

PREVENTION OF DENTAL CARIES BY ACUPUNCTURE

BY

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ABSTRACT

By acupuncture stimulation (at the Chinese meridian point), the total number of oral Streptococci and the caries-pathogenic bacteria, *Streptococcus mutans*, in the rats were decreased. The anti-RC-20 (*Streptococcus mutans*) titer of the rat serum increased as the result of acupuncture stimulation. Rat caries induced by a caries-inducing diet (6-PMV*²) was reduced by acupuncture stimulation.

INTRODUCTION

Two etiological theories on dental caries have been put forward. One is Miller's chemico-parasitic theory (Miller [1]) of decalcification of the tooth surface by the acid from the acidogenic bacteria. In Miller's theory, the ecological relationship of the tooth with the oral acidogenic bacteria is a commensal condition. The other theory put forward is the infectious theory proposed by Orland *et al.* [2] and Onisi [3] who emphasize the host-parasite relationship between the host and the caries-pathogenic bacteria, from the ecological point of view. According to this theory, dental caries starts with the invasion of the pathogenic bacteria into the tooth tissue, after which the pathogenic bacteria increase inside the tissue, utilizing certain proteins of the tooth tissue. Subsequently, tooth decay will begin. This is the general concept of the infectious disease and is different from Miller's chemico-parasitic theory. In the

present study, with this infectious disease concept in mind, we attempted to prevent dental caries by enhancing the host's ability to resist the bacterial invasion.

MATERIALS AND METHODS

We presumed that the fissure lesions of the rat tooth are pathologically and ecologically equivalent to the infectious type of dental caries in the human (Onisi [4]). Three groups of Wistar strain rats, litters from a closed colony maintained in our laboratory, were used in this experiment. There were fifteen rats in each group. The A group rats were stimulated by acupuncture at point 1 (Ho-ku point in Chinese meridian, Fig. 1) of the rat's forepaw and B group at point 3 (non-meridian point, Fig. 1), using a stainless steel needle of 0.2 mm diameter. The C group rats were given no stimulation. The acupuncture treatment was given at 6:00 p.m. on the first day of the experiment and subsequently every second day at 6:00 p.m. up to a

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*² 6-PMV (caries-inducing diet) consists of 210 g of starch, 600 g of sugar, 100 g casein, 30 ml of olive oil, 10 g of vitamin mixture and 50 g of salt mixture.

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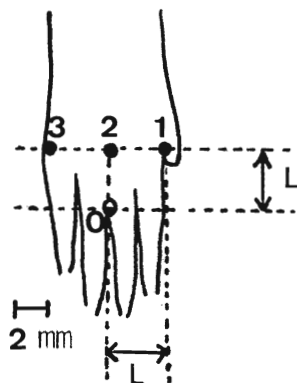


Fig. 1. This is the right forepaw. The origin (point 0) is the point of intersection between the third and fourth finger. Point 1 (Ho-ku, Chinese meridian) is used for acupuncture stimulation. Point 1 is given by (L, L), point 2 by (0, L), and point 3 by (-L, L). Point 3 is situated nearly at the margin of the fifth finger. (By courtesy of Dr. Toda)

total of 17 times. After 34 days, all the rats were weighed under anesthesia with chloroform. On the dental plaque swabs viable counts of oral bacteria were made. Agglutinating titers against the whole cells of cariogenic *Streptococcus mutans*, RC-20, were detected using the micro titer plate technique. Blood samples were removed and all the rats were killed.

The jaws were extracted and the soft tissues were stripped as completely as possible. The jaws were then fixed and stained in 10% neutral formalin solution saturated with Kernechterot for two days and cut into two sagittal sections. The sections were examined at a magnification of 40 times. Examination of the fissure lesions was performed using the double-blind test.

RESULTS

The rats of the A group had 557 fissures examined and 81 lesions were detected. The B group rats had 563 fissures examined and 186 lesions were detected. The C group

Table 1. Effect of Acupuncture on Rat Dental Caries Induced by 6-PMV (Caries-Inducing Diet)

	Acupuncture stimulation		No stimulation
	A group	B group	C group
Number of rats	15	15	15
Total fissures examined	557	563	549
Lesions	81	186	173
Anti-RC-20 titer	24.8	24.1	23.2
St. mutans count	10 ^{3.61}	10 ^{4.37}	10 ^{4.50}

rats had 549 fissures examined and 173 lesions were detected. The reduction rate of the caries by acupuncture was 53.7% (Table 1). Agglutinating titers against the whole cells of cariogenic *Streptococcus mutans*, RC-20, were detected using the micro titer plate technique. The agglutinating titers of the A group serum were higher than those of the B group and C group. On the dental plaque swabs viable counts of oral bacteria were made. Rats of the C group and B group had two times the number of *Streptococcus mutans* and total oral *Streptococci* than that found in the A group (Table 1).

DISCUSSION

In this experiment, the rat dental caries induced by the caries-inducing diet, 6-PMV, were reduced by the acupuncture stimulation at the Chinese meridian point 1, but not by the acupuncture stimulation at point 3, which is not a Chinese meridian point. Toda [5] reported that the most effective point for electro-acupuncture analgesia in the oral region is point 1 (Fig. 1), which corresponds to the Ho-ku Chinese meridian point.

Up to the present there are some reports (Sjolund and Eriksson [6], Mayer *et al.* [7])

that have suggested the possibility of a neurohumoral mechanism of acupuncture analgesia and acupuncture curative effect. We presume that acupuncture stimulation activates the immunological systems of the host and strengthens the host's homeostasis by releasing morphine-like substances such as endorphins into the brain. We presume that, consequently, in the case of the A group rats in our experiment, the number of *Streptococcus mutans* in the rat's dental plaque decreases and rat dental caries is reduced. However, we are not yet able to show exactly the relationship between our results and the neurohumoral mechanism of acupuncture.

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