



Antibiogram of Biofield-Treated *Shigella boydii*: Global Burden of Infections

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Abstract: Bacillary dysentery and acute gastroenteritis caused by infection of *Shigella* species are major public health burden in India and its neighboring countries. Emergence of antimicrobial resistance threatens to render current treatments ineffective. The current study was attempted to investigate the effect of biofield treatment on *Shigella boydii* (*S. boydii*) with respect of antimicrobial susceptibility assay, biochemical characteristics and biotyping. The American Type Culture Collection (ATCC 9207) strain of *S. boydii* was used in this experiment. The study was conducted in revived and lyophilized state of *S. boydii*. Both revived (Group; Gr. II) and lyophilized (Gr. III) strain of *S. boydii* were subjected to Mr. Trivedi's biofield treatment. Gr. II was assessed on day 5 and day 10, while Gr. III on day 10 with respect to control (Gr. I). Sensitivity pattern of amoxicillin/k-clavulanate was improved from intermediate (I) to susceptible (S) with correspond to MIC value was also reduced by two folds ($16/8$ to $\leq 8/4$ $\mu\text{g/mL}$) in both the treated groups as compared to control. The antimicrobial susceptibility of *S. boydii* showed 15% alteration in Gr. II on day 5, while significant (40%) alteration was found on day 10 as compared to control. The MIC values of antimicrobials for *S. boydii* also showed 12.50% alteration in Gr. II on day 5 while, significant alteration (59.38%) of minimum inhibitory concentration (MIC) value was found in Gr. II on day 10 as compared to control. It was observed that overall 69.70% biochemical reactions were changed in which 66.67% alteration was found in Gr. II on day 10 with respect to control. Moreover, biotype numbers were changed in all the treated groups without alteration of organism as compared to control. These results suggested that biofield treatment had significant impact on *S. boydii* in Gr. II on day 10 with respect to antimicrobial susceptibility, MIC and biochemical reactions pattern.

Keywords: *Shigella boydii*, Antimicrobial Sensitivity, Biofield Treatment, Biochemical Reaction, Biotype, Bacillary Dysentery, Shigellosis, Acute Gastroenteritis

1. Introduction

Shigella boydii (*S. boydii*) is a non-motile, non-spore forming, non-lactose fermenting and Gram-negative rod shape bacterium that belongs to the family of *Enterobacteriaceae*. *S. boydii* mainly causes infections through contaminated food/water/soil or with fecal matter. It inhabits in the gut and rectum of humans and other primates [1, 2]. *S. boydii* contains 20 distinct antigenic serotypes [3]. *Shigella* species are highly infective and virulent due to release of a potent cytotoxin known as 'Shigatoxin' which causes severe and sometimes fatal disease [4]. It does not produce gas from carbohydrates but ferments glucose

predominantly which is one of its characteristic features [5]. The manifestations of major clinical complications in *S. boydii* infected patients include, shigellosis (watery diarrhoea with mild vomiting), reactive arthritis and hemolytic uremic syndrome [6]. According to the reports of Centers for Disease Control and Prevention in the USA *Shigella* is estimated to cause 80 - 165 million cases of disease and 600,000 deaths per year worldwide. Therapeutic uses of antimicrobials against shigellosis can slightly shorten the duration of symptoms. Fluoroquinolone or ceftriaxone is the drug of choice to treat this disease. However, due to high

tendency of multidrug resistance globally including fluoroquinolones and newer cephalosporins, particularly in South and East Asia [7], some alternative strategies are needed to treat against strains of *S. boydii*.

Based on National Institute of Health/National Center for Complementary and Alternative Medicine (NIH/NCCAM) has reported that energy therapies either biofield or electromagnetic based involve use of this energy fields to promote health and healing [8]. Harold Saxton Burr had performed the detailed studies on correlation of electric current with physiological process and concluded that every single process in the human body had an electrical significance [9]. Recently, it was discovered that all electrical processes happening in body have strong relationship with magnetic field as described by Ampere's law, which states that moving charge produces magnetic fields in surrounding space [10, 11]. According to Rivera-Ruiz *et al.* it was reported that electrocardiography has been extensively used to measure the biofield of human body [12]. Thus, human has the ability to harness the energy from environment or Universe and can transmit into any living or nonliving object(s) around the Globe. The objects always receive the energy and respond into useful way that is called biofield energy and the process is known as biofield treatment (The Trivedi Effect®). Mr. Trivedi's unique biofield treatment has been known to transform the structural, physical and thermal properties of several metals in material science [13-15], improved the overall productivity of crops [16, 17], altered characteristics features of microbes [18-20] and improved growth and anatomical characteristics of various medicinal plants [21, 22].

Due to the clinical significance of this organism and literature reports, biofield treatment as an alternative approach, the present work was undertaken to evaluate the impact of biofield treatment on *S. boydii* in relation to antimicrobials susceptibility, minimum inhibitory concentration (MIC) and biotyping based on various biochemical characters.

2. Materials and Methods

S. boydii, American Type Culture Collection (ATCC 9207) strains were procured from Micro Bio Logics, Inc., USA, in two sets A and B. Two different sealed packs were stored with proper storage conditions until further use. The antimicrobial susceptibility, MIC values, biochemical reactions and biotype number were estimated with the help of MicroScan Walk-Away® (Dade Behring Inc., West Sacramento, CA, USA) using negative breakpoint combo 30 (NBPC 30) panel. All the tested antimicrobials and biochemicals were procured from Sigma-Aldrich (MA, USA).

2.1. Experimental Design

Two ATCC samples A (revived) and B (lyophilized) of *S. boydii* were grouped (Gr.). The revived sample A was divided into two parts Gr. I (control) and Gr. II (revived; treatment); likewise, ATCC B was labeled as Gr. III (lyophilized; treatment).

2.2. Biofield Treatment Strategy

The Gr. I remained as untreated. The treatment Gr. II and III in sealed pack were handed over to Mr. Trivedi for biofield treatment under laboratory condition. Mr. Trivedi provided the treatment through his energy transmission process to the treatment groups without touching the samples. After treatment, all samples were handed over in the same condition and stored for analysis. Gr. II was assessed at two time points *i.e.* on day 5 and 10 and Gr. III was assessed on day 10. After biofield treatment, all groups (control and treated) were investigated for antimicrobial susceptibility, MIC, pattern of biochemical reactions and biotyping.

2.3. Antimicrobial Susceptibility Test

Investigation of antimicrobial susceptibility of *S. boydii* was carried out with the help of automated instrument, Micro Scan Walk-Away® using NBPC 30 panel. The panel can be stored at 2 to 25°C for analysis. The panel was allowed to equilibrate to room temperature prior to rehydration. All opened panels were used on the same day. The tests carried out on Micro Scan were miniaturized of the broth dilution susceptibility test that has been dehydrated. Briefly, 0.1 mL of the standardized suspension of *S. boydii* was pipetted into 25 mL of inoculum water using pluronic and inverted 8 to 10 times and inoculated, rehydrated, and then subjected to incubation for 16 hours at 35°C. Rehydration and inoculation was performed using the RENOK® system with inoculators-D (B1013-4). 25 mL of standardized inoculum suspension was poured in to inoculum tray. The detailed experimental procedure and conditions were followed as per the manufacturer's instructions. The antimicrobial susceptibility pattern (S: Susceptible, R: Resistant; and I: Intermediate) and MIC were determined by observing the lowest antimicrobial concentration showing inhibition of growth [23].

2.4. Biochemical Reaction Studies

Biochemical reactions of *S. boydii* were determined using Micro Scan Walk-Away®, system with NBPC 30 panel [23].

2.5. Identification of Organism by Biotype Number

The biotype number of *S. boydii* was determined by the data of a series of biochemical reactions when processed on Micro Scan Walk-Away® panel [23].

3. Results and Discussion

3.1. Antimicrobial Susceptibility Test

The outcome of *S. boydii* susceptibility pattern and MIC values of tested antimicrobials after biofield treatment are summarized in Table 1 and 2, respectively. The data were analyzed and compared with respect to control. Antimicrobial susceptibility was carried out using twenty antimicrobials. The revived treated cells (Gr. II) of *S. boydii* showed a significant alteration in antimicrobial sensitivity pattern *i.e.* 40% (eight out of twenty) on day 10, 15% (three

out of twenty) on day 5 as compared to control. Moreover, lyophilized treated cells (Gr. III) showed 10% (two out of twenty) alteration on day 10 as compared to control. The susceptibility pattern of *S. boydii* for amoxicillin/k-clavulanate in control sample of *S. boydii* was observed as intermediate (I) type of resistance *i.e.* low resistance. This finding is supported by several literature data, reporting that *S. boydii* is resistant to this antibiotic [24, 25].

In this experiment, susceptibility pattern of amoxicillin/k-clavulanate was improved from I to S in Gr. II as well as Gr. III on day 10 as compared to control. Besides, the MIC value of amoxicillin/k-clavulanate was also reduced by two folds (16/8 to $\leq 8/4$ $\mu\text{g/mL}$) in both the treated groups as compared to control. This improvement in susceptibility pattern from intermediate to susceptible may be due to biofield treatment. Antibiotics such as aztreonam, cefotaxime, ceftazidime, chloramphenicol and tetracycline showed an alteration of susceptibility pattern from S to R in Gr. II on day 10 as compared to control. However among five, sensitivity pattern of tetracycline was additionally changed from S to R in Gr. II (on day 5) and Gr. III as compared to control. The sensitivity patterns of both cefotaxime and ceftazidime in control *S. boydii* sample were matched with literature data [26]. Moreover, antibiotics such as ampicillin and cefepime showed an alteration of sensitivity pattern from S to I in Gr. II on day 10 while sensitivity of ampicillin was altered from S to R on day 5 as compared to control after biofield treatment. Twelve out of twenty (60%) antimicrobials *viz.* ampicillin/sulbactam, ceftriaxone, ciprofloxacin, gatifloxacin, imipenem, levofloxacin, meropenem, moxifloxacin, piperacillin/tazobactam, piperacillin, ticarcillin/k-clavulanate and trimethoprim/sulfamethoxazole did not show any change of antimicrobial sensitivity after biofield treatment with respect to control sample (Table 1). The MIC values of aztreonam, ceftazidime, cefotaxime and chloramphenicol were changed from ≤ 8 to >16 $\mu\text{g/mL}$ in Gr. II on day 10 as compared to control. Alteration of MIC value of ampicillin, cefazolin, cefepime and cephalothin (≤ 8 to 16 $\mu\text{g/mL}$) was noticed in Gr. II on day 10 while ampicillin additionally changed to (>16 $\mu\text{g/mL}$) on day 5. However, these four antibiotics did not show any change in MIC value in Gr. III as compared to control. Moreover, changes in MIC values of amikacin, cefotetan from ≤ 8 to > 32 $\mu\text{g/mL}$ were observed in Gr. II on day 10 after biofield treatment while did not change in Gr. III as compared to control. Antimicrobial *i.e.* nitrofurantoin showed an alteration of MIC value from ≤ 32 to > 64 $\mu\text{g/mL}$ in Gr. II on both day 5 and 10 while change of MIC value (64 $\mu\text{g/mL}$) was observed in Gr. III as compared to control. Besides this, gentamicin, tetracycline and tobramycin showed an alteration of MIC value from ≤ 4 to > 8 $\mu\text{g/mL}$ in Gr. II on day 10 while tetracycline was additionally changed the MIC value to > 8 $\mu\text{g/mL}$ in Gr. II (on day 5) and Gr. III (on day 10) as compared to control. The MIC values of ESBL-a Scrn and ESBL-b Scrn were changed from ≤ 4 to > 4 and ≤ 1 to >1 respectively in Gr. II on day 10 while no change of MIC values was observed in Gr. II (on day 5) and Gr. III as

compared to control.

Overall, 59.38% (nineteen out of thirty two) antimicrobials showed altered MIC values after biofield treatment in Gr. II on day 10 and 12.50% (four out of thirty two) on day 5 as compared to control.

Table 1. Effect of biofield treatment on antibiogram analysis of *Shigella boydii*.

S. No.	Antimicrobial	Type of Response			
		Gr. I	Gr. II		Gr. III
			Day 5	Day 10	
1.	Amoxicillin / k-clavulanate	I	S	S	S
2.	Ampicillin/sulbactam	S	S	S	S
3.	Ampicillin	S	R	I	S
4.	Aztreonam	S	S	R	S
5.	Cefepime	S	S	I	S
6.	Cefotaxime	S	S	R	S
7.	Ceftazidime	S	S	R	S
8.	Ceftriaxone	S	S	S	S
9.	Chloramphenicol	S	S	R	S
10.	Ciprofloxacin	S	S	S	S
11.	Gatifloxacin	S	S	S	S
12.	Imipenem	S	S	S	S
13.	Levofloxacin	S	S	S	S
14.	Meropenem	S	S	S	S
15.	Moxifloxacin	S	S	S	S
16.	Piperacillin / tazobactam	S	S	S	S
17.	Piperacillin	S	S	S	S
18.	Tetracycline	S	R	R	R
19.	Ticarcillin/k-clavulanate	S	S	S	S
20.	Trimethoprim / sulfamethoxazole	S	S	S	S

R: Resistant; I: Intermediate; S: Susceptible; Gr.: Group

Beside this, MIC values of 9.38% (three out of thirty two) antimicrobials were altered after biofield treatment in Gr. III. Thirteen, out of thirty two tested antimicrobials (40.63%) *viz.* ampicillin/sulbactam, ceftriaxone, ciprofloxacin, gatifloxacin, imipenem, levofloxacin, meropenem, moxifloxacin, norfloxacin, piperacillin/tazobactam, piperacillin, ticarcillin/k-clavulanate and trimethoprim/sulfamethoxazole did not show any alteration of MIC values in treated cells of *S. boydii* as compared to control (Table 2).

Table 2. Effect of biofield treatment on *Shigella boydii* to minimum inhibitory concentration (MIC) value of tested antimicrobials.

S. No.	Antimicrobial	Type of Response			
		Gr. I	Gr. II		Gr. III
			Day 5	Day 10	
1.	Amikacin	≤ 16	≤ 16	>32	≤ 16
2.	Amoxicillin/ k-clavulanate	16/8	$\leq 8/4$	$\leq 8/4$	$\leq 8/4$
3.	Ampicillin/sulbactam	$\leq 8/4$	$\leq 8/4$	$\leq 8/4$	$\leq 8/4$
4.	Ampicillin	≤ 8	>16	16	≤ 8
5.	Aztreonam	≤ 8	≤ 8	>16	≤ 8
6.	Cefazolin	≤ 8	≤ 8	16	≤ 8

S. No.	Antimicrobial	Type of Response			
		Gr. I	Gr. II		Gr. III
			Day 5	Day 10	
7.	Cefepime	≤8	≤8	16	≤8
8.	Cefotaxime	≤8	≤8	>32	≤8
9.	Cefotetan	≤16	≤16	>32	≤16
10.	Cefoxitin	≤8	≤8	>16	≤8
11.	Ceftazidime	≤8	≤8	>16	≤8
12.	Ceftriaxone	≤8	≤8	≤8	≤8
13.	Cefuroxime	≤4	≤4	>16	≤4
14.	Cephalothin	≤8	≤8	16	≤8
15.	Chloramphenicol	≤8	≤8	>16	≤8
16.	Ciprofloxacin	≤1	≤1	≤1	≤1
17.	ESBL-a Scrn	≤4	≤4	>4	≤4
18.	ESBL-b Scrn	≤1	≤1	>1	≤1
19.	Gatifloxacin	≤2	≤2	≤2	≤2
20.	Gentamicin	≤4	≤4	>8	≤4
21.	Imipenem	≤4	≤4	≤4	≤4
22.	Levofloxacin	≤2	≤2	≤2	≤2
23.	Meropenem	≤4	≤4	≤4	≤4
24.	Moxifloxacin	≤2	≤2	≤2	≤2
25.	Nitrofurantoin	≤32	>64	>64	64
26.	Norfloxacin	≤4	≤4	≤4	≤4
27.	Piperacillin / tazobactam	≤16	≤16	≤16	≤16
28.	Piperacillin	≤16	≤16	≤16	≤16
29.	Tetracycline	≤4	>8	>8	>8
30.	Ticarcillin/k-clavulanate	≤16	≤16	≤16	≤16
31.	Tobramycin	≤4	≤4	>8	≤4
32.	Trimethoprim / sulfamethoxazole	≤2/38	≤2/38	≤2/38	≤2/38

MIC data are presented in µg/mL; Gr.: Group; ESBL-a, b Scrn: Extended-spectrum β-lactamase screen

3.2. Biochemical Reactions Studies

Study of biochemical reactions can be utilized to identify the enzymatic and metabolic characteristic features of microbes. Microorganisms can be categorically differentiated based on their utilization of specific biochemicals as nutrients during the process of metabolism or enzymatic reactions. The specific biochemical which showed some changes against *S. boydii* after biofield treatment are shown in Table 3. Biochemicals such as adonitol (ADO), citrate (CIT), colistin (CL4), esculin hydrolysis (ESC), inositol (INO) and urea (URE) were changed from negative (-) to positive (+) reaction in all the treated groups with respect to control. Moreover, biochemicals such as nitrofurantoin (FD64), hydrogen sulfide (H₂S), lysine (LYS), malonate (MAL), melibiose (MEL), galactosidase (ONPG), ornithine (ORN), raffinose (RAF), rhamnose (RHA), sucrose (SUC), tryptophan deaminase (TDA) and Voges-Proskauer (VP) were changed from negative (-) to positive (+) reaction in group Gr. II on both day 5 and 10 while remained unchanged *i.e.* negative (-) in Gr. III with respect to control. However, experimental data also exhibited that certain biochemicals such as arginine (ARG), cephalothin (CF8), kanamycin (K4) and tobramycin (TO4) were changed from negative (-) to positive (+) reaction in group Gr. II on day 10 while remained unchanged *i.e.* negative (-) on day 5 (Gr. II) and Gr. III with respect to control. Change of positive (+) to negative

(-) biochemical reaction was found in case of sorbitol (SOR) in Gr. III which remain unchanged in Gr. II as compared to control. Overall, 69.70% biochemical reactions were altered in tested thirty three biochemicals with respect to control after biofield treatment. In revived treated strain of *S. boydii* cells (Gr. II) showed 66.67% alteration on day 10 and 54.55% alteration on day 5, in terms of biochemical reactions as compared to control. The lyophilized treated cells of *S. boydii* (Gr. III) showed only 21.21% alteration of biochemical reactions as compared to control.

Table 3. Effect of biofield treatment on *Shigella boydii* to the biochemical reaction pattern.

S. No.	Code	Biochemical	Gr. I	Type of Response		
				Gr. II		Gr. III
				Day 5	Day 10	
1.	ACE	Acetamide	-	-	-	-
2.	ADO	Adonitol	-	+	+	+
3.	ARA	Arabinose	+	+	+	+
4.	ARG	Arginine	-	-	+	-
5.	CET	Cetrimide	-	-	-	-
6.	CF8	Cephalothin	-	-	+	-
7.	CIT	Citrate	-	+	+	+
8.	CL4	Colistin	-	+	+	+
9.	ESC	Esculin hydrolysis	-	+	+	+
10.	FD64	Nitrofurantoin	-	+	+	-
11.	GLU	Glucose	+	+	+	+
12.	H ₂ S	Hydrogen sulfide	-	+	+	-
13.	IND	Indole	-	-	-	-
14.	INO	Inositol	-	+	+	+
15.	K4	Kanamycin	-	-	+	-
16.	LYS	Lysine	-	+	+	-
17.	MAL	Malonate	-	+	+	-
18.	MEL	Melibiose	-	+	+	-
19.	NIT	Nitrate	+	+	+	+
20.	OF/G	Oxidation-fermentation / glucose	+	+	+	+
21.	ONPG	Galactosidase	-	+	+	-
22.	ORN	Ornithine	-	+	+	-
23.	OXI	Oxidase	-	-	-	-
24.	P4	Penicillin	+	+	+	+
25.	RAF	Raffinose	-	+	+	-
26.	RHA	Rhamnose	-	+	+	-
27.	SOR	Sorbitol	+	+	+	-
28.	SUC	Sucrose	-	+	+	-
29.	TAR	Tartrate	-	-	-	-
30.	TDA	Tryptophan deaminase	-	+	+	-
31.	TO4	Tobramycin	-	-	+	-
32.	URE	Urea	-	+	+	+
33.	VP	Voges-Proskauer	-	+	+	-

-, (negative); +, (positive); Gr.: Group

About 30.30% of total tested biochemicals, such as Acetamide (ACE), arabinose (ARA), Cetrimide (CET), glucose (GLU), indole (IND), nitrate (NIT), oxidation-fermentation glucose (OF/G), oxidase (OXI), penicillin (P4), and tartrate (TAR) did not show any change in all the treated groups after biofield treatment as compared to control (Table 3).

Based on existing literature *Shigella* serovers are able to

ferment the five basic sugars by producing both acid and gas. However, differentiation of specific *Shigella* serotype on the basis of their sugar fermentation pattern is difficult. The key characteristic feature for *S. boydii* bacterium is non-lactose fermenting, but it can ferment glucose with production of acid [1]. In this experiment, control sample of *S. boydii* resulted positive (+) reaction in GLU and SOR and negative reaction (-) in case of SUC. These biochemical results were corroborated with literature data [3]. These findings could be due to fermentation of GLU and produce acid which supports the characteristic feature of *S. boydii*. Moreover, the positive (+) reaction of SOR was changed to negative (-) in Gr. III and negative (-) reaction of SUC was also changed to positive (+) reaction in Gr. II possibly due to change of enzymatic reaction after biofield treatment. In the present study, negative reactions (-) of VP, URE and CIT utilization tests were observed in control sample of *S. boydii*. The findings were also reported in the literature [27]. However, the negative (-) reaction of CIT and URE were changed to positive (+) in both Gr. II and Gr. III and VP changed to positive (+) in Gr. II which possibly due to alteration of metabolic and/or enzymatic reaction of *S. boydii* after biofield treatment.

3.3. Identification of Organism by Biotype Number

The species (*S. boydii*) was identified based on variety of conventional biochemical characters and biotyping. Biotype number of particular organism was evaluated after interpreting the results of the biochemical reactions. The biotype number that led to the particular organism identification. Based on the biochemical results, biotype number was changed in treated Gr. II on day 5 (77765774, *S. boydii*), on day 10 (77767776, *S. boydii*) and Gr. III on day 10 (41640244, *S. boydii*) with respect to control (51000000) i.e. *Shigella* species (Table 4). These changes of biotype number without alteration of organism are assumed due to change of metabolic or enzymatic reactions of *Shigella* species.

Table 4. Effect of biofield treatment on biotype number of *Shigella boydii*.

Feature	Gr. I	Gr. II		Gr. III
		Day 5	Day 10	Day 10
Biotype Number	51000000	77765774	77767776	41640244
Organism Identification	<i>Shigella</i> species	<i>S. boydii</i> (Very rare biotype)	<i>S. boydii</i> (Very rare biotype)	<i>S. boydii</i> (Very rare biotype)

Gr.: Group

Rapid emergence and outbreaks of resistant microorganisms due to widespread selective pressure and efficient dissemination channels are one of the factors that might have contributed to the spread of resistant organisms [28]. Due to microbial resistance to a single or multiple drugs, invention of an effective antimicrobial therapy for the human-wellness is urgently required. However, due to some limitation of science, the progress of new medications are slow and very challenging for scientists. Biofield

treatment could be responsible for alteration in microorganism at genetic and/or enzymatic level, which may act on receptor protein. While altering receptor protein, ligand-receptor/protein interactions may alter that could lead to show different phenotypic characteristics [29]. Biofield treatment might induce significant changes in revived strain of *S. boydii* and altered antimicrobials susceptibility pattern, MIC values and biochemical. Based on these results, it is postulated that, biofield treatment may be used to alter the sensitivity pattern of antimicrobial i.e. amoxicillin/k-clavulanate.

4. Conclusions

Altogether, the biofield treatment has significantly altered the susceptibility pattern (40%) with MIC values (59.38%) of tested antimicrobials against the ATCC strain of *S. boydii* in revived treated cells (Gr. II) as compared to control. It also altered significantly the biochemical reactions pattern (66.67%) of biofield treated strain of *S. boydii* in Gr. II as compared to control. On the basis of changed biochemical reactions of *S. boydii* the biotype numbers were altered in Gr. II and III without alteration of organism as compared to control. Mr. Trivedi's biofield treatment could be applied as an alternative therapeutic approach to alter the sensitivity pattern of antimicrobials in near future including strict public health strategies like clean water supply, good sewage management and a clean environment against bacillary dysentery and acute gastroenteritis patients infected by *S. boydii*.

Abbreviations

MIC: Minimum inhibitory concentration;
ATCC: American type culture collection;
NBPC 30: Negative breakpoint combo 30;
NIH/NCCAM: National Institute of Health/National Center for Complementary and Alternative Medicine

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