concerning the basic principles and the scientific evidence that support such therapies—indispensable tools for appropriate guidance of patients regarding the use of these medical practices as well as the involved risks.

In 2002 these disciplines were introduced in the São Paulo University Medical School (FMUSP) undergraduate curriculum as elective disciplines, with the objective of satisfying the undergraduates' interest in learning the fundamentals, scientific evidence, and clinical practice of these branches of medicine. Having in mind the improvement of this initiative and repeating the initiative accomplished in other countries, the present authors elaborated a self-administered questionnaire to evaluate the attitudes of FMUSP students regarding homeopathy and acupuncture, to obtain a profile that could contribute to the organization of learning activities concerning these recently implemented subjects.

The questionnaire, consisting of 12 multiple-choice questions, was answered by 484 students in the last (6th) year of medical school, involving their interest in learning, the teaching forms, their knowledge level and manners of acquiring knowledge, their experience (or that of a close person) with these therapies, and the corresponding effectiveness. The questionnaire also addressed the main indicators for these therapies and their general effectiveness, and the possibility of offering and integrating the therapies in public health care units.

More than 85% of the students considered that homeopathy and acupuncture should be included in the curriculum of medical schools, either as optional (72%) or obligatory disciplines (19%). 56% of the interviewed students showed great interest in learning these disciplines. Despite little or no knowledge about the subject (76%), 67% of the students believed, to a certain extent, in the effectiveness of the referred therapies, with chronic diseases (37%) or both chronic and the acute disease (29%) as the main indicators for their use. Approximately 35% of the undergraduates thought positively about offering public primary care in homeopathy and acupuncture, whereas a median of 34% favored the availability of these treatments in hospitals also, with 60% of the students believing in the possibility of integration with the conventional medical practice.

The results obtained in our research with FMUSP undergraduates were similar to those obtained in other surveys of medical students in other countries as well as in academic institutions. The medical students were interested in learning the fundamentals of homeopathy and acupuncture, were able to observe and report the effectiveness of these treatments, and defended the use of these medical specializations in public health care.

**REFERENCE**


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**EFFECTS OF AN ELECTRIC FIELD ON PLASMA LEVELS OF ACTH AND β-ENDOPHRIN IN DOGS WITH TUMORS OR SPINAL CORD INJURIES**

Dear Editor:

We recently studied that an electric field (EF) had an effect on the plasma level of ACTH and β-endorphin in dogs with tumors or spinal cord injuries.

Previously, the curative effects of therapy utilizing EF on several types of pain (headache, stiff shoulders and stomachache) have been described in over a thousand clinical cases from 1994 to 1997.1 EF at 50 Hz and an intensity (17.5 kV/m) are similar to the conditions used in our previous studies.1 This level of EF suppresses the response to stress, as determined by the transient elevation of adrenocorticotropic hormone (ACTH) in space-restricted rats2 and suppresses the lipid peroxide level in hyperoxidative-stressed rats.3 In an *in vitro* study, a current intensity of 6 μA/cm² estimated to be within the range generated in the human body influences the change in intracellular calcium levels in lymphocytes stimulated with lectin.4 In our study, we examined the alterations in plasma levels of ACTH and β-endorphin in dogs to further investigate the mechanisms of the effects of EF.

The EF exposure system was composed of three major parts, namely a high voltage generator (500 mm width, 360 mm length, 92 mm height) made from acrylonitrile-butadiene-styrene resin, which included an upper electrode (465 mm, 245 mm, 5 mm), a grounded electrode (540 mm, 420 mm, 3 mm) made from polyvinyl chloride, which included a stainless wire, and an EF exposure cage (758 mm, 583 mm, 532 mm) made from high-impact polystyrene. The upper electrode and the grounded electrode were located on and under the exposure cage, respectively. A maximum out-
Table 1. Effects of Electric Field (EF) Exposure on Plasma ACTH and β-Endorphin in Dogs with Tumor or Spinal Cord Injury

<table>
<thead>
<tr>
<th></th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
<th>Day 7</th>
<th>One-way ANOVA</th>
<th>Two-way ANOVA with repeated measures</th>
<th>Tukey’s multiple comparison test</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACTH</strong>^a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N.S.</td>
<td>N.S.</td>
<td>N.S.</td>
</tr>
<tr>
<td>Control Before</td>
<td>22.0 ± 2.1^b</td>
<td>19.5 ± 1.3</td>
<td>18.0 ± 1.5</td>
<td>17.6 ± 3.1</td>
<td>17.4 ± 1.0</td>
<td>18.2 ± 0.8</td>
<td>18.0 ± 1.2</td>
<td>N.S.</td>
<td>N.S.</td>
<td>N.S.</td>
</tr>
<tr>
<td>After</td>
<td>24.8 ± 2.1</td>
<td>22.1 ± 1.0</td>
<td>22.8 ± 1.0</td>
<td>19.5 ± 1.6</td>
<td>20.9 ± 1.3</td>
<td>18.3 ± 1.2</td>
<td>20.6 ± 1.1</td>
<td>N.S.</td>
<td>N.S.</td>
<td>N.S.</td>
</tr>
<tr>
<td>Tumor Before</td>
<td>21.1 ± 4.4</td>
<td>19.0 ± 2.2</td>
<td>16.4 ± 1.7</td>
<td>20.3 ± 2.5</td>
<td>17.9 ± 1.5</td>
<td>15.9 ± 2.0</td>
<td>15.1 ± 1.2</td>
<td>N.S.</td>
<td>p &lt; 0.01</td>
<td>N.S.</td>
</tr>
<tr>
<td>After</td>
<td>15.3 ± 3.2</td>
<td>12.9 ± 3.1</td>
<td>9.0 ± 1.3</td>
<td>12.9 ± 2.7</td>
<td>12.1 ± 3.0</td>
<td>12.5 ± 2.9</td>
<td>12.0 ± 2.4</td>
<td>N.S.</td>
<td>p &lt; 0.01</td>
<td>p &lt; 0.05</td>
</tr>
<tr>
<td>Spinal cord injury</td>
<td>Before</td>
<td>37.2 ± 5.0</td>
<td>27.9 ± 3.9</td>
<td>27.2 ± 3.6</td>
<td>22.7 ± 2.5</td>
<td>18.8 ± 2.2</td>
<td>16.9 ± 2.7</td>
<td>15.0 ± 2.2</td>
<td>p &lt; 0.05</td>
<td>p &lt; 0.05 at the day-1</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>21.1 ± 4.9</td>
<td>19.3 ± 3.9</td>
<td>18.2 ± 4.1</td>
<td>15.4 ± 2.3</td>
<td>14.8 ± 3.2</td>
<td>11.6 ± 2.2</td>
<td>9.7 ± 1.7</td>
<td>N.S.</td>
<td>N.S.</td>
</tr>
<tr>
<td><strong>β-endorphin</strong>^a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N.S.</td>
<td>N.S.</td>
<td>N.S.</td>
</tr>
<tr>
<td>Control Before</td>
<td>7.6 ± 1.0</td>
<td>6.8 ± 0.5</td>
<td>6.0 ± 0.4</td>
<td>7.6 ± 0.8</td>
<td>7.0 ± 0.5</td>
<td>6.2 ± 0.4</td>
<td>5.2 ± 0.3</td>
<td>N.S.</td>
<td>N.S.</td>
<td>N.S.</td>
</tr>
<tr>
<td>After</td>
<td>7.0 ± 0.6</td>
<td>6.4 ± 0.5</td>
<td>6.2 ± 0.3</td>
<td>6.4 ± 0.8</td>
<td>6.2 ± 0.5</td>
<td>6.4 ± 0.5</td>
<td>5.2 ± 0.3</td>
<td>N.S.</td>
<td>N.S.</td>
<td>N.S.</td>
</tr>
<tr>
<td>Tumor Before</td>
<td>7.0 ± 1.6</td>
<td>7.6 ± 0.2</td>
<td>8.2 ± 0.4</td>
<td>12.2 ± 0.8</td>
<td>12.4 ± 1.0</td>
<td>11.2 ± 1.9</td>
<td>11.8 ± 2.2</td>
<td>N.S.</td>
<td>p &lt; 0.01</td>
<td>p &lt; 0.05 at day 5, 6, and 7</td>
</tr>
<tr>
<td>After</td>
<td>16.0 ± 2.2</td>
<td>20.2 ± 3.5</td>
<td>20.0 ± 2.3</td>
<td>22.0 ± 3.9</td>
<td>35.8 ± 3.1</td>
<td>33.6 ± 5.3</td>
<td>41.6 ± 4.8</td>
<td>p &lt; 0.05</td>
<td>p &lt; 0.05 at day 5, 6, and 7</td>
<td></td>
</tr>
<tr>
<td>Spinal cord injury</td>
<td>Before</td>
<td>9.0 ± 1.8</td>
<td>13.6 ± 2.1</td>
<td>16.4 ± 3.9</td>
<td>18.2 ± 3.6</td>
<td>20.2 ± 3.6</td>
<td>14.0 ± 2.1</td>
<td>14.4 ± 3.0</td>
<td>N.S.</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>17.0 ± 5.2</td>
<td>25.4 ± 5.9</td>
<td>21.6 ± 3.7</td>
<td>28.8 ± 3.4</td>
<td>33.6 ± 3.0</td>
<td>34.8 ± 2.0</td>
<td>31.4 ± 3.2</td>
<td>N.S.</td>
<td>N.S.</td>
</tr>
</tbody>
</table>

ACTH, adrenocorticotrophic hormone; ANOVA, analysis of variance.

^a pg/mL.

^b The value means mean ± standard error of the mean. (n = 5).
put voltage of 2 kV was the effective value of the 50 Hz alternating current (AC) component superimposed with a direct current (DC) of 0.8 kV. Thus, the total effective value of 2.2 kV was calculated by the following equation:

$$V_{AC+DC} = \sqrt{2^2 + 0.8^2}.$$  

Five male beagles, approximately 2 years of age, weighing 12–16 kg, were obtained from Charles River Japan Inc. (Yokohama, Japan). Five dogs with a confirmed diagnosis of a tumor (brain) and five dogs suffering from a spinal cord injury, weighing less than 15 kg, were chosen at random from outpatients.

Each dog was transferred from a conventional cage to an EF exposure cage and exposed to EF each day for two hours for 7 days. To avoid hormonal changes resulting from circadian rhythms, all experiments were carried out from 2 PM to 6 PM. All dogs were maintained without any other clinical treatment during the experimental period.

Blood samples of 5 mL were obtained from the antecubital vessel using a heparinized syringe before and after EF treatment. Plasma ACTH levels and plasma β-endorphin levels were measured with a commercial kit.

Table 1 summarizes the plasma ACTH and β-endorphin levels in all treatments. In the five control dogs, the plasma levels of ACTH after exposure to an EF were slightly higher; however, these differences were not significant, according to multiple comparisons. In the control group, the plasma β-endorphin levels (pg/mL) also did not change over time or between pre- and postexposure throughout the 7-day period.

In the five dogs with tumors, plasma levels of ACTH after exposure to an EF significantly decreased over the 7-day experimental period compared to the pre-exposure levels ($p < 0.01$; two-way ANOVA). After exposure to an EF, the β-endorphin levels were significantly higher than those before exposure in these animals over the 7 days of the experiment ($p < 0.01$; two-way-ANOVA). Moreover, a one-way analysis of variance (ANOVA) indicated that the plasma values of β-endorphin in this group after exposure to an EF gradually increased throughout the 7 days ($p < 0.01$; one-way ANOVA; $p < 0.05$ at 5th, 6th, and 7th days; multiple range test); however, the pre-exposure levels did not change significantly.

On the 1st day, the plasma ACTH levels before EF in the five dogs with spinal cord injuries were significantly higher than those of healthy dogs and of dogs with tumors ($p < 0.05$; Student’s $t$ test). These higher baseline ACTH values appear to be caused by spinal cord injury. However, the ACTH levels significantly decreased over the 7 days of exposure to EF ($p < 0.01$; one-way ANOVA). As was found for dogs with tumors, the ACTH levels in dogs with spinal cord injuries after EF were significantly lower than those found before exposure over the 7 days of the study ($p < 0.01$; two-way ANOVA). In these animals, the β-endorphin levels after exposure to an EF were significantly higher than those before exposure over the 7 days of study ($p < 0.01$; two-way ANOVA).

Our results indicate that exposure to the EF used in this study did not change the plasma ACTH levels in healthy dogs but did significantly decreased the levels in dogs with spinal cord injuries or tumors. In our previous study, plasma levels of ACTH in stressed rats also significantly decreased after a 50 Hz EF exposure. The production and secretion of ACTH and β-endorphin from pro-opiomelanocortin occurs at the pituitary gland. ACTH is produced in the anterior and intermediate lobes and is only decomposed in the intermediate lobe. On the other hand, β-endorphin is also produced in the anterior and intermediate lobes but its decomposition occurs in both the intermediate and anterior lobes. These results provide evidence that exposure to an EF does not raise stress responses in healthy dogs but may reduce chronic stress caused by diseases, such as spinal cord injury or tumor. In addition, we propose that this EF is a result of a modification of pathways of production, secretion, and/or decomposition of ACTH and β-endorphin in the pituitary gland.

The effect of EF on plasma β-endorphin levels also did not change in healthy dogs. However, contrary to the results of plasma ACTH levels in dogs with tumors or spinal cord injuries, the β-endorphin levels in these animals significantly increased after the EF treatment, suggesting that an EF affects the β-endorphin producing pathway and enhances the central analgesic system.

The effects of electric treatments on several neurological disorders, such as neuropsychiatric disorders, a cholinergic pathway, and depression, have been discussed. It has been speculated that the brain is one of the locations of electric treatment effects. In addition, there are reports that a walking disorder caused by spinal cord injury or Parkinson’s disease was remitted by an electric treatment. EFs, magnetic fields (MF), and electromagnetic fields (EMF) are physically different from each other. If the effect of various electric treatments, including EF, MF, or EMF, on an organism had common target(s), many diseases or symptoms mentioned above would be candidates for EF treatment.

Our results suggest that EF affects hormonal processing or metabolism and that EF may act to enhance the antistress response and activate an analgesic pathway. Further well-controlled studies with sham exposed group, however, are needed to elucidate the possible association of these two mechanisms cited to the findings of this study and their potential role in the palliation of bodily symptoms postexposure to EF.

REFERENCES
Dear Editor:

I am writing this letter as a layperson whose initial understanding of orthomolecular medical care came from a radio interview I heard some time ago with Dr. Avram Hoffer, one of the authors of this term. Because it refers to getting the correct nutritional support on the molecular level for alleviating the body’s ailments, as opposed to taking pills to remove symptoms, I had an epiphany about the kind of medical care I wanted. And while this has kept me in good health, as I have used foods, nutritional supplements (herbs, vitamins, minerals, and so on), to resolve a whole variety of ailments, I find it frightening that the “orthodoxy” of the medical practice I received and paid so exorbitantly for was, and is, absolutely of no avail.

For instance, for the past 5 years I have been grappling with a problematic diagnosis, metaplasia of the antrum, which can be a precursor to stomach cancer, and for which a gastroenterologist (one of several) who diagnosed it says he knows of no healing strategy. This problem began as follows: 5 years ago, I discovered a tick “blood blister” attached to my stomach. I removed it and brought it to a doctor for testing. I was immediately treated with antibiotics for about 10 days. The tick tested positive for Lyme disease, and I was told to find a doctor who treats Lyme for a follow-up appointment around 3 months later.

I chose a doctor whom I thought was a “responsible” doctor, an M.D. who treated in two modalities: complementary and allopathic. He had just set up his own practice after working with a prominent doctor.

Despite this doctor’s awareness of my large number of ailments, I find it frightening that the “orthodoxy” of the medical care I received and paid so exorbitantly for was, and is, absolutely of no avail.

THE CASE FOR ORTHOMOLECULAR MEDICAL CARE: A PATIENT’S PLEA

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