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Efficacy Trial of Bioresonance in Children with Atopic Dermatitis

Key Words
Atopic dermatitis
Bioresonance therapy
Alternative medicine

Abstract
Single case reports and uncontrolled studies claim significant improvements in patients with atopic diseases treated with bioresonance therapy, also called biophysical information therapy (BIT). To assess the efficacy of this alternative method of treatment, we performed a conventional double-blind parallel group study in children hospitalized for long-lasting atopic dermatitis. Over a period of 1.5 year, 32 children with atopic dermatitis, age range 1.5–16.8 years and hospitalized for 4–6 weeks at the Alpine Children's Hospital Davos, Switzerland, were randomized according to sex, age and severity of the skin disease to receive conventional inpatient therapy and either a putatively active or a sham (placebo) BIT treatment. Short- and long-term outcome within 1 year were assessed by skin symptom scores, sleep and itch scores, blood cell activation markers of allergy, and a questionnaire. Hospitalization and conventional therapy in a high altitude climate resulted in immediate and sustained amelioration of the disease state in both the BIT-treated and sham-treated groups. BIT had no significant additive measurable effect on the outcome variables determined in this study. The statement by protagonists of this alternative form of therapy that BIT can considerably influence or even cure atopic dermatitis was not confirmed using for the first time a conventional double-blind study design. Considering the high costs and false promises caused by the promotors of this kind of therapy, it is concluded that BIT has no place in the treatment of children with atopic dermatitis.

Introduction

Bioresonance therapy, also called biophysical information therapy (BIT), has increasingly been proposed as an alternative medical treatment for a variety of diseases especially in German-speaking Europe. Practitioners of this method claim definite improvement or even lasting cure from allergies, including atopic dematitis and asthma. Based on theories of E. Morell [1] bioenergy is defined as the bioelectric magnetic field which is unique to every material in our cosmos [2]. The use of bioelectric waves for diagnostic and therapeutic purposes, originated from a bioelectric magnetic field of the human body, is called bioresonance therapy or BIT. This method pretends to offer a new therapeutic strategy by selecting 'endogenous waves of the ultrafine range of bioenergy, which allow the endogenous regulatory energies to carry on their activities without being disturbed. The proponents of this theory claim that the main purpose of BIT is to give a strong impulse to spontaneous healing energies of the body for self-regulation [3].

The ultrafine bioenergetic electromagnetic waves of the patient's body as well as their disturbances in presence of al-

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lergens can be transmitted for diagnosis and therapy, using brass wire electrodes, and analyzed by a 'bioresonance apparatus' (mostly the commercially available Bicom, Mora or Vegaselect machines). Waves from one part of the body (mostly the extremities) are taken up by a brass electrode (in-line electrode). They are analyzed in a so-called 'separator' within the BIT machine. This electronic instrument allegedly distinguishes between defined pathological and normal (healthy) waves from a patient. The pathological waves can then be reversed electronically ('corrected to healthy ones') by the separator and transmitted back to the patient by an exit electrode (fig. 1) [4]. In a similar way, the BIT device can also be used for diagnostic purposes using a cylindric brass container electrode to capture magnetic waves allegedly produced by allergens or other substances which might induce atopy. According to the current literature on BIT, atopic diseases disturb the normal electromagnetic fields of the body. Such disturbances can be reversed by electromagnetic manipulation using the BIT machine. This process is called elimination or extinction therapy of allergens or allergy [4, 5]. Children and parents who used this kind of alternative therapy for atopic dermatitis report controversial results. However, one of the major promotors of this therapy claims complete cure of allergy in 83% of 204 treated cases [5]. Only two clinical studies, one assessing the diagnostic methodology and one evaluating the clinical effects, have been published in peer-reviewed journals and reported rather poor results [6, 7]. To assess the putative therapeutic value of BIT, we performed a randomized parallel-group double-blind study with children suffering from atopic dermatitis. Efficacy of this alternative therapeutic strategy was tested as an adjunct to conventional medical treatment.

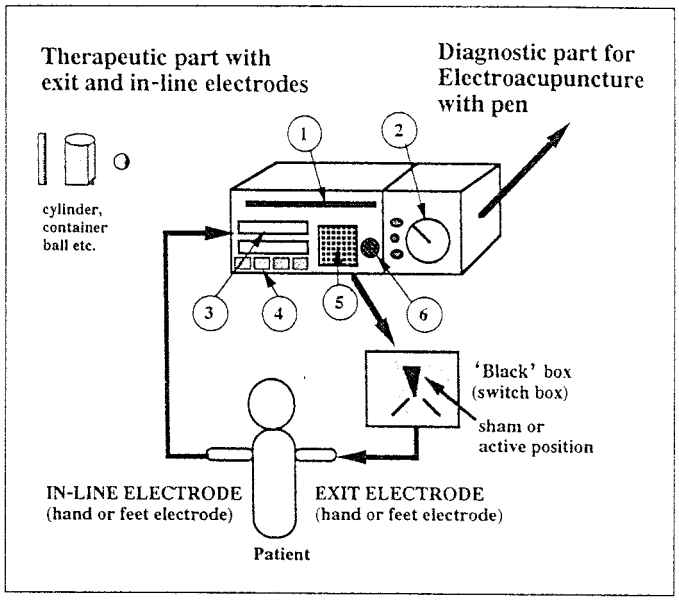

Fig. 1. Scheme of the BIT device and of the intervention with its switch box design for the double-blind assessment used in this study. The BIT device has two parts one used for diagnostic investigation and one for therapeutic interventions. 1 = Frequency band (LED display): 10–150 kHz; 2 = test part for electroacupuncture with test scale display (0–100 arbitrary units), buttons for regulation of sound, for different diagnostic electrodes and for test points. 3 = LED display of chosen functions (programs); 4 = keyboard for on/off, battery, start, exit, test; 5 = keyboard for selecting different therapeutic programs; 6 = button for selecting frequency bandpass.

Patients and Methods

Between July 1993 and July 1995, 36 children with atopic dermatitis were recruited for this inpatient study. 32 children, 11 girls and 21 boys, age range 1.5–16.8 years, were finally evaluated. 4 children had to be excluded from the study protocol, 2 due to early departure from the clinic, 1 due to severe skin infection (eczema herpeticum), and 1 due to poor compliance with the protocol.

Randomization and Criteria for Entering the Study

The parents of children with atopic dermatitis admitted to the Alpine Children's Hospital in Davos, Switzerland were asked to volunteer for the double-blind study for the evaluation of the effect of BIT in addition to conventional therapy. After written informed consent had been obtained, the patients were randomized according to sex, age and severity of disease to receive either sham (placebo) or active treatment with the bioresonance apparatus Bicom II, Brügemann Institute, Gräfelfing, Germany). 18 pairs of children were formed, of whom 16 were suitable for subsequent statistical analysis. A specially developed device ('switch box', fig. 1) made it possible to perform either sham or active treatment (see below: Bioresonance Therapy (BIT) Protocol). The engineer, who constructed the 'switch box' kept its randomization code outside the clinic in a sealed envelope.

Assessment of Disease Severity, Treatment and Clinical Outcome

Atopic dermatitis was diagnosed according to the criteria of Hanifin and Rajka [8]. The severity of the disease was assessed weeekly according to Costa et al. [9]. Their scoring system used ten 'severity' criteria and 10 topographic sites of the body. Skin lesions were scored from 0 (no lesion) to 7 points (extremely severe) for intensity assessment (maximum score 70 points) and from 0 to 3 points from 10 body areas following topographic distribution (maximum score 30 points). The sum of both scores results in the total Costa score (maximum 100 points). The intensity of pruritus and sleep quality were assessed daily using a separate scoring system from 0 (very mild or almost none) to 5 (very bad); this score was assessed by the same person over the whole study period, either the parents or the responsible nurse on the ward.

All patients received a standardized conventional treatment consisting of the topical application of creams, urea, antibiotics, and gentianviolet (see table 1). Dietary restrictions were made for all patients sensitive to common allergens such as cow's milk, egg white, wheat, tomato, nuts, citrus fruits and fish.

Table 1. Patient data at the start of the study and medication used (n = 32)

	Treatment		p[1]
	active	sham	
Patients (male/female)	11/5	10/6	
Age (mean ± SD), years	6.0±4.1 (1.5–16.8)	4.8±3.1 (1.4–14.4)	0.3671
Duration of stay (mean ± SD), days	36±6	36±9	0.8344
Total Costa score (mean ± SD), points	39.8±14.6	35.8±16.4	0.4510
Pruritus score (mean ± SD), points	3.5±1.8	2.6±1.4	0.2913
Sleep score (mean ± SD), points	3.0±1.8	2.6±1.8	0.5591
IgE (mean ± SEM), IU/ml	1,885±992	2,230±1,570	0.5977
Kind of medication			
Oral steroids (n = 1)	1	0	
Oral antibiotics (n = 14)	8	6	
Topical steroids (n = 12)	6	6	
Topical antibiotics (n = 14)	9	5	
Topical urea (n = 21)	10	11	
Topical 1% gentianviolet (n = 32)	16	16	

Figures in parentheses represent range.
[1] Wilcoxon signed rank test.

Study Protocol

Patients hospitalized for at least 4 weeks (28 days) or longer entered the study. At entry, blood samples were taken for routine cell count, serum immunoglobulins including IgE, and radioallergosorbent test (RAST) for allergen-specific IgE antibodies to a mixture of Swiss grass and tree pollens, house dust mites, animal dander, cow's milk and egg white, using the Pharmacia allergen-specific CAP system (Pharmacia antigens, Uppsala/Sweden) and converting the results into RAST classes from 0 to 6 as described by the manufacturer.

Cell activation markers on lymphocytes and monocytes were measured by direct immunofluorescence according to standard methods recommended by Becton Dickinson Monoclonal Centre (Mountain View, Calif., USA), using a flow cytometer (Epic Profile, Coulter, Hicala, Fla., USA), with monoclonal antibodies (mAb). Briefly, 50 µl of whole blood was incubated in the presence of saturating concentrations of fluorescein- or phycoerythrin-conjugated mAb on ice in the dark for 30 min. Erythrocytes were lysed by adding 3 ml lysing solution (8.29 ammonium chloride, 1 g potassium bicarbonate, and 37 mg EDTA per liter of distilled water, pH 7.3) for 3–5 min. Leukocytes were washed twice with phosphate-buffered saline containing 2% fetal calf serum and 0.1% sodium azide. Cytofluorometric analysis was performed with scatter gates on the lymphocyte fraction using laser excitation at 488 nm. The number of immunofluorescence-positive cells was determined for 10,000 analyzed cells. Specific binding of mAbs was controlled by substraction of isotype-matched mouse immunoglobulins.

mAbs against CD2, CD3 (T cells), CD4 (T helper/inducer), CD8 (T suppressor/cytotoxic), CD16 (natural killer cells), CD19 (B cells), CD25 (IL-2 receptor α-chain), HLA-DR antigen (major histocompatibility complex II), CD23 (activated B cells, low-affinity Fcε receptor, induced by IL-4) and CD14 mit HLA-DR (monocytes with HLA-DR) were purchased from Immunotech (Marseille, France) and from Dakopatts (Glostrup, Denmark).

Skin prick testing was performed regarding a range of allergens including house dust mites, dog, cat, horse epithelia, a mixture of Swiss grass pollens, moulds (Alternaria, Cladosporum, Aspergillus), cow's milk and egg white (Bencard skin test antigens, SmithKline Beecham, Neuss, Germany). The skin test reactions were recorded after 15 min by measuring the diameter of the weals, and results were considered positive with a weal of ≥3 mm and no reaction to the saline control solution [10]. A positive control was included with 0.1% histamine. If the skin was extensively affected by the dermatitis lesions, skin testing was omitted.

Bioresonance Therapy (BIT) Protocol

Every patient had a treatment session twice a week with the Bicom apparatus at the same time in the morning by the same therapist (F. S.-A). The Bicom instrument consists of a 'therapeutic unit' encompassing an electronic device with two brass electrodes called incoming and outgoing (exit) electrode. The outgoing electrode represents the 'therapeutic electrode' and allegedly transfers the converted electromagnetic current back to the patient. In our case, this occurred via two possible positions of the 'switch box': one was connected to the instrument and one ended blind. This switch box was located between the apparatus and the patient (fig. 1). The incoming electrode to the BIT unit was not modified. Every session consisted of a so-called 'elementarytherapy' and a 'gut-regulating therapy' followed by a 'geopathic therapy' (for the first three sessions) and of an 'extinction therapy' (for the first four sessions) for heavy metals (amalgam, aluminium, cooper and lead). In the follow-up sessions, the sensitivity to the basic allergens, i.e. wheat, milk, egg, was 'eliminated'. Sensitivity to other individual allergens, which were found positive by the BIT allergen testing kit, was also 'eliminated' by the recommended procedure. These therapeutic interventions were performed exactly as described in the specific literature on BIT and as recommended by BIT teachers at special courses [3–5]. The responsible therapist (F. S.-A) was qualified for BIT treatment according to BIT promoters.

Short Term Outcome. Symptom scores were recorded before starting BIT therapy and then for a period of at least 4 weeks in weekly intervals.

Long-Term Outcome. To assess the long-term clinical outcome of hospitalization and BIT treatment, a questionnaire was sent to the patients within 1 year. The questionnaire included 8 specific questions on changes in general health, skin lesions, itching frequence, sleep quality, oral medication, topical medication, topical steroid use and diet since BIT treatment.

Statistics

The clinical and skin scores (total Costa score, pruritus score, sleep score) and the changes in blood cell activation markers were defined as primary outcome variables. The study was designed to have an 80% power to detect a treatment response of 35% with a standard deviation of 35% (derived from earlier studies on changes of Costa score points) at a significance level of 0.05. We estimated that a minimum of 16 subjects would be required in each group. Statistical analysis used the Wilcoxon signed rank test for comparison of continuous data. Confounding variables were evaluated by ANCOVA using StatView 4.1 for Macintosh. All analyses were performed without knowledge of the randomization code which was revealed afterwards.

Results

The two treatment groups, active and sham BIT therapy, were well matched at baseline for age, sex, disease severity, duration of BIT and additional conventional treatment (table 1). All 32 children showed at least two positive RAST tests for allergen-specific IgE. In the whole group, there was 10× a positive RAST for Swiss grass pollens, 9× for Swiss tree pollens, 9× for animal dander, 11× for house dust mites, 8× for moulds, 17× for henn's egg protein, 19× for cow's milk protein, 12× for wheat, 17× for nuts, 13× for soja beans and 6× for fish. Skin tests were performed in 17 of 32 patients, who showed at least two positive tests. These were 12× positive for house dust mites, 7× for dog, 9× for cat, 5 for horse, 6× for birch pollens, 9× for Swiss grass pollens, 3× for moulds, 2× for cow's milk and 6× for hen's egg protein. The allergic sensitivities as detected by these classical diagnostic tests were evenly and randomly distributed in both treatment groups. Despite the diagnosis of atopic dermatitis 10 children had low serum IgE levels (≤250 IU/ml), 7 of the sham-treated and 3 of the actively treated group. These 10 children were evaluated together with the other participants but also as a special subgroup at the end of the evaluation procedure; the IgE level was then used as a covariable.

Clinical Outcome

Table 2 shows the clinical outcome of scoring of skin lesions, itching (pruritis score) and sleep quality. The total skin (Costa) score improved (indicated by a decrease of the score) significantly within 36 days comparing all patients and the groups separately. In the actively BIT-treated group the mean (±SD) score at the start was 39.8±14.6 and 27.3±13.1 at the end of the study period. The corresponding values in the sham-treated group were 35.3±16.4 at the start and 26.6±15.7 at the end: the change in the BIT group was 12.5±12.6, i.e. slightly better when compared to the 6.7±8.2 for patients in the sham-treated group. However, this difference was not statistically significant ($p = 0.2330$). No difference was observed for the sleep score whereas the pruritus score showed a slight trend to better improvement in the actively treated group than in the sham-treated group. However, none of the differences between the groups was significant.

Blood IgE and Cell Changes

IgE levels in the blood showed no significant changes after the treatment period in both groups. The mean eosinophil count for the whole patient group was significantly elevated table 3 (absolute numbers and percent of leukocytes), but a normal amount of CD3+ cells (T lymphocytes) and a normal percentage of CD4+, CD8+, CD16+ and CD19+ cells were found. On CD4+ and CD8+ cells, HLDR was normally expressed. In these atopic patients, there was a highly significant increase of the IgE receptor (CD19+/CD23+) expression on lymphocytes but a normal HLDR expression on monocytes (CD14+ HLDR+). After 4 weeks of treatment, the absolute number of eosinophils did not change significantly and remained elevated. There was a statistically significantly ($p<0.05$) decrease of CD8+ cells, but CD4+ remained unchanged. B cells (CD19+) ($p<0.005$) and IgE receptor expression ($p<0.05$) increased, whereas the HLDR expression, mainly on CD4+ cells, significantly decreased ($p<0.05$). However, there was no significant difference between the two treatment groups in any of the variables tested. Most of the significant changes seen after 4 weeks in the whole group disappeared after adjusting for treatment (active or sham) and only two statistically significant changes persisted: a decrease of CD8-HLDR in the sham-treated group ($p<0.05$) and an increase of B cells in both groups ($p<0.05$).

Long-Term Clinical Outcome

Figure 2 summarizes the results of the questionnaire using polar charts to demonstrate the outcome of the 8 criteria reported by the patients 8 months later. For each parameter, a scale from 0 to 5 points (none to severe) was used; the scale points indicate the patient's group means on the polar charts. There were significant ($p<0.05$) and persisting im-

Table 2. Clinical scores at the start and end of the study in all patients and computed according to sham or active treatment

Score	All patients			Treatment		
	at start	at end	change (Δstart–end)[1]	sham change (Δstart–end)	active change (Δstart–end)	p (sham vs. active)[1]
Total Costa	37.5±15.5	27.9±14.2	9.6±10.8**	6.7±8.2	12.5±12.6	0.2330
Pruritus	3.5±1.8	2.6±1.4	0.9±1.8*	0.5±1.4	1.3±2.1	0.1166
Sleep	2.8±1.8	1.7±1.4	1.1±1.8*	1.2±1.8	1.1±1.9	0.9165

Values represent mean score points ± SD: Costa score maximal points (very severe disease, whole body): 100 points, and pruritus and sleep scores: 5 = severe, 1 = minimal.
[1] Wilcoxon signed rank test: *$p<0.01$; **$p<0.001$.

Table 3. Cell markers in peripheral blood of all patients and in the specified treatment groups at the start and end of the study

Variables	All patients				Treatment		
	normal values	start	end	p	sham change (Δstart–end)	active change (Δstart–end)	p
Eosinophils (abs.)	<450	779±596	684±557	0.1908	91.0±407	172.9±571	0.6784
CD4+, % pos.	38–56	43.3±9.0	42.1±8.1	0.3306	2.5±7.1	0.56±9.5	0.2934
CD8+, % pos.	19–33	26.7±8.4	24.0±6.0	0.0582	3.3±8.8	1.9±5.5	0.3203
CD4+/CD8+ (ratio)	1.2–2.4	1.8±0.6	1.9±0.6	0.5815	0.05±0.31	0.11±0.34	0.3343
CD19+/CD23+ (IgE rec.)	<20	32.6±19.9	39.3±15.9	0.0286*	3.8±13.5	8.8±14.5	0.2213
CD4+ HLDR+ % pos.	<5	5.5±5.1	3.6±2.0	0.0273*	2.8±6.1	1.0±2.1	0.3882
CD8+, HLDR+, % pos.	<7	7.3±8.4	5.8±4.9	0.1102	2.4±3.5	0.8±6.9	0.1578
CD14+, HLDR+, % pos.		92.4±7.8	90.5±14.1	0.5004	3.5±14.8	0.7±15.9	0.1307

Wilcoxon signed rank test: *$p<0.05$. abs. = Absolute; pos. = positive; rec. = receptor.

provements for most symptoms (itching, skin lesions, sleep) and for diet, topical steroid use, and other topical and oral medications in comparison to scores noted at the start of the hospitalization. However, there were no statistically significant changes between the groups with sham or active BIT.

Discussion

This study is the first double-blind evaluation comparing the effects of an alternative bioresonance therapy to that of conventional treatment for atopic dermatitis. The study design was based on the claims of protagonists of this alternative therapy who contend that it offers an additional option to classical orthodox therapies tought at medical schools. In our hands the addition of BIT to a classical treatment protocol for atopic dermatitis was not successful. Short- and long-term effects of the BIT therapy were not superior to the usual practice of treating children with atopic dermatitis and did not result in a measurable improvement of the determined parameters. The manifest symptoms of skin lesions, day- and nighttime itching as well as sleep disturbances are central in every child with atopic dermatitis. Therefore, these symptoms were chosen as important evaluation criteria. It is appreciated that the Costa scoring system has some drawbacks and that other skin scoring systems, e.g. the Leicester sign score, are used for clinical assessment of outcome in other circumstances [11]. Nevertheless, we used the Costa score system because we have extensive experience with this score in children. Since the Costa scoring system

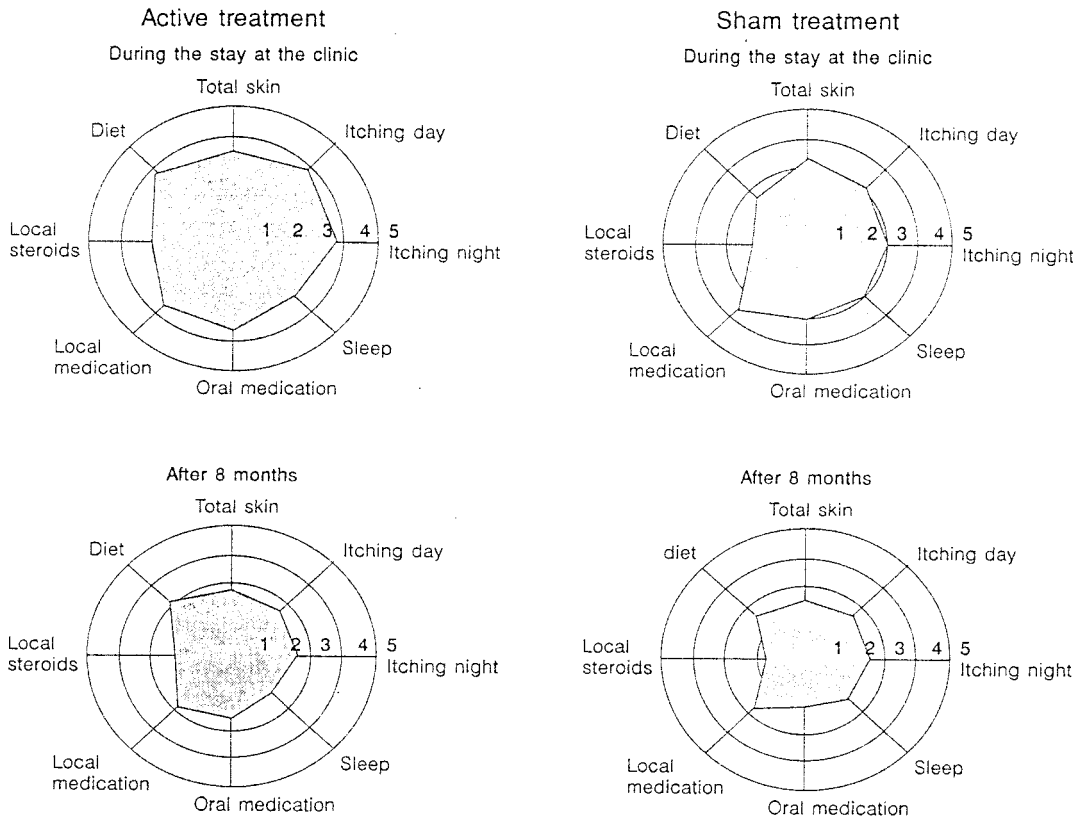

Fig. 2. Results of the questionnaire depicted as polar charts to demonstrate the outcome of the 8 categories reported by the patient 8 months later. For every question a scale from 0 to 5 points (none to severe) was used; the scale points on the polar charts indicate the group means of the patients.

integrates subjective symptoms and the evaluation of lesions in the same score, we additionally used a separate score for itching and sleep. This score was again used by the patients or their parents to rate symptoms at home 8 months later.

To validate our assessments we performed and correlated repeated measurements. The correlation coefficients for values determined at the start, after 1, 2, 3 and 4 weeks of the study ranged from 0.54 to 0.89 with a corresponding p value of <0.01 to 0.001 for all determined variables. Since there were only minor changes in outcome after the 3rd to 4th week and since the effect of regression to the mean of this interventional study could not be eliminated, we decided to report the outcome after 4 weeks of treatment [12]. In most articles and recommendations of the BIT protagonists it is stated that a 4-week treatment period should show significant improvement of atopic symptoms. It is well known that changes in allergen exposure result in an improvement or deterioration of skin manifestations of atopic dermatitis. The stay in an alpine resort with its low allergen exposure to polens, house dust mites and low air pollution, combined with dietary interventions, has been shown to result in a favorable outcome in many patients with atopic dermatitis [13–15]. In our patients, this effect was also clearly shown by improvement of the Costa score, the pruritus and sleep scores, and was maintained for 8 months. This sustained improvement is probably also due to some educational and training effects in the management of atopic dermatitis achieved in patients and parents after the 4-week stay in the clinic. This is especially true for the sustained dietary restrictions of major nutritional allergens followed by the patients, as indicated in the questionnaires. The quantitative effect of this intervention cannot be assessed by the present study. However, it was clearly demonstrated that BIT had no measurable impact on symptoms, medication and degree of interventions after 4 weeks and 8 months. There is ample

evidence that the severity of atopic dermatitis, the variability of the symptoms, the response to medication and environmental changes were paralleled by alterations of allergen-induced markers in serum and in T or B cell activation in the peripheral blood. The changes in children with atopic dermatitis resemble those described earlier for adults [16]. Eosiniphilia, increased IgE serum concentrations, increased numbers of CD4+ HLDR+ (activated T cells), CD8+ HLDR+ (activated B cells), CD4+ CD25+ (Il-2 receptor on T cells) and CD16+ CD23+ (IgE receptor) lymphocytes were observed and tended to normalize after 4 weeks in the alpine climate region. This trend reached statistical significance for some of the activation markers for the whole group of patients. We did not see a significant change in serum IgE, whereas blood eosinophils slightly decreased. However, BIT had no significant influence on any of the serum and cell markers measured. A subgroup of patients with normal IgE levels, possibly having some form of 'intrinsic atopic dermatitis', was separately analysed, but these patients did not change the outcome of the study [data not shown].

Alternative treatment methods in several fields of medicine are becoming increasingly more popular. For example, 1 in 3 American adults uses alternative medicine to treat back pain, colds or cancer; 7 of 10 patients do not inform their home primary care physician about their use of complementary medicine; about US$ 13.7 billion are paid for unconventional therapies, and US$ 10.3 billion are paid by the patients themselves for such treatments [17]. At least 11% of a selected urban Canadian population used alternative medicine for their children according to a recently published paper [18]. A similar drift away from orthodox medicine is observed in the UK where more than 300 alternative methods of diagnosis and treatment are currently in use [19]. In Switzerland, Germany and Austria unconventional medicine has recently become increasingly popular for the treatment of atopic disorders.

The bioresonance therapy tested in this study has experienced a boom in German-speaking countries for the last 3 years and has generated considerable debate in the scientific and lay press. The practitioners of bioresonance therapy – its name was changed in December 1995 to BIT – claim that various allergies, including seasonal rhinoconjunctivitis, asthma, urticaria and atopic dermatitis, can definitively be eliminated. Despite several favorable case reports in self-edited journals and books of the BIT community a comprehensive explanation of the alleged effects or some kind of reproducible study has never been provided. Since this method is expensive for the practitioner and for the patients and since it generates demands for financial support by health insurances, the health care system of any country should rely on some kind of objective proof of efficacy for the reimbursement of any new therapeutic method. It has been debated for a long time whether approval of a new method must depend on orthodox medical research standards such as double-blind placebo-controlled studies or on some mixture of case reports with subjective assessment and uncontrolled group selection. The pros and cons for accepting placebo controls or complementary medicine criteria and requirements have been extensively reviewed [20–22].

Concerning the BIT therapy, its scientific physical background seems to be rather shaky. It is claimed that electromagnetic waves generated by the human body are conducted to the BIT apparatus by brass wires linked to brass electrodes placed in both hands or anywhere on the body. One electrode allegedly picks up the electromagnetic waves of the patient which are then conducted to the analyzer in the BIT apparatus. So-called 'pathological electromagnetic wave patterns' which are pathognomonic for specific diseases are then converted to 'normalized electromagnetic waves', using specific analyzing programs. Such converted electromagnetic waves are then given back to the patient through a second outgoing conducting line and electrode. Allergens and toxic products, e.g. dental amalgam or medications, can be placed in a container electrode and their electromagnetic waves also conducted to the electronic analyzer. These waves may allegedly cause changes in the electromagnetic field of the patient and the corresponding symptoms. Until today, the manufacturer as well as the growing community of users of these devices have failed to reveal or explain the precise physics of the BIT analyzer. A comprehensive investigation of the device at a University Department of Physics in Austria has revealed that the bioresonance apparatus (in particular the Bicom machine) contains nothing else apart from a Fourier frequence analyzer, which produces a background electric noise from which certain waves may be filtered [23]. The investigation team has clearly stated that the biophysical literature dealing with bioresonance and multiresonance therapy is full of systematic errors and controversies [3, 23]. Nevertheless, the authors of bioresonance papers and their followers seem to confound electric current with electromagnetic waves. Whereas the human body is a fairly good conductor of electric current, it is almost impermeable to electromagnetic waves. The terms of wave extinction or inversion which are constantly used by the bioresonance community are misleading. Interference with electromagnetic waves does not eliminate energy or change it into heat; nothing else occurs but a rearrangement and a redistribution of electromagnetic

waves in the field. These simple rules of classical physics are constantly challenged by the proponents of the BIT therapy. They argue that physics is the science of dead material and that physicists are incapable of commenting on the effects of biological phenomena since their biophysical understanding is based on dead material and is not applicable to processes occurring in living bodies [24]. Since none of the companies selling devices for bioresonance therapy has ever revealed in depth the specific content and physical specifications of their machines, it is at present impossible to distinguish them from some magic blackbox.

The proponents of BIT claim that more than 60% of children with atopic diseases are almost cured from their disease [5]. Some reports of parents who experienced favorable results of such treatment prompted us to evaluate the method under strictly controlled conditions. The responsible BIT therapist was thoroughly trained and qualified for this kind of treatment. We based our BIT treatment protocol on written instructions of the German and Swiss Society for BIT and on personal suggestions and recommendations of other experienced BIT therapists. To provide comparable methods within patients we had to had to apply some therapy modalities to all treated children, e.g. 'elementary therapy' and 'geopathic therapy'. We are aware that this part of the therapeutic intervention will become a matter of criticism by the BIT promotors. The argument that solely individually based therapeutic regimens are valid and successful would make it impossible to judge the effectiveness of BIT in a controlled study.

All patients were, from their point of view, handled and treated in the same way but the alleged transmission of therapeutically active 'converted electromagnetic waves' was interrupted by the coded 'switch box' in a randomized manner. This made a double-blind placebo-controlled application of BIT therapy possible.

In summary, it may be argued that BIT would only show its effectiveness when used alone, as a true alternative to conventional medical treatment. For medical and ethical reasons, it was certainly not possible to renounce conventional therapy in these children hospitalized for atopic dermatitis. If BIT had any objective effect, this effect should also become apparent when used in addition to conventional medical therapy. In real life it is anyway frequently the case that allergic patients are concurrently treated by orthodox means but also obtain additional BIT therapy. For a long time the community using this alternative therapy has tried to convince poeple that their treatment represents an additional therapy to conventional medicine. Our study design was, therefore, completely adequate. We have objectively evaluated the BIT method using a double-blind parallel study design. Neither the short- nor the long-term evaluation revealed any significant influence of this method on atopic dermatitis in children under the chosen conditions. However, no serious side effects were noted. Considering the costs of this treatment, we conclude that BIT has no place in the treatment of children with atopic dermatitis and emphasize the ethical issue of falsely promising success in the management of this disease.

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stung (hierfür ist es auch zugelassen) und weniger spezifisch auf das Verhalten einwirkt. Es ist aber festzuhalten, dass nach dem Kriterium des NAB in der Verum-Gruppe 33% der Patienten Responder waren. In der Placebo-Gruppe war die Responder-Rate mit 23% allerdings ebenfalls verhältnismässig gross, so dass der Unterschied nicht signifikant ist. Die fehlende Signifikanz ist somit nicht auf eine geringere Responder-Rate in der Verum-Gruppe, sondern auf eine grössere Responder-Rate in der Placebo-Gruppe zurückzuführen. Die Differenzierung nach der Ätiologie der Demenz (Alzheimer oder Multi-Infarkt-Demenz (MID)) zeigte etwas grössere Verum-Placebo-Differenzen bei den Alzheimer-Patienten für SKT und NAB. Allerdings sind die Unterschiede zu den MID-Patienten gering und deuten nicht auf eine Abhängigkeit des therapeutischen Ansprechens von der Ätiologie der Demenz hin.
Zusammenfassend ist festzustellen, dass diese Studie eindrucksvoll belegt, dass bei sorgfältiger Planung und Durchführung mit dem Instrument der kontrollierten Studie auch bei komplexen Indikationsgebieten der Nachweis der therapeutischen Wirksamkeit von pflanzlichen Arzneimitteln geführt werden kann.

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Bioresonanztherapie bei Neurodermitis

Schöni MH, Nikolaizik WH, Schöni-Affolter F: Efficacy trial of bioresonance in children with atopic dermatitis. Int Arch Allergy Immunol 1997;112:238–246.

Fragestellung: Bewirkt die adjuvante Behandlung mit biophysikalischer Informationstherapie (BIT, Bioresonanztherapie) bei Kindern mit Neurodermitis therapeutische Effekte, die über Placebo hinausgehen?
Design: Randomisierte, Placebo-kontrollierte Doppelblindstudie über 4 Wochen mit Nachbefragung nach weiteren 8 Monaten.
Prüfeinrichtung: Kinderkrankenhaus im Hochgebirge (Davos, Schweiz).
Patienten: 36 Kinder mit Neurodermitis (Diagnose entsprechend der Kriterien von Hanifin und Rajka), die für mindestens 4 Wochen in das Kinderkrankenhaus stationär aufgenommen wurden.
Intervention: Alle Kinder erhielten während der Studie eine schulmedizinische Basistherapie (alle topisch 1% Gentianviolett, ausserdem bei einem bis zwei Drittel der Kinder topische Anwendungen von Harnstoffpräparaten, Antibiotika oder Steroiden; nur ein Kind erhielt eine orale Steroidtherapie). Zusätzlich bekamen die Kinder zweimal wöchentlich ein BIT-Behandlung durch einen qualifizierten Therapeuten, bei der das Gerät entweder einen adäquaten Impuls aussandte oder nicht (Placebo). Die Behandlung beinhaltete verschiedene BIT-typische Elemente (Elementartherapie, Darmregulation, geopathische Therapie, Auslöschungstherapie).
Zielkriterien: Zielkriterien waren eine Skala zur Beurteilung der Schwere der Neurodermitissymptome (Costa-Score), Jucken und Schlaf. Bei der Nachbefragung wurden Fragen zu Therapie und Symptomen gestellt.
Ergebnisse: 4 Kinder wurden aus der Auswertung ausgeschlossen. Bei den Kindern der Verum-Gruppe nahm der Costa-Score gegenüber den Aufnahmewerten um 12,5 ± 12,6 Punkte ab, in der Placebo-Gruppe um 6,7 ± 8,2 Punkte ($p = 0,2$). Auch bezüglich des Pruritus ergaben sich in der Verum-Gruppe statistisch etwas günstigere Werte ($p = 0,1$). Hinsichtlich der Schlafqualität ergaben sich keinerlei Unterschiede. Bei der Nachbefragung waren ebenfalls keine statistisch signikanten Unterschiede zu beobachten.
Schlussfolgerung: Angesichts der hohen Kosten und falschen Versprechungen durch Befürworter der BIT wird die Schlussfolgerung gezogen, dass diese Therapie bei der Behandlung von Kindern mit Neurodermitis nicht empfehlenswert ist.

Methodischer Kommentar – R. Lüdtke, Tübingen

M. H. Schöni und seine Mitarbeiter versuchten in ihrem Ansatz als eine der ersten, die BIT systematisch in ihrer klinischen Wirksamkeit mittels einer formalen klinischen Studie zu evaluieren. Zu diesem Zweck wurden Kinder mit atopischer Dermatitis zum einen mit BIT und alternativ mit einer Scheintherapie behandelt, in der die wesentlichen Schaltkreise des Geräts umgangen wurden.
Der Arbeit ist deutlich anzumerken, dass in der Vorbereitungsphase intensive und ausführliche Diskussionen stattgefunden haben, um das Studiendesign sowohl den Anforderungen moderner Methodik wie auch den Eigenheiten der zu untersuchenden Therapie anzupassen. In wesentlichen Teilen ist dieses gelungen: Sowohl die Vorkehrungen, die eine doppelte Verblindung gewährleisten sollen, wie auch die Überlegungen zu den Zielparametern und die Verlaufskontrollen sind solide und wohldurchdacht.
Die Autoren haben zudem viele Anstrengungen unternommen, die eigentliche Therapie zu standardisieren. Wie sie selbst bemerken, ist eine solche Standardisierung im Bereich der unkonventionellen Medizin umstritten. Ihre Anmerkung, dass eine Validierung individueller Therapien nicht möglich ist, ist allerdings diskussionswürdig. Aus vielen anderen Bereichen unkonventioneller Medizin sind sehr wohl Modelle bekannt, die es erlauben, auch individuelle Therapieansätze wissenschaftlich hieb- und stichfest zu untersuchen.
Trotz des insgesamt guten ersten Eindrucks, den die Studie hinterlässt, kann man als Statistiker und Biometriker dennoch nicht umhin, auf eine Reihe von Problemen und Unklarheiten hinzuweisen. Diese betreffen zunächst die Randomisation. Die Autoren behaupten, sie hätten eine Randomisation «nach Alter, Geschlecht und Schwere der Erkrankung» durchgeführt und meinen damit augenscheinlich ein Matching nach diesen Kriterien. Wenn dem so ist, dann ist die vorgelegte Auswertung problematisch, da die Matching-Kriterien nicht berücksichtigt werden und die Ergebnisse daher deutlich verfälscht sein können. Letztendlich ist aufgrund der Publikation nicht zu entscheiden, ob die richtige Auswertungsme-

thode verwendet wurde oder nicht, da sowohl die Beschreibung der Randomisation wie auch die der Auswertungsverfahren recht unklar ist und viele Fragen offen lässt.

Aus methodischen Gesichtspunkten als kritisch ist ebenfalls die Strategie zu bezeichnen, Kinder aus der Auswertung auszuschliessen, die nicht protokollgemäss behandelt wurden (Per-protocol-Auswertung). Zwei Kinder wurden ausgeschlossen, weil sie die Klinik frühzeitig verlassen haben. Das ist doch wahrscheinlich ein Indiz dafür, dass es den Kindern gut geht, die jeweilige Behandlung (Verum oder Placebo) also geholfen hat. Andererseits wurde auch ein Kind ausgeschlossen, dem es explizit schlechter ging. Insgesamt könnten die Studienergebnisse also auch aus diesem Grund durchaus verfälscht sein, wobei unklar ist, ob der wahre Therapieunterschied grösser oder kleiner ist als in der Studie festgestellt wurde.

Schliesslich erscheint auch die Interpretation der Daten aus statistischer Sicht etwas zu hart. Der Studie ist es nicht gelungen, einen statistisch signifikanten Unterschied zwischen zwei Therapien zu entdecken. Dieses bedeutet aber nicht, dass nicht doch ein Unterschied vorhanden ist. Möglicherweise ist dieser aber z. B. nur aufgrund der geringen Fallzahlen nicht entdeckt worden. Die Schlussfolgerung, dass die BIT «keinen Platz in der Behandlung von Kindern mit atopischer Dermatitis» hat, ist demzufolge unzulässig, zumal die Ergebnisse ja durchaus eine leichte Überlegenheit der Verum-Gruppe indizieren, sowohl in den Kurzzeiterfolgen wie auch in den Langzeitergebnissen.

Aus den genannten Gründen halte ich ein abschliessendes Urteil über die BIT für verfrüht.

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