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## SMOKING CESSATION AFTER ACUPUNCTURE TREATMENT

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Acupuncture is applied, especially in treatment of pain, hemiplegia, obesity, and psychological illnesses including addiction. Recently, ear and body acupuncture have been frequently used in the treatment of smoking. An increase in levels of endorphin, enkephalin, epinephrine, norepinephrine, serotonin, and dopamine in the central nervous system and plasma has been reported as the most important mechanism of acupuncture. That is, acupuncture application may increase the levels of endorphin, enkephalin, epinephrine, norepinephrine, serotonin, and dopamine in the central nervous system and plasma. The authors think that acupuncture application provides the patients with deterioration in the taste of smoking, decrease in desire of smoking, and the obstruction of psychological symptoms that appear as a result of smoking cessation. Because of these effects it is presumed that acupuncture application may be used as an important method for smoking cessation treatment.

**Keywords** acupuncture, dopamine, enkephalin, serotonin, smoking cessation

Received 1 November 2005.

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Acupuncture is one of the oldest and best known Traditional Chinese Medicine treatments. Acupuncture is applied, especially in the treatment of pain syndrome illnesses (Pintov et al., 1997), rehabilitation of hemiplegia (Wong et al., 1999), obesity (Huang et al., 1996; Richards & Marley, 1998; Cabioglu & Ergene, 2005), psychological illnesses (Ullet et al., 1998), and addiction (Ullet et al., 1998). The analgesic effect of acupuncture application has been known for a long time and there have been many studies on this matter. The efficacy of acupuncture in the treatment of substance abusers and drug withdrawal has been amply demonstrated to the scientific community (Scott & Scott, 1997; Lipton et al., 1994; Bullock et al., 1987). In fact, acupuncture has become a standard procedure in detoxification programs worldwide (Bullock et al., 1987). Studies on acupuncture application in the treatment of addiction are quite recent (Ullet et al., 1998). However, the mechanisms underlying the efficacy of acupuncture in the treatment of addiction remain relatively obscure. This article offers a possible explanation for this effect.

Acupuncture applications for smoking cessation in the treatment of addiction have come to the fore. Many methods have been applied in the treatment of smoking cessation such as medicine, nicotine gum, inspiration, hypnosis, and acupuncture (Haustein, 2000). Recently, ear and body electroacupuncture have been used in the treatment of smoking cessation. The most important mechanism of acupuncture has been explained especially by beta endorphin, enkephalin, epinephrine, norepinephrine, serotonin, and dopamine like neurotransmitter effects mainly on the nervous system and other systems (Takeshige et al., 1992; Jin et al., 1996; Fu, 2000).

Liu and his colleagues (1993) examined the changes in the levels of norepinephrin, epinephrin, and glucose in plasma and of cortisol in plasma and saliva with acupuncture treatment applied for weight loss in obesity. Application on acupuncture points determined by Traditional Chinese Medical methods provided weight loss in these subjects. However, they observed an increase in the levels of norepinephrine, epinephrine, cortisol in plasma, and of cortisol in saliva and a decrease in the levels of glucose in plasma.

Pan and his colleagues (1996) examined the changes in the levels of adrenocorticotrophic hormone (ACTH) and beta endorphin (BE) in plasma and the front lobe of the hypophicis with electroacupuncture application in a study on rats. In their study, they applied electroacupuncture to rats with two stel injections from St 36 (Zusanli) points under 50 mg/kg pentobarbital anesthesia. They applied electroacupuncture for 30 min by 4 Hz frequency current. They observed an increase in ACTH and BE levels in the front lobe of the hypophysis and plasma.

As a result of electroacupuncture application on persons (Petti et al., 1998) and animals (Takeshige et al., 1993; Wang et al., 1992), BE level was observed to increase in both central nervous system and plasma. It is thought that BE level increasing in plasma stimulates corticotropin releasing factor (CRF) secretion from paraventricular nucleus (Pan et al., 1996). Corticotropin releasing factor increases ACTH secretion from the front lobe of the hypophysis. Analgesic effect of electroacupuncture application has depended on BE secretion from the hypophysis (Han et al., 1999; Takeshige et al., 1992, 1993).

Wenhe and Yucun (1981) designated an increase in 5-hidroksitriptamin, 5-hidroksiindolasetic acid and noradrenalin levels in brain tissue with electroacupuncture treatment in a study on rats. Lin and Lin (2000) determined an increase in dopamine level in brain tissue in the study with rats on which parkinsonism was experimentally formed.

It is determined that beta endorphine and enkephalin, levels of which have increased in central nervous system and plasma, have played a role in arranging psychological conditions and have effects of relieving anxiety (Plottnikoff et al., 1985). With acupuncture application, an increase in serotonin level in the central nervous system has been observed (Li et al., 1982). It is observed that serotonin has effects on a person's feeling happy, feeling satisfied, normal levels of appetite and sex impulses, and providing psychomotor balance. Beta endorphine, enkephalin and serotonin, levels of which have increased in central nervous system and plasma, are effective in arranging psychological conditions due to the aforementioned effects with acupuncture application. Due to these effects, acupuncture has been used in the treatment of anxiety and depression successfully (Ullet et al., 1998).

The limbic system contains structures that play a vital role in the expression of emotion and the activity of the reward system of the brain. A cascade or chain of neurons within the limbic system that interact through various signaling molecules or neurotransmitters is responsible for the experience of pleasure and the modulation of reward. Researchers have proposed that the craving associated with addiction may stem from a biochemical deficiency in one or more of these neurons or signaling molecules. This deficiency can replace an individual's sense of well-being with a feeling of anxiety or anger, and produce a craving for a substance that can alleviate the negative emotions (Scott & Scott, 1997).

Nucleus accumbens of the brain's limbic system, "ventral tegmental" area in mezensefalon and "prefrontal cortex" in the frontal lobe of brain constitute the rewarding system. The neurotransmitter that comes to the fore is dopamine. In relation to a substance taken, nucleus accumbens and ventral tegmental cells,

which are the central stations of the affected system, increase the production and secretion of dopamine. Especially the rewarding system is affected by the nicotine included in cigarettes. Connected to the nicotine receptors in the central nervous system, nicotine stimulates the secretion of neurotransmitters such as dopamine, serotonin, norepinephrine, and beta endorphine (Haustein, 2000). It also increases the level of these neurotransmitters in the central nervous system (Haustein, 2000). Affecting the corticotropic cells that are present in the frontal lobe of hypophysis, nicotine stimulates ACTH secretion and causes an increase in ACTH level in plasma. Constant intake of addicting substances like nicotine causes an increase in dopamine and serotonin levels, an increase in the level that is “normal” and the increased level becomes a “normal” level for the addict. Dopamine and serotonin secretion create the sense of happiness and therefore reward the person. Constantly usage of these addicting substances makes the person dissatisfied with the reward. In this condition, the person will have to continue taking the addicting substance in order to keep dopamine and serotonin in high levels (Haustein, 2000).

Blum and Kozlowski (1990) proposed that serotonin is the neurotransmitter that initiates the reward cascade. Evidence suggests the importance of serotonin in acupuncture, particularly high frequency (50–2000 Hz) electroacupuncture. We suggest that acupuncture directly affects the reward cascade by increasing the amount of serotonin in the hypothalamus. Investigations have shown that acupuncture activates the descending serotonergic pathways via the anterolateral tract. When acupuncture stimulation is applied at the correct points, neural impulses are received in the dorsal horn of the spinal cord.

Most detoxification clinics use auricular acupuncture in the treatment of substance abusers. In particular, the ear point “lung” has proved to be very effective in the treatment of withdrawal symptoms and should be included in any program of relapse prevention. This point has a unique location at the most superficial branch of the vagus nerve. Stimulation of the vagus nerve by use of this point is believed to produce neural impulses that restore activity of the nervous cells of the reticular formation that, in turn, stimulate the hypothalamus (Sytynska & Galebskaya, 1979), which initiates the reward cascade.

First electroacupuncture applications in the treatment of addiction began at the beginning of the 1970s (Ter Riet et al., 1990). Electroacupuncture applications were also used in the treatment of addiction with currents in various frequencies without using needles (Ullet et al., 1998).

Clavel-Chapelon and his colleagues (1997) examined the success rate at smoking cessation following the treatment with acupuncture and nicotine gum for 4 years on 996 subjects smoking 10 or more cigarettes a day. They applied acupuncture from Bitong and Shuaigou (Du 26) points on the 1st, 7th, and 28th days. The treatment of nicotine gum was applied by 2 mg gums and 30 gums a day at the most were used in the first 6 months. They observed that the success rate at smoking cessation in a group of 540 persons in which the treatment of acupuncture was applied for a month, a year, and 4 years was successively 22%, 8.8%, 5.6%. The success rate at smoking cessation in a group of 481 persons in which the treatment of nicotine gum was applied for a month, a year and 4 years successively 26.2%, 11.1% and 6.1%.

He and his colleagues (1997) investigated the efficacy of acupuncture treatment in smoking cessation. In their study, they applied acupuncture treatment pertaining to smoking cessation on 26 voluntary subjects smoking  $20 \pm 6$  cigarettes a day (test group) and acupuncture treatment not pertaining to smoking cessation on 20 voluntary subjects (control group). They performed 2 seances a week to test and control groups for 3 weeks. They applied electroacupuncture to Lieque (Lu 7) and Kongzui (Lu 6) body points; acupuncture to Shen Men, Mounth, Lung ear points; acupress to Shen Men, Mounth, Lung, Trachea, Hunger and Endocrine ear points. In control group, they also applied electroacupuncture to body points; and acupuncture and acupress to ear points not pertaining to smoking cessation. Acupress application was given 4 times a day in both groups when smoking tendency occurred. Although 31% of the test group gave up smoking as a result of these applications, nobody in the control group could give up smoking. With this study they determined that the application made to acupuncture points pertaining to smoking cessation was more effective than the application made to points not pertaining to smoking cessation.

He and his colleagues (2001) observed the subjects in the aforementioned study for 8 months and 5 years. Although 31% of the test group gave up smoking just after the treatment, they determined that 23% of this group were not smoking in the 8th month and 18% in the 5th year. In the control group, they noticed that nobody gave up smoking after the treatment or in the 8th month, but 18% of this group gave up smoking in the 5th year by using nicotine gum. Moreover, they determined less tendency of smoking, deterioration in cigarette taste in the test group compared to pretreatment period. In this study, they observed that the application made to acupuncture points pertaining to smoking cessation had efficacy after a long time treatment, and provided

deterioration in cigarette taste and less tendency of smoking just after the treatment.

Bier and his colleagues (2002) applied verum acupuncture to the points pertaining to smoking cessation in the first group (test group 1), smoking cessation training, and verum acupuncture in the second group (test group 2), and smoking cessation training and acupuncture treatment to the points not pertaining to smoking cessation in the third group (test group 3). They applied acupuncture to Shen Men, Sympathetic, Lung, Kidney, and Liver points in ears and Hegu points in the body in test group 1 for 4 weeks, 5 seances a week. They added smoking cessation training in addition to verum acupuncture in test group 2. In this study, they observed that the second group, in which verum acupuncture and smoking cessation training were applied, was more effective than the other groups.

Nicotine causes dopamine and serotonin level to increase in the brain tissue and plasma (Haustein, 2000). Smoking cessation also causes disorders in the body because of nicotine deprivation; that is, low level of serotonin and dopamine. At the preliminary stage, serotonin and dopamine lack causes psychological symptoms. Therefore, the first 72 h are very important in smoking cessation period. In this period, it is thought that an increase in serotonin in the brain tissue and plasma with acupuncture treatment can help disorders to be removed because of nicotine deprivation.

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