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How Can Acupuncture Promote Modifications on Metabolism?

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Osteoporosis is a metabolic disorder which may result in fragile bones that are more likely to fracture, leading to negative consequences for human mobility if not treated appropriately [1,2]. Aging is associated with several anatomical and physiological changes that are conducive to increased disability, frailty and falls. Much of this physical impairment is related to a gradual deterioration of bone mass [3].There are many causal factors of osteoporosis, such as European ancestry, older age, genetic inheritance, body mass index – BMI<20 - and female population [4,5]. In addition, other factors are associated to osteoporosis, including lifestyle factors: morbidity, deficient Ca^{2+} consumption, excess of alcohol and tobacco consumption, drug use, medical history, hormonal changes and physical inactivity as well as other aspects related to bone mineral density [BMD] [6]. Traditional medicine refers to traditional medical systems [TM] such as traditional Chinese medicine [TCM]. Acupuncture is likely the most popular of these therapies worldwide [7]. Its basic philosophy is mobility and balance equilibrium known as Qi, which provides continuity between material forms and tenuous, nonmaterial energies. Qi is reported to be the basis for a number of manifestations of life in the universe, including minerals, plants, and rational and irrational beings [8].

Acupuncture, the most popular technique applied by traditional Chinese medicine, uses needles that are introduced into specific points on the body [9]. This nociceptive stimulus produces continuous stimuli on piercing the skin, superficial fascia and occasionally muscle tissues. These points correspond to organs and other issues, and the needles are left in place for some time [10]. The Tao philosophy, advocates that balance between yin and yang must coexist. Yin has relations with hard structures, tissues like bone and yang has relations with organic functions as bone metabolism [7,11].

Based on these thoughts comes the necessity to ask how the acupuncture can promote or interfere on bone metabolism? Many studies using acupuncture and eletroacupuncture shows the stimuli and the effects but do not offers a reasonable a physiologic answer to explain how it works. A scientific interest to understand how the physiological mechanism works and modifications promoted by acupuncture. First let try to understand what happens when the needle is inserted on skin, basically: 1) The acupuncture point is an area which has a particular afferent activity in peripheral sensory nerves fibers A and C types; 2) When the needle is penetrated, based on animal and human studies, it increases generation of nitric oxide that increases blood circulation [12,13], 3) Promote T cell proliferation [14].

These stimulations with needles, goes up to central nervous system and hypothalamus promoting hormonal modifications changing the metabolism. Trying to understand the phenomenon, let me find some correlations between hormones that improve the bone metabolism. Some studies tried to improve the metabolism of insulin to treat diabetic mellitus type II. Why insulin? Because the structure is similar to insulin grown factor which may influence cell growth [15]. The enhanced responsiveness to insulin following exercise is mediated via the muscle contraction. The acupuncture-induced alterations in the excitability of the motor system might provide a suitable physiological basis for explaining the link between acupuncture and motor performance [16].

To enforce this hypothesis, Zhang Li [17] found significant difference on bone mineral density and serum levels of insulin growth factor in osteoporotic rats submitted to electro acupuncture when compared with control group. Finally, as could be demonstrated based on papers presented that acupuncture can promote hormonal modifications on bone metabolism. The actual studies including acupuncture and similar method must try to explain the results on physiological basis, nowadays it not enough just to present effect and cause. It will give credibility to acupuncture and all associated systems. The autonomous nervous system controls the body's visceral functions, such as blood pressure, gastrointestinal motility, secretion, urinary debt, body temperature and the cardiac muscle. In many aspects, the effects of stimulation on the parasympathetic nervous system are opposite to those of sympathetic response. The parasympathetic system, however, is not normally activated as a whole. Parasympathetic nerve stimulation may result in decreased heart rate, dilation of visceral blood vessels, and greater digestive tract activity.

It was observed on study made by Pernambuco et al. who analyzed the acute changes promoted by acupuncture on glucose, rate-pressure product of normal tension on cycle ergometer. The subjects were submitted an acupuncture stimuli on spleen 3 – SP3 and were oriented to maintain the intensity as someone hard – hard [13-15] at the Borg`s visual scale and 70% of maximum heart frequency [MHF], that was obtained by estimate formula 220 – age. The study conclude that the

Acupuncture procedures promoted acute reduction on blood pressure, heart frequency during and after the exercise, did not found significative modifications on glucose levels on observed group.

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