

# CLINICAL AND EXPERIMENTAL STUDY OF LOW ENERGY HELIUM-NEON INTRAVASCULAR LASER IRRADIATION OF BLOOD IN CHRONIC SCHIZOPHRENIA

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## SUMMARY

By means of a prospective randomized controlled study, the low energy helium-neon intravascular laser irradiation of blood (LEILIB) was tested in schizophrenic patients. A total of 66 patients were recruited, matched for the duration of illness, and randomly assigned to the two experimental groups (one received the LEILIB in addition to medications while the other received only the medications). An additional 25 healthy volunteers were recruited as a control group. Venous blood were tested for T-lymphocyte subpopulation. The results showed that LEILIB in conjunction with medication was better than medications alone. They also indicated that schizophrenic patients had low and abnormal T-lymphocyte levels. It was possible that LEILIB therapy could enhance immune functions, and theoretically should have no side-effects.

**Key words:** chronic schizophrenics, intravascular irradiation, T-lymphocytes, Chinese

## INTRODUCTION

Low Energy Helium-Neon Intravascular Laser Irradiation of Blood (LEILIB) has been a new high-technical treatment method in recent years. Its essence is the direct irradiation of circulating blood by low energy He-Ne laser via an intravascularly applied light guide fiber optic device. According to the medical literature, the former USSR had used LEILIB in the treatment of cardiovascular diseases, severe infection, bronchial asthma and even depression. This method was firstly used in mainland China in November, 1991, and was employed for the first time for schizophrenic patients in the Beijing Huilongguan Hospital in July, 1992 with some efficacy.

The exact mechanism of this method has not been clearly known. Based on the research data, when low energy He-Ne laser directly irradiates the blood, it changes the molecular configuration of some proteins (enzymes and other proteins) which could cause the following biological effects, through some photochemical and photophysical mechanisms. These were as follows: i) Changes the blood rheological properties, including a decrease in the blood viscosity, platelet and red blood cells clotting capacity, and decreased in red blood cells transformation properties; ii) Modulation of humoral and cellular immunity leading to improved body immune functions, especially in the T-lymphocytes. iii) Amelioration of the body intoxicated status by increasing the activities of superoxide

dismutase (SOD), decreases medium molecular substances and accumulation of other toxic substances.

In 1992, a study was conducted in the Beijing Huilongguan Hospital to test the effectiveness of this therapy (Dong et al, 1992). 47 schizophrenic patients were divided into three groups: Group 1: an experimental group 10 cases who received only LEILIB; Group 2: a control group of 10 similar cases (matched for age, sex, course, subtypes of diagnosis and severity) who received only medications of a dose equivalent to 300-600 mg chlorpromazine per day; Group 3: 37 chronic schizophrenic refractory patients who received both LEILIB and medications.

The results showed that There was no statistical difference in the clinical outcome between Group 1 & 2, though in Group 1, the delusional symptoms disappeared faster. As for Group 3, 18.9% of the patient had an obvious improvement, while 29.7% had a turn for the better (thus making the total effective rate of 48.6%). Since then, the authors had treated a few hundred schizophrenic patients without any obvious adverse effects. It appeared that LEILIB has empirical effects on hallucinations, delusions, anxiety and depression symptoms, but not much effect on negative symptoms.

The present paper is the report of a prospective randomized clinical and experimental study about LEILIB treatment for chronic schizophrenic patients.

## METHODOLOGY

### SELECTION OF SUBJECTS

#### The experimental groups

From May, 1994 to April, 1995, all in-patients of the Beijing Huilongguan Hospital with a diagnosis of schizophrenia (DSM-III-R and CCMD-II criteria based on symptoms at interview and in the case records) were screened. They neither suffered from any significant infection or immunological deficiency diseases, nor had they taking any immunopotentiating drugs or received any laser treatment for the past six months.

Altogether, sixty-six chronic schizophrenics had been selected, and they matched for the course of their illness and then randomly divided into two subgroups. The group A received LEILIB treatment while the second group B was without. As seen in Table 1 above, the sex, age, course and length of stay in the hospital between the two groups showed no significant difference ( $p>0.05$ ). All patients had a duration of disease of at least two years, most of them over five year (29 out of the 33 in group A, and 28 in group B).

Experimentally, all patients had their venous blood taken twice for T-lymphocyte subpopulation test. They were done at the same time (9AM -10AM) and same interval between the two tests. For group A, the times blood was drawn just before and after their LEILIB treatment.

#### The control group

The control group C consisted of normal volunteers from amongst the staff of the Mental Institute of the Beijing Medical University. There were 25 subjects, 14 men and 11 women aged between 22-59 years. Their venous blood was taken only once for T-lymphocyte subpopulation test during 9Am-10Am.

### TREATMENT METHODS

Both groups A & B were maintained on the original anti-psychotic drugs within the therapeutic dosage. These patients with a duration of less than 5 years took a dosage of Chlorpromazine 500-600mg each day or a dosage of Clozapine 300-400mg each day while there is a duration of 5 years or more.

The multi-functional KX-28001B He-Ne-Laser Therapy Apparatus made by Nanhai Kangxing Company was used in Group A. The laser probe was put into the veins of the upper limbs. Then the patients were given an Intravascular Irradiation with laser wavelength 632.8nm, output power 1.5W for 60 minutes each time. The LEILIB was given once a day in the first three days, and then once every two days. One course of treatment consisted of ten sessions.

### ASSESSMENT INSTRUMENTS

The BPRS, SANS, SAPS and TESS were chosen for clinical assessment. Three psychiatrists with at least five years of clinical experience and who were not involved with patient treatment were asked to evaluate (blindly) the clinical status and the side-effects. They received the same training in assessment before the evaluation, and reached a uniformity intra-class consistence of correlation ranged from 0.82 to 0.96.

### THE T-LYMPHOCYTE SUBPOPULATION TEST

Using an immunohistochemical assay that linked alkaline-phosphatase and anti-alkaline-phosphatase to identify positive cells, 500 cells were viewed under a high-power lens and the percentage of positive cells was recorded.

## RESULTS AND ANALYSIS

All the data were input into a computer and the analysis was performed using the SPSS. Thirteen patients in group A received one course of treatment, while the rest of 20 took two courses, with an interval of seven days between them.

### ANALYSIS OF THE THERAPEUTIC EFFICACY

According to the BPRS, a reduction rate of above 80% in the score was considered as cure, that of 60-80% indicated an obvious improvement, 30-60% as a turn for the better, and less than 30% meant non-effective.

After the LEILIB therapy, 2 patients could be considered cured, 8 (24.2%) showed an obvious improvement, 15 (69.7%) took a turn for the better and 10 cases no improvement. In group B, however, only 1 patient was cured, 4 (15.1%) had an obvious improvement, 6 (33.3%) took a turn for the better and 22 no improvement. Thus, as seen in Table 2, both the rates of obvious improvement and a turn for the were better in group A than in group B, and the difference between these two groups was statistically significant ( $p<0.05$ ), using the parametric test.

**Table 1: Comparison of basic information between Groups A & B**

	Group A	Group B	Stat. Sig.
<b>Number</b>	33	33	N.S.
<b>Sex</b>			
<b>Male</b>	20	19	N.S.
<b>Female</b>	13	14	N.S.
<b>Age</b>			
<b>Mean years ± S.D.</b>	37.65±8.48	36.72±7.61	N.S.
<b>Duration of illness</b>			
<b>Mean years ± S.D.</b>	15.66±7.37	14.76±7.48	N.S.
<b>Hospitalizations</b>			
<b>Mean number ±S.D.</b>	4.23±2.34	4.02±2.00	N.S.

**Table 2: Clinical improvement amongst groups A & B**

Clinical condition	Group A (%)	Group B (%)
<b>Effective</b>	23 (69.7)	11 (33.3%)
<b>Fully recovered</b>	2	1
<b>Significantly improved</b>	6	4
<b>Improved</b>	15	6
<b>Ineffective</b>	10 (30.3%)	22 (66.7%)

**Table 3: Comparison of BPRS, SAPS & SANS between Groups A & B**

Scale	Factors	Group A		Group B	
		Before	After	Before	After
<b>BPRS</b>					
	Anxiety Depression	2.11±1.04	1.55±.52**	1.67±.67	1.53±.64
	Anergia	2.68±1.05	2.37±.93	2.84±.99	2.69±.86
	Thought Disorder	2.76±1.24	1.93±.89**	2.45±1.18	2.21±1.12
	Hyperactivity	1.85±.88	1.34±.51**	1.72±.64	1.37±.55
	Hostility Suspiciousness	2.73±1.17	1.89±.84***	2.34±1.07	2.09±1.10
<b>SAPS</b>					
	Hallucination	4.03±4.91	1.90±2.91*	3.66±4.44	3.06±4.51
	Delusion	7.24±6.5	3.60±4.1**	6.51±6.2	4.12±4.19
	Odd behaviour	2.78±2.44	2.12±2.05	2.42±2.1	2.03±2.08
	Disorder of thought form	1.9±2.94	1.03±2.0	1.78±2.55	1.42±2.62
<b>SANS</b>					
	Apathy	7.3±3.97	6.45±3.98	8.48±4.9	7.21±4.09
	Poverty of thought	1.63±2.54	1.27±2.51	2.18±2.97	1.96±2.41
	Abulia	4.33±2.86	4.15±3.21	4.42±2.39	4.45±3.29
	Deficiency of happiness	7.69±3.0	6.57±3.39	8.39±3.17	7.45±3.42
	Disorder of attention	1.45±2.13	1.21±2.05	1.33±2.27	1.03±2.0

\* p&lt;0.05; \*\* p&lt;0.01; \*\*\* p&lt;0.001

**Table 4: T-lymphocyte subpopulation between Groups A, B & C**

	Group A		Group B		Group C
	Before	After	Before	After	
<b>n</b>	22	22	20	20	25
<b>CD3</b>	55.9±7.7	65.8±6.7**	61.09±9.9	61.51±8.6	70.9±4.9
<b>CD4</b>	32.6±3.3	39.4±4.7**	37.7±6.5	40.1±4.9	45.9±3.1
<b>CD8</b>	26.9±6.0	25.0±2.9	25.4±5.9	24.9±5.0	26.1±2.6
<b>CD4/8</b>	1.20±.3	1.61±.2*	1.57±.5	1.66±.3	1.78±.2

\* p&lt;0.01; \*\* p&lt;0.001

**ANALYSIS FOR THE TOTAL SCORES OF BPRS**

There was no significant difference between two groups in the total score of the BPRS before treatment ( $t=1.72$ ,  $p=0.09$ ). After treatment, the mean scores of the BPRS were reduced in both two groups. In group A, the mean score was  $44.06±10.63$  before treatment, and  $33.21±8.98$  after treatment; and the difference attained a very statistically significant level ( $t=3.71$ ,  $p<0.001$ ). In group B, the mean score of the BPRS were  $40.9±7.92$  before treatment and  $6.15±9.15$  afterwards, without any significant difference ( $t=1.86$ ,  $p=0.068$ ). Group A was found to have a significantly reduced score of the BPRS compared with group B ( $t=3.71$ ,  $p<0.001$ ) which suggested that Laser treatment had contributed to a remarkable clinical improvement.

**BPRS FACTORS ANALYSIS**

As seen in Table 3, both groups had a significantly decrease in factor 4 (activity) at the second assessment. In group A, however, there were significant improvement compared with group B in the scores for anxiety and depression (factor 1,  $p<0.01$ ), thought disorder (factor 3,  $p<0.01$ ) and positive symptom such as illusion, hallucination, delusion (factor 5,  $p<0.001$ ).

**ANALYSIS OF SAPS AND SANS**

There were no significant differences between the two groups in the scores of SAPS and SANS ( $p>0.05$ ) at the beginning. From the scores of the SAPS and SANS after treatment, it was seen that the positive symptoms (e.g. illusion, hallucination, delusion, etc.) had improved in both groups, but only the group A showed a significant difference ( $p<0.05$ ,  $p<0.01$ ). However, negative symptoms showed no such remarkable improvement (See Table 3).

**SIDE-EFFECTS**

Using TESS to measure the side-effects, there was no statistical significant difference between the two groups, as the mean score for Group A was  $3.24±2.13$  and for Group B  $3.56±2.41$  ( $t=0.75$ ,  $p>0.05$ ). It implied that all the side-effects recorded were caused by the anti-psychotic drugs alone and not by the laser.

**THE T-LYMPHOCYTE SUBPOPULATION TEST**

The results (see Table 4) for the 25 normal volunteers were: CD3  $70.9±4.9$ , CD4  $45.9±3.1$ , CD8  $26.1±2.6$ , CD4/8  $1.78±0.2$ . The comparative data for the schizophrenic patients were significantly decreased compared with the normal volunteers ( $p<0.001$ ). It suggested that schizophrenic patients had some

immunological dysfunction with a low immunological function.

Following Laser therapy, the level of CD3, CD4 and CD4/8 in group A increased significantly ( $p < 0.01-0.001$ ), but still did not reach normal levels. On the other hand, there were no

## DISCUSSION

The results in this clinical study showed that combining medication with LEILIB for chronic schizophrenics, the rate of obvious improvement was 24.2%, and 69.7% for a turn for the better. This therapeutic efficacy of combined medication with LEILIB was superior to medication alone. The various symptoms (e.g. hallucination, delusion, anxiety, depression, hostility, suspiciousness, etc.) in the laser treated group had a greater decrease than the medication only group.

It showed that LEILIB could be an important accessory treatment for schizophrenia. The results also indicated that there were no increased side-effects with LEILIB compared with the control group. It could therefore be more widely used, given its safety and ease of operation which was quite similar to that of venous transfusion.

Statistical analysis with the T-lymphocyte subpopulation test demonstrated a markedly reduction of CD3, CD4 and CD4/8. It revealed significant differences ( $p < 0.001$ ) in CD3, CD4 and CD4/8 between the Schizophrenics and the normal people. Our results are consistent with the findings of Fang et al (1988) and Liu et al (1992): the function of immune system in schizophrenic was low and in a state of chaos. In this study, the ratio of CD3, CD4 and CD4/8 was increased remarkably ( $p < 0.001$ ) in Group A (combined with the LEILIB treatment), although it does not reach the normal level; and it has no significant differences ( $p > 0.05$ ) in Group B (only take anti-psychotic drugs). The results indicated LEILIB can improve the function of the immune system in Schizophrenia, although the exact mechanism is still uncertain.

There is a large number of research about the treatment mechanism of LEILIB at home and abroad in recent years. LEILIB is thought to improve the quality of blood rheology, adjust immunocompetence, decrease medium molecular substance, improve circulation, clear oxygen free radical,

significant case in the non- Low Energy Helium-Neon Intravascular Laser Irradiation of Blood schizophrenic Group B. These finding raised the possibility that Low Energy Helium-Neon Intravascular Laser Irradiation of Blood can enhance the immunologic function in schizophrenic patients.

induce beneficial stimulation and cause no harm to the tissues or cells (Dong et al, 1992). Some people think LEILIB can improve the circulation of immune organs, activate certain cell enzymes, increase the content of glycogen and microglobulin, and produce more antibody, thereby, improving immunocompetence of the body (Gao et al, 1990). It is also found that LEILIB can improve the cell's physiology by changing the state of oxidation-reduction of the cellular respiration chain. The indolent cells' growth activity is evoked, and the activity of potential energy in the kineocyte is changed (Luo et al, 1994).

In summary, the LEILIB method is a new high-tech method that has proven efficacy in recent years. Similar studies may help to provide further insight into the treatment mechanism, especially in schizophrenic.

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