

## Preliminary Report on the Use of Autogenic Feedback Training in the Treatment of Migraine and Tension Headaches

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A new technique for psychosomatic self-regulation, called autogenic feedback training, was developed by combining biofeedback techniques with autogenic training, a therapeutic method involving simultaneous management of mental and somatic functions. The approach used to control autonomic nervous system functioning was voluntarily increasing blood flow into the hands which is directly related to an increase in hand temperature. By chance, one research subject found that her sudden recovery from a migraine attack coincided with an increase in hand temperature of 10°F in two minutes. This observation culminated in a study of 28 migraine and tension headache sufferers who used hand-warming exercises to regulate their headaches. From this study, regulation of blood flow to the hands seems a useful treatment for migraine attacks. Tension headaches may require a different form of biofeedback training. The encouraging results of this study should provide impetus to other basic research in psychosomatic medicine.

For at least three thousand years, migraine headaches have been a subject of study and discussion. Hippocrates used the expression "hemicrania" and Galen spoke of this entity in his writings. Gradually "hemicrania" evolved into our present word "migraine" (1). The exact cause of migraine is still unknown, although it is clear that symptoms of this type of headache are mediated through the autonomic nervous system.

From 1932 until the time of his death, Wolff probed the pathophysiology of migraine headaches through systematic studies. As a result of his work, it seems likely that there is a "headache stuff" (2)

which causes both the edema around blood vessels and the pain which persists long after the prodromal symptoms have subsided. Inability to control the effects of this substance increases the morbidity of migraine attacks.

The migraine syndrome has been defined by many clinicians and investigators. For our purpose the definition as given by Wolff will be used. "The outstanding feature of the migraine syndrome is periodic headache usually unilateral in onset which may become generalized. The headaches are associated with 'irritability' and nausea and often with photophobia, vomiting, constipation, or diarrhea. Not infrequently the headaches are ushered in by scotomata, hemianopia, unilateral paresthesia, and speech disorders. The pain is commonly limited to the head. Often other members of the patient's family have similar headaches" (3).

In 1953, Wolff, et al, made a study of 119 kindred and found migraine headaches frequently occurring in two to three generations. Three families had evidence

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of migraine attacks in five generations. The inheritance of this trait is thought to be through a recessive gene with a penetrance of approximately 70 percent (2). This could suggest a common, inherited biochemical defect; however, an environmental factor should also be considered. A personality type characterized as ambitious, perfectionistic, rigid, tense or resentful, yet efficient and poised has been described (4). Emotional crises in these individuals have precipitated migraine attacks.

Tension headaches result from chronic muscle contraction and have a close relationship to emotional conflicts. Onel, et al, have shown that blood flow in the affected muscle is increased (5). Thus, both migraine and tension headaches could possibly be ameliorated by regulation of blood flow via the autonomic nervous system.

Neal Miller in a recent paper has presented research that challenges the concept that "learning" in the autonomic nervous system is a reflection of striate activity. Through animal studies it has been shown that heart rate, gastrointestinal contractions, blood pressure, and the rate of saliva and urine formation, can be directly controlled through "operant conditioning techniques" by way of the autonomic nervous system (6). In humans there is recent scientific evidence for voluntary control of the autonomic nervous system through the training techniques of Yoga (7), biofeedback training (8-11) and the work of Schultz and Luthe on "autogenic training" (12).

Autogenic training, according to Luthe, is a basic therapeutic method of a series of psychophysiological-oriented approaches which are in contrast to other medical or psychological forms of treatment (12). It involves the simultaneous

regulation of mental and somatic functions. The desired somatic responses are brought about by passive concentration upon phrases of preselected words (12). The specific somatic responses in preliminary training brought under voluntary control are heaviness in the limbs, warmth in the extremities, control of heart rate, sense of warmth in the abdomen, and cooling of the forehead.

The usual psychosomatic approach to medicine has emphasized stress as a factor producing dysfunction and pathological change in the patient. Autogenic training evokes changes diametrically opposed to those produced by stress; thus, the autogenic approach has importance for preventive medicine (12).

In treating migraines, Schultz and Luthe reported that the majority of their patients responded with lessened frequency and intensity of headaches with autogenic training exercises. A number of patients reported a cure after several months of practice and learned to interrupt the onset of an attack by starting autogenic exercises as soon as prodromal symptoms appear (12).

Biofeedback training, a recently developed technique, holds promise of accelerating psychosomatic self-regulation. This technique, when combined with autogenic phrases, is called autogenic-feedback training and uses visual and auditory devices to show the subject what is happening to normally unconscious bodily functions as he attempts to influence them by his use of mental, emotional, and somatic visualizations (9). One physiological function experimented with was increasing the hand temperature as an index to the voluntary control of the autonomic nervous system.

The possibility of using autogenic-feedback training for migraine patients was

## AUTOGENIC FEEDBACK TRAINING

suggested by the experience of a research subject who, during the spontaneous recovery from a migraine attack, demonstrated considerable flushing in her hands with an accompanying 10°F rise in two minutes. Knowledge of this event quickly spread throughout the laboratory and prompted two individuals with migraine to volunteer for training in hand temperature control. One was wholly successful; the other had a partially beneficial result. On the basis of this pre-pilot experience, it seemed useful to conduct further study with a number of headache patients in a clinical setting.

### METHODS

Subjects in the pilot study have been either self-referred or referred by physicians in the community. Each patient before participating in the project had a detailed history, complete physical examination, and laboratory tests which included electroencephalogram, skull x-rays, echoencephalogram, chest x-ray, serological test for syphilis, CBC, and urinalysis. Subjects with serious physical and/or psychological disorders were eliminated from the study.

Of 28 subjects there were 22 females and 6 males; all were white. One subject was eliminated from the group because of too brief a period of observation. The age at starting the project ranged from 21 to 63 years. Ten of the subjects with a positive family history of headache had migraine attacks. None of the subjects with tension headaches had a family history of head pain. Twenty subjects fit the

definition of migraine headache as defined earlier in the paper by Wolff. Two had questionable migraine attacks. One of the questionable migraine subjects has had continuous right frontotemporal headache for the past three to four years. The other had continuous right mandibular pain for the past several years but also had intermittent right frontotemporal headache. Only the right frontotemporal pain responded to the handwarming exercises. Six subjects had tension headaches.

The patient received instructions in the use of a "temperature trainer" which indicated the differential temperature between the midforehead and the right index finger. He was also given a typewritten sheet containing autogenic phrases (Table 1). The first group of phrases helped the subject achieve passive concentration and relaxation of the whole body. The second group of phrases focussed on achieving warmth in the hands. After learning the phrases, the participant dispensed with the typewritten sheet and visualized the changes while watching the temperature trainer. A positive response as indicated by the trainer was accomplished by increasing temperature of the hands in comparison with the forehead and helped the subject to learn to observe the changes that occurred in his hands while practicing. Since absolute temperatures were not measured at either site, it is impossible to know whether a positive response indicated an actual increase in hand warmth or a decrease in the forehead temperature. However, it should be noted that a positive response was always associated with a feeling of increased warmth in the hands without any apparent change of feeling in the forehead. Recent unpublished results in our laboratory with experimental subjects indicate that the positive temperature response is almost entirely due to increased hand temperature. The correlation between subjective and objective responses is an important aspect of the training exercises if the subject is to overcome his initial doubt with respect

TABLE 1 Autogenic Phrases

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I feel quite quiet . . . I am beginning to feel quite relaxed . . . My feet feel heavy and relaxed . . . My ankles, my knees, and my hips, feel heavy, relaxed, and comfortable . . . My solar plexus, and the whole central portion of my body, feel relaxed and quiet . . . My hands, my arms, and my shoulders feel heavy, relaxed and comfortable . . . My neck, my jaws, and my forehead feel relaxed . . . They feel comfortable and smooth . . . My whole body feels quiet, heavy, comfortable and relaxed.

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I feel quite relaxed . . . My arms and hands are heavy and warm . . . I feel quite quiet . . . My whole body is relaxed and my hands are warm, relaxed and warm . . . My hands are warm . . . Warmth is flowing into my hands, they are warm . . . warm.

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to the control of basic physiological processes. A positive response on the trainer affords the patient confidence in doing his exercises.

Each participant practiced daily with the temperature trainer and kept a record of the practice session on a special data sheet. Pertinent details included the hour of the day, the position (sitting or recumbent), temperature change as shown by the meter and estimation by the patient of his level of concentration, his overall relaxation, and his sense of warmth in the hands. The patient also recorded severity of headache between practice sessions, type of medication, and dosage. Such a record was expected of the participant as long as he remained in the project.

At first the subject was seen on a weekly or biweekly basis until he had a consistent sense of warmth in his hands and positive responses on the temperature trainer. After mastering the handwarming technique he practiced on alternate days without the trainer which later was withdrawn. He was expected to continue daily practice sessions and was encouraged to use the handwarming to help control tension and headache. In two to four months the frequency of office visits was reduced to once monthly. The expected followup period is two to three years. During his regular office visits pertinent data which may have influenced or precipitated the patient's headaches were recorded.

The clinical investigator's global clinical judgment of each patient's success or failure was compared with the independent assessment by two psychologists of the regression lines of three scales—severity of headache, sum of the potency of the analgesics, and number of analgesics used. The potency scale represented the sum of the strengths of the analgesics used over a 24-hour period. Each analgesic was assigned a number, the extremes of which were aspirin (one) and morphine (seven). The other scale of analgesic usage was the number of

different types used in 24 hours. The subjects also rated the severity of the most intense period of headache in each 24-hour period on a five-point scale.

**RESULTS**

Agreement was reached on 19 subjects and of these 15 had migraine and 4 had tension headaches (Table 2). Of the 15 migraine subjects, 12 were evaluated as improved and 3 as unimproved. Two of the subjects with muscle contraction headaches seemed improved and 2 unimproved.

Of the 8 subjects on whom there was disagreement, 4 had migraine headaches, 2 questionable migraine attacks, and 2 tension-type head pain. The internist judged that improvement occurred in 4 migraine sufferers, 2 with tension headaches, and one of the 2 in the questionable migraine category.

Of the 19 migraine patients 12 (or 63%) were evaluated as improved by both the internist and two psychologists, while only 2 (or 33%) of the 6 with tension headaches and none of the 2 with questionable migraine attacks were concurred on. No subjects on which there was disagreement were included in the percent improved column. One patient with migraine attacks was not evaluated be-

**TABLE 2 Classification of Headache Type and Evaluation of Treatment**

Type of headache	# of subjects on which there was unanimous agreement		# of subjects on which agreement was not unanimous	Percent improved
	Improved	Unimproved		
Migraine	12	3	4	63
Tension	2	2	2	33
Uncertain	0	0	2	0
Total	14	5	8	

## AUTOGENIC FEEDBACK TRAINING

cause of a too brief period of observation.

The exploratory nature of the project and varying lengths of practice with temperature feedback training prohibited any systematic statistical analyses. The period of observation for the evaluated group varied from one month to 22 months, with a mean of 7.7 months.

### COMMENTS

Although the agreement between the internist's clinical judgment and the two psychologists' independent assessments was moderately good, the devised scales do not measure all the variables upon which the internist's opinion was based.

For instance, some subjects suffered with more than one type of headache and had not been asked to distinguish between them. Such persons had combinations of migraine, tension, and/or "sinus" headache. A subject could control his migraine headache and still have a record showing little improvement in headache severity if he was troubled with "sinus" headaches as was the case with three participants.

Due to the small number of patients with tension headaches it is not possible to reach a definite conclusion regarding the effectiveness of handwarming in this entity. However, tension headaches may require a different kind of biofeedback training. The technique developed by Budzynski, Stoyva, and Adler (13) seems promising and in the future we plan to treat patients with such headaches by biofeedback training that produces low electromyographic potentials in the frontalis or trapezius muscles.

At the outset it was hypothesized that decrease in headache severity and type and dose of analgesic used would corre-

spond with clinical judgment of improvement; however, information obtained by the internist during regular interviews did not necessarily correlate with the devised scales. The rapidity and ease with which the patient succeeded in warming the hands contributed greatly in aborting milder headaches. Many patients were improved simply by eliminating such symptoms as nausea or vomiting and others could recognize and handle prodromal somatic manifestations of tension much more easily with the exercises. Both factors contributed to the subjects' sense of improvement. The visits to the emergency room for injections, time spent in the hospital, absenteeism from work, the length of stay at home during an attack, and the altered behavior with family and fellow workers were not directly assessed. All these factors will need future evaluation.

Modifications in the project were made as it progressed. One such change was an individual's recording severity and frequency of headache and medication usage one month prior to training in handwarming so that a baseline for each patient was established.

So far, the majority of patients have had the capacity to produce warmth in their hands within one to eight weeks. A beginner's chief difficulty is the recognition of feeling in the hands associated with rise in skin temperature; to some this may be actual warmth, to others it may be throbbing. Since our experience suggests that most subjects acquire the technique more rapidly than originally thought, the training phase is presently limited to one month. Then the trainer is withdrawn and the subjects are advised to continue daily practice in handwarming. When the participant is able consistently to produce handwarming, he is urged to continue to

apply his acquired skill in the prevention and amelioration of the attacks.

The reasons for individual failure varied. One subject lost interest soon after she entered and declared later that she preferred Yoga to handwarming. Two individuals lost interest (they thought the training bordered on mysticism). One individual suffered almost constantly with frontotemporal pain; his exact diagnosis remains unclear. Two faithful participants in the project for one year showed no improvement.

There is need for a more effective treatment modality for tension and migraine headaches. Psychotherapy may be useful for some patients, but it is too often out of reach financially and is an objectionable form of treatment to them. Potent drugs have been developed for management of migraine headaches but often have deleterious side effects. More effective and safer drugs are promised for control of migraine but are still in the experimental phase. Some patients with migraine are not helped by any type of medication. For these, temperature regulation of the hands offers an alternative method of treatment.

The encouraging results of this project should justify not only an expanded evaluation of the effectiveness of temperature training in the control of migraine, but also should provide greater impetus to other basic research in psychosomatic medicine.

#### SUMMARY

A new technique for psychosomatic self-regulation, called autogenic feedback training, was developed by combining biofeedback techniques with autogenic training, a therapeutic method involving

simultaneous management of mental and somatic functions. Autogenic training developed out of the work of Schultz and Luthe and its effects on the body are diametrically opposed to changes elicited by stress.

Research with animals has shown that the autonomic nervous system can be controlled directly by "operant conditioning techniques." Voluntary control of the autonomic nervous system in humans has been demonstrated in Yoga, autogenic training, and biofeedback training.

The symptoms of a migraine attack are mediated through the autonomic nervous system and are often evidenced by increased blood flow in the head. In muscle contraction headaches one group of investigators has demonstrated increased blood flow through the affected muscle. Thus, both migraine and tension headaches might be ameliorated by regulation of blood flow through voluntary control of the autonomic nervous system.

Increased blood flow in the hand is associated with an increase in hand temperature. In this study 28 patients suffering from migraine and from tension headaches used handwarming exercises to ameliorate or abort their headaches. The internist's clinical judgement was compared with the independent assessment of the other two authors' observation of regression lines of three scales—severity of headache, sum of potency of the analgesics used, and the number of pain-relieving medications. The scales consisted of numerical scores obtained from daily records kept by the patient. One patient was eliminated from the group because of too brief a period of observation. Of the remaining 27 participants, agreement was reached on 19. Of these, 15 had migraine and 4 had tension

## AUTOGENIC FEEDBACK TRAINING

headache. Out of 15 migraine subjects, 12 were improved and 3 unimproved. Twelve migraine sufferers out of a total of 19 (or 63%) were improved.

From this study, temperature regulation of the hands seems a useful adjunct in the

treatment of migraine attacks. Tension headaches may require a different type of training. The encouraging results of this study should provide impetus to other basic research in psychosomatic medicine.

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