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SCIENCE BULLETIN

National Science Council
2 Canton Street
Taipei, Republic of China

Advisory Meeting on Earthquake Engineering and Landslide Opens

Scores of Chinese and U.S. scientists attended an Advisory Meeting on Earthquake Engineering and Landslide in Taipei which opened in Taipei August 29. It was the second one in the series jointly sponsored by the National Science Council and the National Science Foundation of the U.S., the executive agencies of the ROC-U.S. Cooperative Science Program. The first one, the Advisory Meeting on Agricultural Productivity, was held last year.

Dr. S.S. Shu, chairman of NSC pointed out the pertinence of the conference in his welcome remarks. He said: "Because of Taiwan's topography and climatic conditions, landslide has alway's been a serious concern of our people. Tihs problem is compounded by the fact that this land is also situaed on the earthquare active rim of the Pacific bain,, a fact we share fully with the west coast of the United States ranging from Alaska to California."

Tracing recorded earthquakes in Taiwan back to 315 years ago, Dr. Shu said earthquakes resulting in substantial damages appeared on the average of once in every five years during this period. "Such damage tends to become more severe as Taiwan is being built up and industrialized," he noted.

Dr. Shu recalled that prior to 1964 the Republic of China had only one large dam instead of three to worry about, and the country did not have to worry about oil gas pipelines, nuclear power plants, 345,000-volt high tension transmission systems, electrified railroads and superhighways. "These have all become facts of life today," he said. He liked earthquake engineering to medical science in one respect. In both disciplines, he said, precaution is more important than cure.

During the six-day meeting, state of arts papers will be presented by the participating scientists. They cover such areas as strong seismic motions, liquefaction, testing of reinforced concrete building elements, rockslides, landslides, response of dams, soil structure interaction, and earthquake prediction.

On August 31, the participants were divided into grouups to visit research facilities related to earthquake engineering and landslide. The last two days will be devoted to drafting recommendations.

The principal figures taking part in the advisory meeting are:

On the U.S. Side

Chen, Wai-fah
Professor of Structural Engineering
Purdue University

Chopra, Anil K.
Professor of Civil Engineering
University of California

Clough, Ray W.
Professor of Civil Engineering
University of California

Evernden, Jack
U.S. Geological Survey

Fang, Hsia-yang
Professor of Civil Engineering
Lehigh University

Hawkins, Neil M.
Professor of Civil Engineering
University of Washington

Hendron, Alfred J.
Professor of civil Engineering
University of Illinois

Jennings, Paul C.
Professor of Applied Mechanics
California Institute of Technology

Lee, Kenneth L.
Professor of Engineering & Applied Science
University of California

Lu, Le-wu
Professor of Civil Engineering
Lehigh University

Newmark, Nathan M.
Professor of Civil Engineering
University of Illinois

Penzien, Joseph
Professor of Structural Engineering
University of California

On the Chinese Side

Chen ,Roger Y.
Vice President
Sino-Engineering Consulting IMC

Hong, Ju-liang
Professor
Department of Civil Engineering
National Taiwan University

Mau, Sheng-taur
Professor and Head
Department of Civil Engineering
National Taiwan University

Moh, Za-chieh
Executive Vice President
Moh and Associates Consulting Engineers and Architects

Ou, Chin-der
Manager
Moh and Associate Consulting Engineers and Architects

Pai, Yung-yin
Senior Civil Engineer
Taiwan Power Company

Tsai, Yi-ben
Director
Chinese Earthquake Research Center

Yang, Zen
Research Fellow
Chinese Earthquake Research Center

Yeh, Chau-shioung
Professor
Department of Civil Engineering
National Taiwan University

Yeh, Chi-tung
Professor and Head
Department of Construction Engineering Technology
National Taiwan Institute of Technology

Taiwan's Geothermal Electric Power Generation

By David T. Wang

In recent years, the Republic of China has consistently and relently sough talternative sources of energy to generate electricity in order to achieve self-sufficiency in meeting the needs of our people and economically to improve the balance of payment. Since approximate 85 per cent of our electric power comes from fossil power plant, relying heavily on fuel imported from abroad, and in terms of financial expenditure—going into NT$200-300 billion figures annually. That's why our government is more than eager to make every effort to explore other sources of energy production. We are excited when it was discovered that Taiwan is an island that lies within the belt on the earth where geothermal energy could be easily tapped! Needless to say, once this source of energy is utilized to its full capacity, the impact will be enormous on all aspects of life in this densely populated nation! Whereas for U.S. if the electrity produced from geothermal power plants could reach even 5 per cent of the total electric power produced, it would be considered quite an achievement, for Taiwan, if we could simply move all the power plants those which are generated by the Geysers in Northern California to Taiwan, it would already provide one-eighth of the total amount of electricity produced by this country. Therefore, the geothermal power generation will necessarily occupy a very important position among the many energy sources still being explored and its influence on our economy, industry and agriculture etc. will also be tremendous and far reaching.

Back in 1961, the Mining Research and Service Organization was already given the responsibility to start the exploration of geothermal energy. They began exploring in the northern part of the island around Tatun volcanic region, since this area has always been well known for its hot springs and other tourist attractions. Geothermal fluid there was found to be sufficient for power generation, but unfortunately, the water content was corrosive in nature, so no further steps were taken to continue exploration in this area. In 1972, the Motor Columbus Consulting Engineering Inc. of Switzerland was invited to come to Taiwan to make a feasibility study. Their estimate for the Tatun area as far as the potential for geothermal power production was concerned, come to at least 100 MW or as high as 500 MW or over.

In 1973, first steps were taken by the Mining Research and Service Organization in cooperation with the Sino-American Joint Commission on Rural Reconstruction to utilize the dry steam of well No. E-208 of Tatun volcanic region for lumber drying, horticulture greenhouse and raising of poultry in a laboratory set-up.

In the meantime, the Same organization mentioned above, continued to explore all over the island for other possible sources of geothermal energy. Finally, they selected Yilan, Tuchang and Chingshui areas for more detailed geological surveys, chemical analysis of fluid contents and electric resistivity surveys. They drilled 5 exploratory wells that measured 500 meters in depth. By 1976, the Chinese Petroleum Corporation also joined the efforts in drilling a few other geothermal wells that measured 1500 meters in depth. The temperature of hot water in these wells is about 180°C. The shut-in pressure is close to 30 atm. and water is discharged at the rate of more than 100 tons per hour (with 5 to 8 per cent steam). Among these wells, No. 4 well has discharged hot water continuously now for over half a year. The temperature, pressure and quantity of water have all remained quite constant.

It was only in 1976, the National Science Council, under the leadership of Dr. Hsu, gathered under its roof all those people in this country who are knowledgeable in this field to begin a more formal planning in this direction. It was decided that No. 4 well of Chingshui just mentioned should be used first on which to construct a laboratory scale geothermal power plant using a small model turbine generator set. It is estimated that the amount of power output in this test case would reach around 200-300 kw.

It is our hope that this laboratory scale geothermal power plant would be used not only as a testing ground for new ideas, but also as an exploratory base for discovering the special characteristics of geothermal wells in Taiwan and for other parameters such as geotechnical, environmental and economical feasibility of producing electricity from hydrothermal resources for future development on a much larger scale. And that is as far as we have reached to-date.

Areas of Cooperation on Copolymers Identified

(*Continued from last issue*)

Area 5—Coating Technology

Description

This project will deal primarily with marine coatings, acrylic coating composition for automobile paints, and electropainting technology.

Locations

U.S.—North Dakota State University, Lehigh University.

R.O.C.—National Tsing Hua University.

Benefits

Marine coating technology is extremely important to the R.O.C. economy, particularly to the fishing and defense industries. On the U.S. side, automobile coating are receiving intense research and development efforts. Technological breakthroughs in this area would therefore greatly benefit both countries.

Potential Areas For Future U.S.-R.O.C. Seminars

It was the concensus of both delegations that the following topics would be worthy of future U.S.-R.O.C. seminars.

1. Recycling of Polymers.
2. New Uses for Polymers.

Recycling is a subject of interest to both countries from a resources conservation point of view. New uses of polymers are particularly important to R.O.C. as they expand their economy and technology in the direction of increased polymer usage. One potentially large volume use is as matrices for reinforced plastics. Improved mechanical properties through unique processing techniques using currently commercial polymers is of major interest to the U.S. transportation industry.

Studies on the Therapeutic Effects of Acupuncture on the Withdrawal Syndrome of Drug Addicts

Cho-Boon Sim and Men-Sheng Hsu

Acupuncture Research Committee
Tri-Service General Hospital

ABSTRACT

It is a painful experience to encounter withdrawal syndrome for drug addicts. The effect of acupuncture to relieve or decrease the withdrawal syndrome was investigated. We treated 50 subjects of morphine addicts and 1 case of heroin addict. The method of treatment was acupunncture with electrical stimulation for ear loci and with manual twitching for body loci. Three ear loci, Lung, Shemen and Sympathetic, were used in combination. Body loci including Tsusanli, Neikwan, Kwanyuan and Chenshan were used. The duration of every treatment was about 30 min. The subject required daily treatment for about 9 days.

Subjects felt less irritable and muscle cramps decreased immediately after acpuncture. Anorexia usually disappeared 4-5 days and pupil size recovered to normal 8-9 days after acupuncture. These results suggest acupuncture is effective in relieving drug withdrawal syndrome. However, further investigation on the mechamism of action is required.

INTRODUCTION

Acupuncture with electrical stimulation has been used to treat withdrawal syndrome of drug addicts, mostly heroin addiction, with satisfactory results. However, the effect of acupuncture on morphine withdrawal was not well evaluated, and its mechanism of action needs further investigation.

In this paper, the therapeutic effect of acupuncture with electrical stimulation on withdrawal syndrome of 50 subjects of morphine addicts and 1 case of heroin addict was reported. Furthermore, dopamine-β-dydroxylase activity, an enzyme activity associated with sympathetic nerve function, was studied in relation to acupuncture treatment

MATERIALS and METHODS

Subjects studied were from Taipei Detention House. Totally, 50 cases of morphine addicts and 1 heroin addict were investigated (Table 1). They administered the drug by intramuscular injection.

The method of treatment we used was acupuncture with electrical stimulation for ear loci and with manual twitching for body loci. Three ear loci, lung, shenmen and sympathetic, were used in combination as described previously. The electric delivered biphasic pulsating wave with an output voltage of 8 volts and a frequency of 100 Hz during treatment. Body loci used include Tsusanli, Neikwan, Kwanyuan, Chenshan and Tungli. The duration of every treatment was 45 min in the first three treatments and about 30 min in the following ones. On the first two days, daily treatment of 2-3 times was required and once daily in the following days. During the course of treatment clinical symptoms and signs were daily recorded according to a special chart reported previously.

The dopamine-β-hydroxylase activity of healthy subects receiving acupuncture was determined by the Nagatsu's photometric assay with some modifications by Yin & Lee.

RESULTS and DISCUSSION

Acupuncture with electrical stimulation is acceptable to the drug addicts and they felt relieved after every treatment session. The duration of treatment ranged 6-9 days and 9-16 times of acupuncture were required (Table 1).

After 3-5 times of treatment in two days, an urge for the drug lessened and muscle pains and cramps greatly decreased. Back pains also greatly lessened on the 4th to 5th day of treatment, the subject became interested in eating food and they could get into sleep easily. At end of treatment, 6th to 9th day of treatment, most of the withdrawal syndrome were gone and pupil size returned to normal.

Acupuncture, therefore, is effective in relieving drug withdrawal syndrome. It is simple and economical although it is rather time consuming. There was no complications during the course of treatment. Thus, acupuncture may be of value in the management of withdrawal syndrome although addiction is a psycho-social problem.

Since some of the withdrawal syndrome are related to autonomic funcaions, e.g. miosis, lacrimation, apprehension and gastrointestinal motility, we determined serum dopamine-β-hydroxylase activity in healthy adult male Chinese before and 45 min after acupuncture. The activity was 8.5-68.0 with a mean of 28.7 IU/liter serum for normal Chinese. Acupuncture, however, seemed not to alter the activity of the sympathetic nerve related enzyme activity. Thus, dopamine-β-hydroxylase was unlikely related to the action of acupuncture.

In rats addicted to morphine experimentally, Ng et al found that if the animals received 30 min of treatment with electroacupuncture prior to the injection of naloxone, a morphine antagomist, there was a significant attenuation of the severity and frequency of the withdrawal signs. This provides a scientific basis for the credibility of clinical use of the procedure.

Table 1. Drug Addicts treated by Acupuncture

Drug Used	No. of Case	Daily dose	Route	No. of acupuncture	Duration of treatment (days)
Morphine	M 50	4-16pkg*	IM	9-16	6-9
	F 0				
Heroin	M 1	2g	IM	12	8

* Pkg represents package. Each pkg costs NT$100.00 dollars.

Table 2. Human Serum Dopamine-β-hydroxylase Activity

Mean (IU/liter serum)	28.7
Range	8.5-68.0
Subjects	18

Summary of Reports on NSC-Supported Acupunture Research in Taiwan

1. PRELIMINARY OBSERVATION OF HUMORAL RESPONSE in MAN BY ACUPUNCTURE TREATMENT

Shih-ching Lee, Shih-Jiun Yin, Men-sheng Hsu and Cho-Boon Sim

Department of Biochemistry, National Defense Medical Center, Taipei, and Medical Research Laboratory, Tri-Service General Hospital

A possible involvement of humorol factor(s) in the acupuncture action was investigated. The changes of blood cortisol, an important hormone secreted by the adrenal cortex, were determined in thirteen healthy adult male Chinese before and after acupuncture. Needling at the traditional acupuncture loci for 15 and 45 min caused, respecively, 31 and 47 per cent increase of serum cortisol. Needling of the non-acupuncture sites, however, showed little change. The cortisol response after acupuncture suggests that humoral factor(s) may play a role in the action of acupuncture.

2. PRELIMINARY REPORT ON EFFECTS OF ACUPUNCTURE ON HYPERLIPIDEMIA IN MAN

Chun-chung Wu

Department of Medicine, National Taiwan University Hospital

ABSTRACT—This pilot study was carried out to determine the potential of acuppuncture for the treatment of hyperlipidemia in man. Control and acupuncture groups of hyperlipidemic patients were needled in nonspecific and specific points, respectively, once every two days for four to six weeks. Reduction of serum schlesterol and triglyceride 17 and 44 per cent, respectively, occurred significantly in the acupuncture group of patients and was particularly prominent in type IIb, V, and IV patients.

3. ELECTROPHYSIOLOGICAL INVESTIGATION OF THE MECHANISM OF ACUPUNCTURE ANALGESIA

T. C. Fu

Dept. of Physiology, College of Medicine, National Taiwan University

a. The aim of the present study was to investigate which nerves play more important role, and what stimulation parameters are more effective in the generation of electro-acupuncture analgesic effect at the lumber spinal level of the cat.

b. Various nerve in the hind legs of the cat, and different stimulation parameters have been tested in this study.

c. Dorsal root potentials (DRP), dorsal root reflex (DRR) and monosynaptic reflex (MSR) from lumabr region were recorded before, during and after electro-acupuncture or direct nerve condition stimulation for 20-30 minutes. The change of DRP, DRR and MSR were used as indicators of the increase or decrease of presunaptic inhibition.

d. The findings were:

(1) The DRP or DRR was not changed when the intensity of the condition stimulation was below group I max (> 3 X T) (i.e. to activate maximum effect of group I afferents)

(2) The DRPs or MSR were greatly influences when the intensity of the condition stimulation was between 5 X T and 10 X T (T is threshold for the largest group I fibers)

(3) The DRP and monosynaptic reflect incues by ABSm and PLSt were selecttively increased by condition stimultion of common peroneal nerves with incensity of 10 X T at low frequency of 2/sec. However, those induced by sural and G.S., the effects were just opposite.

(4) At the train stimulation, the DRPs induced by all nerves except tibia were mainly inhibited after 10 X T condition stimulation of common peroneal nerve. However, they were mainly increased after 5 X T condition stimulation of the same nerve.

e. It is suggested that acupuncture or electro-acupuncture at the region controlled by common peroneal nerve may more effectively inhibit pain arised from the region distributed by ABSm and PBSt.

4. EFFECT OF ELECTRO-ACUPUNCTURE ON UTERUS ACTIVITIES

T. C. Fu and H. M. Lieu

Both pregnant and non-pregnant uterus activities of the rat (Long-Evans) under light chloralose (40 mg/kg), treated by acupuncture, electro-acupuncture or direct nerve stimulation were studies. Various stimulation paragmeters have been tested, and the electroymograms (EMG) of the uterus were continuously recorded throughout the entire experimently. The findings were:

a. There was very little spontaneous activity in the non-pregnant or non-full-term pregnant (> 20 days) uters which was not sensitive to acupuncture, electro-acupuncture or direct nerve stimulation.

b. Full term pregnant (21-22 days) uteri had rather good spontaneous activity, their responsiveness to various stimulation were as follows:

(1) Direct nerve stimulation for 30 minutes: Stimulations of isolated tibial nerve could cause more uterine contraction than that of common peroneal nerve. The uterine activity was not influenced when stimulation intensity was less than 3 X T (T is threshold for largest Ia fibers), but it might be inhibited when stimulation intensity was higher than 20 X T. Low frequency (> 5/sec) stimulation was more effective in increase of uterine contraction and the effectiveness had longer duration than that of high frequency (> 50/sec) stimulation. The most effective stimulation parameters were: intensive=5XT to 10XT, with square wave current duration 0.2 msec; frequency, 2/sec.

(2) Electro-acupuncture stimulation: It was much more effective in increase of uterine contraction than direct nerve stimulations. Low freuency (2/sec) and short train (train rate=2/sec, train duration=30 msec, pulse frequency=60/sec) stimulation with intensity between 5 X T and 10 X T could greatly increase uterine contraction, while the latter one was more effective and had longer duration than that of former one. The effective loci including: San-In-Chiao (Sp-6), Tsu-San-Li (St-36), Yan-Ling-Chuan (GB-34) and Kun-Lun (B1-60) in the hind legs.

(3) Acupuncture with manual manipulations: Some times it could increase uterine contraction but the results were inconsistent.

c. Conclusion: Among three methods, the electro-acupuncture was the most effective and most reliable one to increase the uterine contraction. The optimal stimulation parameters were: intensity, 5 X T-10 X T, with square wave current duration, 0.2 msec; frequency, 2/sec or short train (train rate=22sec, train duration=30 msec, pulse frequency=60/sec.

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