

## The NGF Point-Injection for Treatment of the Sound-Perceiving Nerve Deafness and Tinnitus in 68 Cases

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**Objective:** To observe the therapeutic effects of the point-injection with nerve growth factor (NGF) for the sound-perceiving nerve deafness and tinnitus. **Methods:** The 140 cases in this series were randomly divided into a treatment group of 68 cases treated by NGF injection at the points of Yifeng (TE 17) and Wangu (GB 12), and a control group of 72 cases orally taking *Xibiling* (西比灵) and adenosine triphosphate (ATP) and intramuscular injection with VB<sub>1</sub> and VB<sub>12</sub>. **Results:** The total effective rate was 78.6% in the treatment group and 31.8% in the control group, with significant difference between the two groups ( $P < 0.05$ ). **Conclusion:** For treating nervous deafness and tinnitus, NGF point-injection may show good therapeutic effects, but inversely proportional to the illness course, age and the extent of hypoacusis.

**Key words:** the sound-perceiving nerve deafness; nerve growth factor (NGF); point-injection

The sound-perceiving nerve deafness with tinnitus is commonly seen in clinic. Because of the complicated etiology with unclear pathogenesis, there is no specific remedy and therapy for the treatment. Since 2003, the authors have adopted the nerve growth factor (NGF) point-injection therapy for treatment of the sound-perceiving nerve deafness and tinnitus, yielding relatively good results. A report follows.

### CLINICAL MATERIALS

#### Criteria for admission

The patients admitted were those who conformed to *The Diagnostic Criteria for The Sound-perceiving Nerve Deafness and Tinnitus*,<sup>1</sup> with the age range from 18–59 years and with the illness course from one month to 18 years; and were those who had failed to respond to the previous treatments, or received no any treatment at all. The cochlear pathological changes were excluded by the ABR or CT exam.

#### General data

In this series, the 140 cases admitted were randomly

divided into the following two groups. In the treatment group of 68 cases, 32 cases were male and 36 were female, aged 15–59 years (45.8 on the average), with their illness course ranging from 1 month to 18 years. 52 cases had tinnitus on one side, and 16 cases on both sides, with the mild deafness in 21 ears, moderate in 37 ears, severe in 26 ears. In the control group of 72 cases, 35 cases were male and 37 were female, aged 18–58 years (41.5 on the average), with their illness course ranging from 1 month to 16 years. 59 cases had tinnitus on one side, and 13 cases on both sides, with the mild deafness in 24 ears, moderate in 36 ears, and severe in 25 ears.

#### Grading of the illness condition

According to the grading criteria for tinnitus,<sup>2</sup> grade 0 means no tinnitus; grade I means the mildest tinnitus; grade II means the mild tinnitus not influencing the patient's daily life and work; grade III means the moderate tinnitus with no obvious interference for the daily life and work; grade IV means the moderate tinnitus affecting the sleep and work; grade V means

the severe tinnitus seriously affecting the patient's sleep and work, and with light vexation, anxiety and mental depression; and grade VI, the tinnitus is so severe that the patient can not sleep and work, and with obvious vexation, anxiety and mental depression. The deafness is graded according to the criteria described in the medical book *Otorhinolaryngology* (耳鼻咽喉科学):<sup>3</sup> 26–40 dB indicate the mild deafness, 41–70 dB the moderate deafness, and over 70 dB the severe deafness.

### METHODS

The NGF point-injection therapy was used for patients in the treatment group. 2000 Au of NGF (produced by Xiamen Beidazhilu Biological Engineering Company) resolved with 1 ml of water was injected alternately into Yifeng (TE 17) and Wangu (GB 12) in a depth of no more than 1.5 cm, once every other day, for one month as a treatment course.

The patients in the control group orally took *Xibiling* (西比灵) 10 mg a day at night, and adenosine triphosphate (ATP) 20 mg, 3 times a day; and intramuscular injection with 100 mg of VB<sub>1</sub> and 500 µg of VB<sub>12</sub>, once a day.

### Criteria for therapeutic effects

The criteria stipulated by the Chinese Medical Association were adopted. Cured: the hearing returned to normal and/or the tinnitus disappeared with no relapse for over one month. Markedly relieved: the hearing was increased by at least 30 dB and/or the tinnitus was decreased by 2 grades or more. Improved: one of the following criteria had been reached: 1) the audition for single frequency was improved by at least 15 dB; 2) the tinnitus was

reduced by 1 grade; 3) the progressive and/or fluctuating dysaudia was no longer aggravated. Failed: the audition for single frequency was improved less than 15 dB or the tinnitus was not improved.

## RESULTS

### Comparison of the therapeutic effects between the two groups (Table 1)

The total effective rate was 78.6% in the treatment group and 31.8% in the control group, with a significant difference between the two groups ( $P < 0.05$ ).

### Relation between the illness course and the effect in the treatment group (Table 2)

The total effective rate was 82.8% for the sick ears with illness course <1 year, and 46.2% in the sick ears with illness course >1 year ( $P < 0.05$ ). It is indicated that the longer the illness course is, the poor the effect will be.

### Relation between the age and the effect in the treatment group (Table 3)

The total effective rate was 91.7% in the patients aged 15–29 years, 82.1% in the patients aged 30–49, and 40.6% in the patients aged over 50, suggesting that the older the age is, the poor the effect will be.

### Relation between the deaf grade and the effect in the treatment group (Table 4)

The total effective rate was 85.7% in the 21 ears of mild deafness, 51.4% in the 37 ears of moderate deafness, and 46.2% in the 26 ears of severe deafness. The effect in patients with mild deafness was obviously superior to that in patients with moderate or severe deafness, showing a significant difference ( $P < 0.05$ ).

Table 1. Comparison of the therapeutic effects between the two groups

Group	Sick ears	Cured	Markedly relieved	Improved	Failed	Total effective rate (%)
Treatment group	84	16	24	26	18	78.6*
Control group	85	0	8	19	58	31.8

Note: For the intergroup comparison, \* $P < 0.05$

Table 2. Relation between the illness course and the effect in the treatment group

Illness course	Sick ears	Cured	Markedly relieved	Improved	Failed	Total effective rate (%)
< 1 year	58	15	19	14	10	82.8*
> 1 year	26	2	5	5	14	46.2

Note: Compared with the illness course >1 year, \* $P<0.05$

Table 3. Relation between the age and the effect in the treatment group

Age group	Sick ears	Cured	Markedly relieved	Improved	Failed	Total effective rate (%)
15-29	24	8	9	5	2	91.7
30-49	28	6	5	12	5	82.1
Over 50	32	1	3	9	19	40.6

Table 4. Relation between the deaf grade and the effect in the treatment group.

Deaf grade	Sick ears	Cured	Markedly relieved	Improved	Failed	Total effective rate (%)
Mild	21	4	9	5	3	85.7*
Moderate	37	2	5	12	18	51.4
Severe	26	0	3	9	14	46.2

Note: \* $P<0.05$  as compared with moderate or severe deafness

## DISCUSSION

TCM theory holds that the function of internal organs is an expression of physiological activities and pathological changes. Channels and collaterals are passages to connect the internal organs and limbs, circulate the *qi* and blood, and communicate the exterior with the interior. Closely related to the kidney, heart, liver, gallbladder and spleen, the ear is a place where the channels and collaterals converge. Wangu (GB 12), a point of the Gallbladder Channel, is closely related to the great auricular nerves in its shallow part and approaches the cochlea in its deep part. The point-injection given at Wangu (GB 12) can improve the micro-circulation, showing good effects for restoring the hearing and improving tinnitus. Under Yifeng (TE 17) are the great auricular nerve, auriculotemporal nerve, external carotid artery, external jugular vein, parotid gland, facial nerve stem, vagus nerve, hypoglossal nerve and glossopharyngeal nerve. Acupuncture at Yifeng (TE 17) can improve the nerve regulation, vascular nutrition and lymph

circulation, which is helpful to deafness and tinnitus.

NGF is a necessary factor for development, maturity, proliferation, division and activation of the auditory epithelial cells and the auditory neuronal cells, and it plays an important role in repairing the damaged neuronal cells. In the present study, the NGF point-injection was used to treat the sound-perceiving nerve deafness and tinitus with a total effective rate of 78.6%, showing an obvious difference ( $P<0.05$ ) as compared with the routine treatment in the control group. The effect is especially good in patients with mild deafness or short illness course, possibly because the auditory nerve cells have not completely degenerated with relatively good regenerating ability.

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- (Translated by DUAN Shu-min 段树民)

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