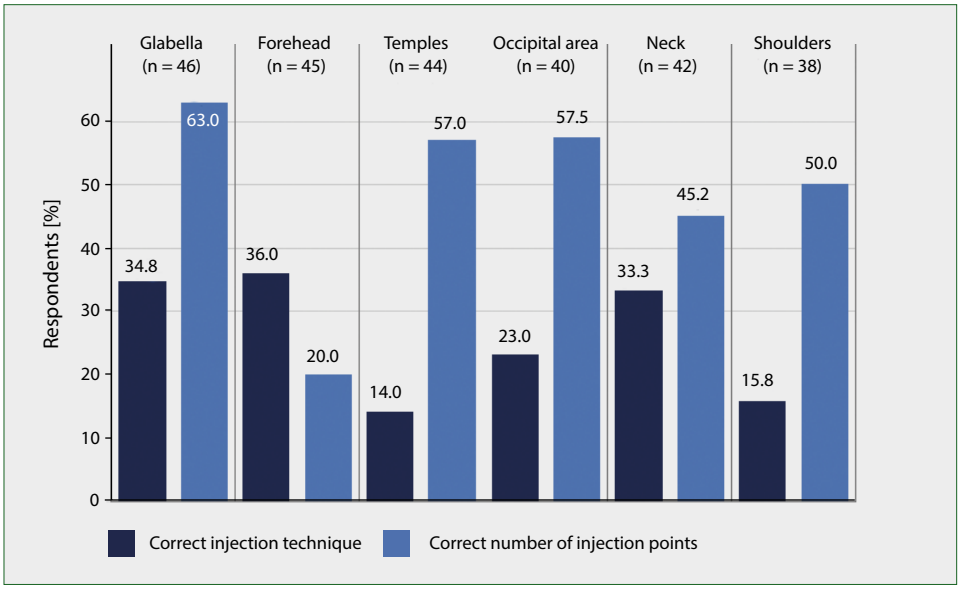


**Figure 2.** Compliance with PREEMPT paradigm during botulinum toxin injections for chronic migraine analysed from perspective of treatment in different areas of head and body

BoNT-A deep into the muscles. Others administered the drug subcutaneously (6/40, 15%) or intradermally (6/40, 15%), or deep into the periosteum (2/40, 5%). AMPs mainly injected BoNT-A into the temples (40/41, 97.6%), forehead (38/41, 92.7%), back of the head (35/41, 85.4%), glabella (34/41, 82.9%), neck (26/41, 63.4%) and shoulders (14/41, 34.1%). The great majority, 37 of 39 AMPs (94.9%), administered the drug bilaterally, and only two persons (5.1%) injected only half of the head.

The results relating to the detailed technique of OnaBoNT-A injection into particular areas of the head and face, following the PREEMPT protocol, e.g. the location and number of injection points as well as the depth and angle of drug administration, are presented in Figure 2.

Only 16 of 46 physicians (34.8%) administered BoNT-A correctly, i.e. at a 90-degree angle, in the glabella area. Others declared that they inserted the needle diagonally upwards (n = 14/46, 30.4%) or downwards (n = 2/46, 4.3%). In addition, as many as 13/46 (28.3%) specialists administered an additional dose of BoNT-A in this area laterally into the skin attachment of the frowning muscle. Only 12 of 45 respondents (26.7%) applied BoNT-A in the upper third of the forehead, with the other 33 doing so in other places. Most AMPs (33/47, 70.2%) did not aspire before injecting.

As per the PREEMPT paradigm, additional doses in the so-called Follow-the-Pain protocol were always used by 6/40 (15%) of respondents. 19/40 (47.5%) gave these doses correctly but not in every patient, and 15/40 (37.5%) were unfamiliar with this part of the PREEMPT protocol.

Only 18 of 43 (41.9%) physicians give the correct dose of BoNT-A at each injection point (5 units). The others use different drug doses, as shown in Figure 3.

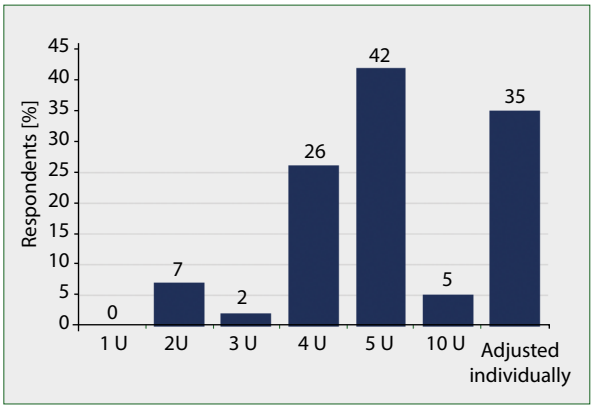


**Figure 3.** Specific doses of botulinum toxin used per injection point. U — units; N = 43

## Evaluation of effectiveness of chronic migraine treatment with botulinum toxin

Evaluation of effectiveness of chronic migraine treatment with botulinum toxin 7/40 (17.5%) doctors, by the recommendations, administered BoNT-A at least three times at 3-month intervals, and 5/40 (12.5%) declared that they treat migraine with BoNT-A every three months and give it as many times as needed. The others repeated the procedure irregularly, usually when the migraine reoccurred (13/40, 32.5%).

The answer to the question "How do you assess the effectiveness of migraine treatment with BoNT-A?" was presented on the Likert scale [from poor (1) to very good (5)]. Of 43 respondents, 16 (37.2%) indicated a very good effect of BoNT-A. The others rated therapy effectiveness as 4 (n = 19/43, 44.2%) or 3 (n = 8/43, 18.6%).

### Concerns of aesthetic medicine professionals about BoNT-A therapy for chronic migraine

Fifty-seven physicians shared their worries and anxieties about CM therapy with BoNT-A. As many as 32 of them (56.1%) were most afraid of patient qualification errors, 20 (35.1%) of performing the procedure incorrectly, 11 (19.3%) of damage to nervous structures and neurological complications, five (8.8%) of eyelid ptosis, eight (14.%) of the unsightly appearance of the patient, 24 (42.1%) of the patient's dissatisfaction with the procedure performed or the entire therapy, 24 (42.1%) of the ineffectiveness of BoNT-A, eight (14%) of a patient's negative opinions, and seven (12.3%) of patient's claims against them.

According to the majority of physicians (43/59, 72.9%), patients were discouraged from using BoNT-A by the high price of the therapy. Only 36 of 70 AMPs (51.4%) knew that some patients with CM could obtain reimbursement for BoNT-A treatment, and 28 physicians (40%) believed that BoNT-A was not reimbursed for patients with CM in Poland.

Almost half of the specialists (29/59, 49.2%) believed that patients did not receive information about this therapy, and 27 (45.8%) respondents believed that patients were afraid of BoNT-A toxicity, including eight physicians (13.6%) claiming that patients were afraid to have head injections, and 16 (27.1%) who believed that patients were discouraged from starting treatment for fear of the uncertain effect of the therapy. Over a third of AMPs (23/64) believed that the CM treatment procedure with BoNT-A was not economically feasible for them.

## Discussion

This was a pilot study among AMPs in Poland concerning migraine treatment. It was challenging to identify all Polish AMPs because aesthetic medicine is a skill, not a specialisation. Every doctor, including dentists, can become AMPs, and they acquire skills during postgraduate studies and additional courses. There are no reliable data, but it is estimated that 2,500–3,000 doctors practice aesthetic medicine in Poland, but not every professional is registered in databases of scientific societies. Only a few representatives of the aesthetic medicine community participated in this pilot study, but the author believes that its results indicate the need for further analysis and education in CM treatment with BoNT-A.

The PREEMPT paradigm is the only valid protocol for CM treatment with OnaBoNT-A [2, 3, 11, 14]. According to it, BoNT-A should be administered in 31–39 sites within the head and neck area, inserting the needle shallowly under the skin and administering 5 units of OnaBoNT-A at each point. The minimum dose of BoNT-A is 155U, which corresponds to 31 injection points (registered in both the USA and Europe), and the maximum dose is 195U, which corresponds to 39 injection points (European registration) [15]. The initial administration technique has been improved, taking into account new scientific reports on the proposed mechanism of action of BoNT-A in neuropathic pain [16, 17]. Today, it is known that the goal of BoNT-A treatment in CM is not muscle relaxation but rather reaching the nerve endings of the trigeminal-occipital-cervical nerve complex. BoNT-A affects unmyelinated C fibres, inhibiting the secretion of pain neurotransmitters [16–19]. This molecule is supposed to be transported by axonal retrograde transport along peripheral nociceptive pathways and affects the central mechanisms of migraine pain generation, including reducing the duration of cortical spreading depression [18, 19]. BoNT-A could have a unique neuromodulatory effect, causing peripheral and central desensitisation of nerve pathways involved in the pathogenesis of migraine pain [2, 17]. Therefore, there is no reason to administer this medication deep intramuscularly but only shallowly under the skin innervated by the endings of the trigeminal nerve, occipital and supraclavicular nerves [11]. Performing at least three treatment cycles every 12 weeks is necessary to obtain a satisfactory clinical effect, and the continuation brings further clinical benefits [20]. Evidence from open-label real-world trials has proven the safety and effectiveness of treatment according to the PREEMPT protocol [21]. Recent observational studies indicate a clinical benefit even from several years of regular administration of OnaBoNT-A every 12 weeks [22].

BoNT-A for CM is one of the most important and effective treatment methods for this severe condition. The therapy's success depends on the patient's proper qualification for the procedure and on conducting it according to a strictly defined protocol, including a specific injection technique, drug dose, and intervals between treatments [12, 23]. In order to achieve a beneficial long-term effect, it is necessary to monitor and verify the patient's clinical condition systematically and to supervise the emergency medication used concomitantly.

In most cases, such treatment should be carried out by neurologists, although not all of them can administer injections of BoNT-A in CM. Given cooperation between a neurologist and another doctor, e.g. an AMP, who has injection skills, BoNT-A therapy can be appropriately conducted [23].

This study is the first attempt at an analysis of CM treatment with BoNT-A performed by AMPs to evaluate their state of knowledge, experience, and educational needs.

To the best of the author's knowledge, this is the first available analysis of CM procedures among AMPs performed by online questionnaires. Perhaps thanks to the individual contact and establishing a relationship between the author and the respondent, the response rate was as high as 73.6%. In the study by Begasse de Dhaem et al., who conducted a similar questionnaire analysis of modifying the PREEMPT protocol among headache specialists, only 20.7% of practitioners responded [24].

The anonymous survey revealed that half of AMPs perform BoNT-A injections in CM. Most do these procedures to accompany the treatment of wrinkles or bruxism. Unfortunately,

only a few AMPs can qualify the right patient for the procedure and treat migraine sufferers without considering the BoNT-A treatment.

OnaBoNT-A is registered for treating CM, and there is insufficient evidence for its effectiveness in episodic migraine (EM) or other types of headaches. Proper treatment of BoNT-A of CM starts with qualifying the right patient. Most respondents claim that they use BoNT-A only in patients with CM, but almost half of the respondents gave this medication "at the patient's request" without verifying and confirming the diagnosis of CM. Only a few of the respondents cooperated permanently with a neurologist or performed the procedure based on a referral from a neurologist. 20% of the surveyed AMPs admitted that they do not verify the diagnosis because they "know nothing about migraine". Qualification of inappropriate patients comes from ignoring the criteria for CM diagnosis.

More than half of the surveyed physicians claimed to know the criteria for diagnosing CM, but few could provide the correct definition of CM. The most common definition of CM given by the respondents was at least 15 days with a headache in a month. Few doctors knew that at least eight of these days should have migraine symptomatology, and the observation period must be at least three months. This raises suspicions that patients who do not meet the criteria for CM diagnosis and suffer from other types of headaches, such as tension-type headaches, may still qualify for BoNT-A treatment. However, ignorance of the full criteria for diagnosing CM is not only the domain of AMPs. Indeed, the great majority (90%) of Polish family physicians cannot list the full criteria for the diagnosis of migraine; only one in two of them claimed that they could distinguish between CM and EM, and only one in three could provide the correct definition of CM [25].

According to this study, AMPs do not often perform BoNT-A injections in CM. Only every second surveyed physician carried out at least one procedure last year; most performed it once every few months. Such a frequency of injections does not allow for developing and maintaining the experience in CM therapy with OnaBoNT-A.

Based on this survey's results, it can also be concluded that most AMPs perform the CM treatment procedure misusing BoNT-A. Many of them, apart from OnaBoNT-A, also use other types of BoNT-A for treatment, which are not registered and tested for CM treatment. Almost all dilute the drug incorrectly, usually using a larger amount of 0.9% saline, a typical dilution protocol for treating wrinkles. Some clinicians mix BoNT-A with lidocaine, perhaps trying to gain additional therapeutic effects.

Unfortunately, only a third of respondents perform injections as per the PREEMPT protocol, a third modify it at his/her discretion, and the last third do not even know the protocol. Only half of those familiar with the PREEMPT paradigm administer Follow-the-Pain injections. Half of the physicians administer the incorrect dose of OnaBoNT-A per injection point, and most give a lower dose, due to worrying about side effects.

The depth of drug administration is a strategic element of the technique in the procedure of BoNT-A injection in CM. Most AMPs inject BoNT-A deep into the muscles and perform injections at the wrong angle, adhering to aesthetic medicine treatment protocols. Most AMPs inject the drug into the frown muscle as recommended by the BoNT-A manufacturers, as they treat glabellar wrinkles and direct the needle upwards and laterally from the eye (towards the forehead). This corresponds to the original PREEMPT paradigm from 2010 [14]. According to this, the BoNT-A injection site in the PM is approximately 1.5 cm (i.e. one finger width) above the medial superior edge of the orbital ridge. The midpoint of puncture into the longitudinal muscle of the nose is located on the line connecting both injection points in the area of the frowning muscle, also about 1.5 cm above the edge of the eye socket, which in turn does not correspond to the location of the puncture in the longitudinal muscle of the nose in the treatment of lion's wrinkle. This one is shifted slightly downwards, even to the level of the bridge of the nose. Currently, according to the recommendations of Blumenfeld et al. from 2017, in the glabella area, BoNT-A should be administered at an angle of 90 degrees, not obliquely upwards [11].

Similarly to the study by Begasse de Dhaem et al. [24], most of the AMPs do not aspirate before injecting, which is recommended for CM treatment with BoNT-A in the temple and occipital area. The topic of aspiration during injections in aesthetic medicine still raises much controversy, and many experts have differing opinions [26]. Nonetheless, in areas with rich vascularity such as the temporal and occipital regions, it is worth aspirating during the injection so that the drug does not end up in the vessel. However, accidental injection of a small amount of drug into the vessel is not dangerous and is less important than losing the drug that is supposed to act on the nerve endings in this area.

The surveyed doctors did not know the principles of CM therapy using BoNT-A. OnaBoNT-A should be administered at least three times at 12-week intervals to evaluate the clinical effect. Only a few AMPs administer BoNT-A at least three times at 3-month intervals. Others repeat the treatments irregularly, usually when migraine recurs. In the case of such inconsistencies in therapy, the effectiveness of BoNT-A may be low, which was confirmed by the respondents; only 1/3 of them assess the effect of the treatment as very good.

AMPs are limited by worrying about incorrect procedures, from qualifying the wrong patient to the occurrence of side effects. Ignorance of the pathogenesis of migraine, neuroanatomy, and the mechanism of action of BoNT-A causes many AMPs to be worried about damage to the nervous structures and neurological complications. Ptosis, which is more common after wrinkle treatment than after CM treatment, is not as worrying as the presence of other neurological complications. On the other hand, some doctors are afraid of the unsightly

appearance of the patient, which may be related to the specificity of the PREEMPT protocol and the possibility of medial brow ptosis, full eyebrow ptosis, or the Mephisto phenomenon in anatomically predisposed patients. The anatomical differences should be considered in every case, but the general principles of the PREEMPT paradigm should be preserved.

Almost half of the respondents were afraid of patient dissatisfaction with the performed procedure or the entire therapy, the ineffectiveness of BoNT-A, and negative opinions or even claims made by the patient. Such worries are frequent among clinicians performing procedures in the commercial healthcare market, especially in aesthetic medicine.

Not all surveyed physicians knew the new possibilities of BoNT-A reimbursement in CM treatment in Poland [8, 9]. They also believed Polish migraine sufferers do not receive sufficient information about this therapy and that the high price and uncertainty of the therapeutic effect discouraged them from BoNT-A treatment.

Since July 2022, Polish neurologists and patients with CM migraine have been widely informed about free treatment programmes via the National Health Fund, the Polish Neurological Society, the Polish Headache Society, and social media websites. The truth is that the area of practical education in the field of BoNT-A in CM treatment in Poland is addressed mainly to neurologists. The Polish Headache Society and the manufacturer of OnaBoNT-A run free educational programmes, conferences, and workshops in which neurologists can participate. Doctors in other specialisms, including those with the skill of aesthetic medicine, have little opportunity to acquire knowledge and experience in this area. The only chance for them is to follow scientific reports or participate in commercially organised courses in aesthetic medicine, where the subject of CM is implemented. For most of the surveyed physicians, their source of information on CM treatment is the internet. For this purpose, they use the Google search browser or YouTube. The respondents confirmed they have little experience or knowledge in this area. They wanted to gain this knowledge and improve their skills in treating CM with BoNT-A. In additional comments at the end of the survey, several physicians asked for additional courses and training.

This study has several limitations; it relies on respondents' willingness to answer the survey, and despite a high responder rate it is not free of non-response bias. The sample size was relatively small compared to the number of AMPs in Poland; thus, the accurate representation of the respondents' population is limited. The cross-sectional design does not support determining cause and effect relationships; however, this first survey can create a baseline for a similar assessment to be conducted in the future, i.e. after implementing different educational initiatives. To make this possible, the original and translated questionnaire is published alongside this manuscript.

## Conclusions

AMPs want to treat patients with CM with BoNT-A and strongly need education. Unfortunately, those doctors who have already conducted such treatment have mostly done it incorrectly, which is caused by ignorance of the CM diagnosis criteria and the current therapeutic protocol. This may result in the lack of effectiveness of BoNT-A treatment and even the intensification of symptoms due to the chronification of migraine in a patient not supervised by a neurologist.

To prevent such events, an appropriate educational programme should be implemented for all physicians authorised to administer BoNT-A in Poland. This would allow the broader therapeutic resources required to cope with the burden of CM in Poland [13].

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