

## **Olav Skille: Vibroacoustic Research 1980 - 1989**

Vibroacoustics = The use of sinusoidal, low-frequency (30Hz - 120 Hz), rhythmical sound-pressure waves mixed with music for therapeutic purposes. The principle and procedure were first described by Skille at the 1st ISFMIM symposium in 1982.

There are, at present, more than 20.000 hours of use on record. Most records are of anecdotal nature, and have basically been concentrated on testing Skille's descriptions and findings in practise. The effects may be sorted in three main areas:

- 1: Spasmolytic and muscle relaxing effect.
- 2: Increase of blood circulation in the body (brain included).
- 3: Marked, but variable, effects on the vegetative system.

VA-therapy has a more physical direction than most other therapies using music in medical contexts. Music and frequencies are transferred directly to the body. The patient is placed directly on a chair or bed filled with loudspeakers.

### **RESEARCH AND EMPIRICAL FINDINGS**

#### Estonia:

A research team composed of Professor Saima Tamm, Psychologist I. Ojaperv and psychiatrist Erika Saluveer at the Medical Centre of Tallinn Pedagogical Institute have studied 40 neurotic patients and have come to the conclusion that 10 treatment sessions seem to be the most effective number of treatments. Of the 40 patients, 25 have got the treatment of ten sessions, and a report has been made. The information have been processed by computer and are within the required statistical probability levels.

The patients were first consulted by various physicians, - therapist, neurologist and cardiologist, and the patients with diagnosis hypertension were treated by the VA-team. Another group of patients were selected by the psychiatrist from the dept. of neurosis in the Psychiatric Hospital of Tallinn.

#### Methods used

1. The psychological condition of the patients was estimated by the Taylor test. The Taylor test estimates neuro-psychical, somato-psychical and somatogenic distress.
2. The asthenics were identified by a test compiled by Professor Tamm, The test consists of 59 questions and gives an evaluation in points. The average index is normally 68 - 70.
3. Blood pressure was measured before and after treatment during the ten-time treatment. The initial BP was measured after 5 minutes rest, lying on the VA bed.
4. ECG was made before and after the VA procedure.
5. EEG was made before and after the VA procedure.

Patients treated

N= 25. 72% female, 28% male.

Age: 21-30 years: 12%, 31-40 years: 32%, 41-50 years: 24%, 51-60 years: 28%.

Profession: 16% head of educational establishment  
 16% head of industrial enterprises  
 56% social workers  
 16% various professions

Complaints, by main syndrome  
 36% depression  
 32% asthenics  
 16% hypochondria  
 16% hypertension

Characterisation of main complaints (Tamm-scale)

Normal index : 68 - 70.

57,30 Neuropsychical distress  
 46,68 Sociopsychical distress  
 43,03 Somatic distress  
 126,60 Asthenia

Subjective symptom reports:

1) Cry often	50,0%
2) Head-ache	58,3%
3) Tachycardia	58,3%
4) Lack of concentration	50,0%
5) Restless dreams	75,0%
6) Constipation	54,2%
7) Indigestion	62,5%
8) Easily stirred up	58,3%
9) Stomach troubles	50,0%
10) Poor appetite	42,2%
11) Sweating	57,9%
12) Trembling of hands	38,9%
13) Apathy	66,7%

A correlation analysis was carried out when evaluating the effect of treatment on individual symptoms. The results are described in the conclusion of the survey.

A histogram analysis of the changes in blood pressure shows the progress of BP changes during the 5 weeks of the described project:

Weeks	Before treatment		After treatment	
	RR syst. > 130	RR diast. > 80	RR syst. > 130	RR diast. > 80
1.	44,6%	56,0%	32,0%	52,0%
2.	36,0%	44,0%	36,0%	46,0%
3.	50,1%	45,5%	50,2%	41,7%
4.	54,1%	56,5%	43,4%	52,1%
5.	47,6%	38,2%	38,2%	42,8%

The Estonian research team is summing up their findings by describing the results this way:

1. The treatment of elderly patients was more effective.
2. Women are more easily cured than men (They became less tired, less headache, less distressed, less trembling of hands)
3. During the course of treatment the blood circulation was improved.
  - a) acro-cyanosis is diminishing. Temperature of limbs rises.
  - b) systolic and diastolic blood pressure drop
  - c) Head-ache and nausea vanish. Improvement of cerebral blood circulation
4. ECG - no remarkable improvement after one procedure, the studies go on in this field.
5. EEG - large individual differences and it still needs more research.

The effect of treatment is as follows: Rise of self confidence, less stomach troubles, less head-ache, less depression and asthenia. The patients are more willing to work.

#### CONCLUSION

The Estonian team say that the VA-methods can play a considerable part in the treatment of neurotic patients and patients with hypertension. Good results have already been achieved. However, there are many problems still to be solved.

The research at Tallinn Pedagogical Institute, Dept. of Medicine goes on.

#### England:

A single-blind study of the difference between the effects of Vibroacoustic therapy and the same procedure using music alone in reducing high muscle tone in multiply handicapped people and 2) the effects of the same parameters on oedema in mentally handicapped people have been carried through at Harperbury Hospital, Herts., by A.L. Wigram, B.A., L.G.S.M. (MT), VATH and L. Weekes, M.C.S.P., S.R.P..

1) 3 male and 7 female subjects in a large Mental Handicap Hospital took part in trials to determine whether high muscle tone could be reduced by introducing low frequency sound at 44 Hz or 55 Hz into a treatment programme involving music. The subjects' ages varied from 28 to 77 years and their range of functioning ranged from very profoundly handicapped to moderately handicapped. All subjects had measurably high muscle tone which affected them in different ways. The average age of the male subjects were 51 and the average age of the female subjects was 44. The overall average age of the 10 subjects was 46.

2) 2 male and 1 female subjects were also involved in an experiment to evaluate whether the condition of chronic oedema could be alleviated and the size of limbs reduced by the use of Vibroacoustic therapy as opposed to music alone. The subjects were all residents of a mentally handicapped Hospital, and their average age was 52.

The design of the study was identical for the two groups.

## Materials

The equipment used was modelled on the descriptions Skille had made in the late 70's and early 80's with local modifications.

Two 18" loudspeakers were used in the sprung bed designed for the study. On top of the springs were a single polythene sheet and a 1" pile sheepskin. One half of the bed could be lifted up to an angle of approximately 30 degrees. The speakers were connected to an amplifier with 120 watts output per channel with the ability to increase and decrease the bass volume.

A cassette desk was used to play the therapy tapes used in the study,- for the clients with high muscle tone a tape with a single tone of 44 Hz and another with a single tone of 55 Hz throughout were used. For the oedema group a tape with a single tone of 40 Hz were used.

## Design

The experiment was set up as a repeated measures design across two experimental conditions. Each subject undertook a minimum of 12 trials, 6 in each condition. Condition A gave the subject 30 minutes on the Vibroacoustic unit with Vibroacoustic stimuli. In condition B the subject was given music alone.

In the muscle tone trials, the dependent variables were the measurements taken on the subjects of their degree of extension before and after each session. The dependent variables were coded and are as follows:

1. Left shoulder to right shoulder
2. Right shoulder to right arterial archery
3. Left shoulder to left radial archery
4. Right elbow to side
5. Left elbow to side
6. Nose to navel
7. Right side greater trochanter to right side lateral malleolus
8. Left side greater trochanter to right side external malleolus
9. Base of right patella to base of left patella.

For each subject in each trial, an independent evaluator measured the maximum range between each of the two points in the dependent variables pertinent to each subject, and then was not present during the course of the trial. When the trial was finished, the independent evaluator repeated the same measurement procedure, without knowing which treatment condition (A or B) had been used. This formed the basis of a single-blind test, in which the subjects may have been aware of which condition they were in, but the evaluator was not. The course of the trials was randomly decided for each subject.

In the oedema group where 3 patients were monitored for oedema, the same design was used, and the same number of trials in the two conditions undertaken. The dependent variables were:

- a. Base of right great toe
- b. Base of left great toe
- c. Instep of right foot
- d. Instep of left foot
- e. Right ankle round the heel
- f. Left ankle round the heel
- g. Circumference of right leg 3 cm above lateral malleolus

- h. Circumference of left leg 3 cm above lateral malleolus
- i. Circumference of right leg 10 cm above lateral malleolus
- j. Circumference of left leg 10 cm above lateral malleolus
- k. Circumference of right leg 20 cm above lateral malleolus
- l. Circumference of left leg 20 cm above lateral malleolus

#### Blood pressure and heart rate.

Systolic and diastolic blood pressure as well as the pulse was measured before and after each trial in both conditions

#### PROCEDURE

Each subject was placed on a VAT unit with adequate support under their head. The body was given support by pillows containing polystyrene beads when this was necessary. Blood pressure and pulse were measured, and then the measurements were taken as specified for each subject. The evaluator then left, and the therapist in charge started the tape. The controls of the equipment were set uniformly in all trials and conditions. The treatment proceeded, and the therapist remained sitting quietly in the room with the client. At the end of the treatment all controls were turned to 0 and the independent evaluator came in and repeated the initial measurement procedure.

The patients were undressed to the point of absolute necessity to take the measurements, and always covered with a blanket.

The blood pressure and pulse was measured by digital blood pressure monitors. The following models were used:

- 1. Cm - Model DS-175 Auto Inflation BP Monitor.
- 2. Cm- Model DS-55p Digital BP Monitor.

#### RESULTS

By measuring the difference in maximum range of movement achieved throughout the trial (found by comparing the "before" and "after" situations) and labelling increase of movement with a "+" and reduction of movement with "-" one is left with a mean improvement (or deterioration) due to introducing or not introducing low frequency sound.

The research team found that the best way of expressing changes in the observed parameters were to describe the changes in % increase or decrease in relation to the observed "before" levels before the trials started.

Table 1 gives the means of mean scores of increased or decreased range of movement within minimum and maximum ranges, shown as percentage scores for both conditions

Measurement	1	2	3	4	5	6	7	8	9	%tot
LFS+music (LFS =	+18	+15	+10	+21	+26	+27	+09	+04	+19	+13
			Low			frequency				sound)
Music alone	-04	-02	+01	+03	+10	+16	-01	0	+01	+01

Table 1: Increase (+) and Decease (-) of movement range in %

Table 2 indicates the significance levels of the percentages given in table 1:

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Total Measurements	+	-	P
n=	40	37 03	< .004

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Table 2: Significance level of values in Table 1

Table 3 is a significance test on the mean scores of the measurements, where the number of subjects being measured at the given positions exceeded 5. The test was applied on the normalised data from Table 1.

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Measurement #	+	-	P
2	7	0	.0079
3	7	2	.0899*
7	5	0	.0313
8	5	1	.1094*
9	7	0	.0079

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Table 3: Significance levels of difference between Condition A & B where n at each measurement# = < 5.

\*= not statistically significant

Table 4 shows a significance test on the absolute data compared between the two conditions.

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Measurement #	+	-	P
2	36	05	<.0003
3	37	13	.0005
5	05	00	.0313
7	21	09	.0214
8	22	10	.0251
9	08	34	<.0015

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Table 4: Significance levels of difference between Condition A & B - all

measurements.

\* = not significant.

The data show a greater degree of extension when low frequency sound was used in the trial.

Table 5 indicates the changes in BP and pulse levels. The table indicates that there is significant change in Systolic Blood pressure. However, the number of observations is small, and there are indications that the significance might not be so clear if the test had been taken on a more representative population.

	+	-	P
Systolic BP	9	0	.0020
Diastolic BP	4	5	*
Pulse	4	4	*

Table 5: Significance levels of changes in BP and pulse

\* = No significance

A very small group of three subjects were run for the oedema trial, and although 12 different measures were taken overall, only measures a and b were common in all three clients. The test indicate that the low frequency sound condition gave a small, but significant, reduction in the measurements compared with the music alone condition.

#### DISCUSSION/CONCLUSION

The outcome of the trials on clients with high muscle tone showed consistently that when low frequency sound (either 44 or 55 Hz) was used with the music, a greater reduction in muscle tone and an improved rate of motion was achieved than when music alone was used.

The results obtained from measuring blood pressure fluctuated quite considerably, and only the regular drop in systolic BP gave any level of significance.

The oedema difference scores, although very small, also gave significant indication of improvement due to low frequency sound.

The research in England continues, and more emphasis will be laid on obtaining data from subjects not being patients of the hospital.

#### Finland:

Petri Lehtikainen has completed a three month study of the effect of VibroAcoustic therapy on occupational stress in an insurance company. N = 32. The participants were divided in two groups.

Group 1 consisted of 15 persons and got traditional stress-reduction treatment. (Autogenous training, processual insight, communication training etc.) Their treatment was distributed in 1 hour passes once a week.

Group 2 consisted of 17 persons who got two half-hour passes of VibroAcoustic therapy every week.

The experiment was carried out from February to May 1987.

Parameters used:

- 1 Normal physical examination
- 2 Psychiatric interview
- 3 Spielberger scale
- 4 Hamilton scale
- 5 Stress-hormone analysis (adrenalin, nor-adrenalin, cortisol)

The hypotheses for the projects were as follows:

1. A certain education is able to help workers to cope with stress-situations and to strengthen the professional identity.
2. A certain physical relaxation treatment is capable of reducing situational stress.

The results are confirming both hypotheses.

#### CHANGES OF STRESS-FACTORS IN THE TESTED GROUPS

There is a remarkable difference between the groups when we look at the number of persons who report unchanged or reduced stress-level. In group 1 : 54 % compared with 80 % in group 2.

#### CHANGES IN ANXIETY FACTORS IN THE TESTED GROUPS

The anxiety level was decreased in both groups. Unchanged or decreased anxiety was reported by 77 % in group 1 and by 80 % in group 2.

#### HAMILTON-ANXIETY

Unchanged or decreased anxiety was reported by 62% in group 1 and 87% in group 2.

#### CHANGES IN DEPRESSION FACTORS IN THE TESTED GROUPS.

Unchanged or decreased depression was reported by 85% in group 1 and 87% in group 2.

#### DISCUSSION

The research project was carried out on two groups, totalling 37 persons. This number is too low to give the results statistical significance, but is big enough to give us a strong indication that progress was made in both groups, but group 2 has obtained better results in most of the factors measured.

If this trend is supported by other projects, it will be wise to develop the VibroAcoustic method further to suit the demands of professional life for stress-reduction methods and equipment.

### The Ronni-project

A study of the effect of VA treatment of nine severely retarded children in Ronni Keskuslaitos was conducted during September - December 1988. Each patient received 15 treatments. The nurses in the research team evaluated the following factors:

#### 1) Changes in the general state of mind

The results show that the immediate effect of VA-therapy was obvious. All patients became more aware of the treatment situation and showed positive emotional reactions. In three cases this improvement was to some extent transferred to other, on-treatment, situations, but the clearest effects were limited to the treatment situation.

#### 2) Changes in social interaction

Social interaction showed improved development. Both eye- and voice communication increased in the therapy situation. This improvement was not observed outside the therapy sessions.

#### 3) Changes in motor behaviour (mobility)

The motor activity improved in all cases. One patient reacted so well in the VA-therapy, that the physiotherapist started to do all of his physiotherapy on the VA-bed.

#### 4) Changes in general behaviour

Changes observed in changing the general behaviour were not too obvious. However, in two cases remarkable improvement was observed: The severely aggressive behaviour of one boy disappeared, and one severely autistic girl became more open and co-operative.

#### 5) Changes in blood circulation

One patient had severe problems with her blood circulation, and this problem was helped considerably by VA-therapy.

The short term results in this group seem to be very positive. The long term changes are not so obvious. This is, however, understandable, because the patients suffer from very severe disability, and the described treatment period lasted only for a few months. The results were so satisfactory however, that the leading physician decided to continue the experiment, and to develop this project further.

### REPORTS FROM PRACTICAL USE IN VARIOUS CONTEXTS

#### Norway:

#### VARIATIONS IN BLOOD PRESSURE AND PULSE DURING VIBROACOUSTIC TREATMENT. PILOT STUDY.

In TRILAX Centre, Steinkjer, routine measurements of Blood Pressure (BP) and Pulse (P) are done to evaluate the effect of treatment on the clients. A sample of 82 measurements show a marked, but varying effect on the measured

functions. The medium values were : Syst. BP -4,34. Diast. BP -5,35. Pulse - 4,49.

Rising values were found in about 25 % of the cases.

The measured values are checked initially (A), after 5 min rest (B) and at termination of treatment (C). The variation of values A-B, B-C, and A-C are described.

The necessity for further studies in order to increase the predictability for reduction of BP is emphasized.

#### THE BASIS FOR THE STUDY.

In TRILAX Centre, Steinkjer, one has included measurement of Blood Pressure and Pulse in the standard procedure of client reception. Systolic (SPB) and Diastolic (DBP) blood pressure and Pulse (P) are measured.

The study includes 82 randomly chosen measurements of patients coming for treatment during fall 1988. The all-over distribution of patients show 30% men and 70% women.

#### Age distribution:

20-29 years : 6%.    30-39 years : 17%.    40-49 years : 16%..  
 50-59 years : 18%.    60-69 years : 20%.    70-79 years : 14%  
 80-89 years : 3%

The equipment in use has been a Multivib Chair VA 115 or a TRILAX Bed VB 555 and signal unit SU 225 from Vibroacoustics a/s. The therapy programs are made by VibroSoft a/s and are supplied on C-60 cassette tapes.

The music which, for research purposes, is used to mask the low frequency signals is supplied by Spirit Music Inc., USA, and the composers Otto Romanowski, Finland and Sven Grünberg, USSR Estonia, Soviet Union.

A Digital Electronic Blood Pressure Monitor from Select a/s was used as measuring instrument.

A therapy session normally lasts between 20 and 29 minutes.

#### RESULTS

##### Basic values :

BP at arrival : m = 138,09    sd = 14,37  
 DBP at arrival : m = 86,72    sd = 7,69  
 P at arrival : m = 76,54    sd = 16,01

SBP after 5 minutes rest : m = 127,54    sd = 18,08  
 DBP after 5 minutes rest : m = 79,84    sd = 15,49  
 P after 5 minutes rest : m = 72,44    sd = 13,95

SBP after therapy session : m = 124,15    sd = 16,90  
 DBP after therapy session : m = 77,05    sd = 11,41  
 P after therapy session : m = 67,77    sd = 11,60

## TABLE OVER CHANGE IN VALUES

Group A = values measured after 5 min rest and at end of session

Group B = values measured at arrival and after 5 min rest

Group C = values measured at arrival and at end of session

SBP = Syst. BP DBP = Diast. BP P = Pulse

Group	Unchan- ged	Rise N=	M= Rise	Sd= Rise	Whole Group		Fall N=	m= Fall	sd= Fall
					m=	sd=			
ASBP	1	24	8,92	9,94	- 4,34	9,44	57	- 9,98	7,65
ADBP	3	22	8,86	10,58	- 5,35	7,69	58	- 9,09	7,66
AP	8	18	4,78	4,16	- 4,49	7,20	56	- 8,43	5,08
BSBP	4	16	7,06	3,51	- 4,29	9,44	62	- 12,74	8,94
BDBP	5	22	7,41,	7,73	- 4,23	10,67	55	- 8,51	9,92
BP	12	19	5,32	5,69	- 3,16	7,18	51	- 7,14	5,06
CSBP	3	12	8,33	6,09	- 12,20	12,94	67	- 16,75	9,35
CDBP	5	14	6,00	7,69	- 7,98	11,23	63	- 11,38	10,03
CP	2	13	5,40	5,84	- 7,40	8,25	67	- 9,86	5,54

**DISCUSSION**

The statistics give an indication of what effects one can expect on SBP, DBP and P as a consequence of exposition to Vibroacoustic Therapy.

The results cannot be directly compared with other studies dealing with the effect of 20 - 30 min rest only on SBP, DBP and P, as all persons were exposed to Vibroacoustic stimuli in the corresponding period of time.

Clients who react to the therapy with a rise in the measured parameters have the same subjective feeling of stress-reduction, muscular relaxation and well-being after end of therapy session as clients in whom the same values are falling. The rise in values therefore has no correlation with physical discomfort.

There is a ca. 75% probability for a fall in SBP, DBP and P values in a client who is exposed to Vibroacoustic Therapy. A client cannot be expected to show the same direction of effect during repeated treatments.

**CHOICE OF MUSIC AND FREQUENCIES**

The data collected on the use of tapes and frequencies for specific purposes are based on subjective feedback from clients.

However, the first study done by TRILAX Centre, Steinkjer, based on 231 measurements of BP and Pulse show us that we may expect a more uniform decrease in all three parameters when single-frequency tapes are used, than by use of multi-frequency tapes.

Research of this kind will be very important for the future development of Vibroacoustic therapy.

## CASE STUDIES

Asthma Bronchiale: Three clients with Asthma Bronchiale, all women, 16, 56 and 83 years of age have used VA chairs for home use. All of them are invalids because of their asthma, and all have reported substantial relief of symptoms when the equipment is used regularly,- i.e. several times a day. The effect seems to be good for the bronchospasms, and the general de-stressing and relaxing effect of the therapy seems to contribute to the rise in life quality of the clients. The study has been going on for 1,5 years and is continuing.

Functional dysmenhorrea: 5 clients with functional dysmenhorrea have shown considerable improvement of both pain symptoms and mental stability in the pre-menstrual situation. Treatments have been given regularly, 21 times during a 3 month period. The project was terminated in February 1989, and the subjects report that the effects still lasts, 4 months after terminating the test period.

Fibromyalgia/Fibromyositis: TRILAX Centre Steinkjer has treated 20 cases of Fibromyalgia with positive results in about 50% of the cases. Best results have been obtained by giving concentrated treatments in a short period (11 treatments per week) and periods of 3 - 5 months intervals between the concentrated periods. The clients report that the pains gradually return during the intervals between treatments. The patients return for a new session when they feel the need for a "refill".

Denmark:

Using the MIMO 2 biofeedback equipment (from Khepri Bioelectronical development Company) which is doing numerical analyses of the spectral and amplitudal conditions of brain waves, a study of the relative activity level in the two brain hemispheres has been made.

The result shows a remarkable shift in the balance of activity between left and right hemisphere. The change in activity showed an increase in right hemispheric activity when the levels before and after VA-therapy were evaluated. The comparison was done between the readings before and after a 20 min. session in the VA chair.

Sweden:

Four top skiers from the Swedish national cross-country team have been using VA-equipment to relax after extreme muscular strain during intensive training periods. The restitutional effect on muscles used under extreme conditions is considerable, and the physical discomfort is reduced to a remarkable extent.

Finland:

Sport use: At the Polar Rally 1989 considerable attention was given to the effect of VA-therapy on sportsmen, when a driver with acute stiff neck was treated. The condition was so dramatically improved that the Finnish Olympic team is starting to explore how to use VA-therapy in the psycho-physic relaxation of the team during intensive training periods.

Hard of Hearing/Deaf: The institute for Hard of Hearing and Deaf (Kuulonhuoltoliitto) is treating their multiply handicapped patients from all over the country for periods for 3 - 6 weeks. The patients come for extensive examination and intensive therapy.

Since December 1988 VA-therapy has been included as an essential part of their daily rehabilitation program.

The experiences are very positive and VA-therapy is regularly used in auditive training, speech therapy and physiotherapy.

VA-therapy and stress in musicians: VA-therapy was started at the Sibelius Academy in Helsinki in the spring 1988 to treat stressed students. The Academy is educating advanced level music students from all over the world.

All students in this experiment reported improvement in muscle relaxation, better voice control, decrease of insomnia and reduced psychosomatic pains.

In the spring 1989 also the office staff of the Academy have started to use VA-therapy for stress- symptoms,- especially head ache and muscle tensions. The results are positive also in these cases.

#### CONCLUSION

Vibroacoustic therapy has now been used for 9 years, and The International Society for Vibroacoustics (ISVA) has reports from over 20 000 hours of use from around 60 different institutes, institutions and private persons.

There are clients who have been using VA therapy twice a day for 7 years, and private persons who have been using the chair several times daily,- up to 15 times - for 1 1/2 year.

Over 90 % of the clients are positive to the treatment. No negative effects have been reported out over normal over-exposure reactions because of too high amplitude.

In some cases of pain treatment, the pains increase initially and then gradually subside.

It is demonstrated that VA therapy has an effect beyond placebo reactions. However, the descriptions and research results collected do not satisfy the statistical requirements of medical research.

There are many projects of basic research lying ahead of us, if we are to develop the method and equipment to a satisfactory level of perfection .

We hope that there are many research institutions, institutes, hospitals or scientists who have interest, possibility, creativity and capacity to join us in ISVA in our efforts to spread information and knowledge about this method, which is at its very beginning.

The VA method has been rejected by many Music Therapy institutes and unions in Europe. I am grateful to the ISFMIM for the moral support I have been given during the last 7 years of more or less solitary work of opening new roads in Music Medicine. We are now seeing the outline of an international team trying to develop the VA method, and this team will welcome new members who are willing to join us in this work.

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