

• Research Article

Human biofield therapy does not affect tumor size but modulates immune responses in a mouse model for breast cancer

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ABSTRACT

OBJECTIVE: To assess the effect of human biofield therapy, an integrative medicine modality, on the development of tumors and metastasis, and immune function in a mouse breast cancer model.

METHODS: Mice were injected with 66cl4 mammary carcinoma cells. In study one, mice received biofield therapy after cell injection. In study two, mice were treated by the biofield practitioner only prior to cell injection. Both studies had two control groups of mock biofield treatments and phosphate-buffered saline injection. Mice were weighed and tumor volume was determined. Blood samples were collected and 32 serum cytokine/chemokine markers were measured. Spleens/popliteal lymph nodes were isolated and dissociated for fluorescent-activated cell sorting (FACS) analysis of immune cells or metastasis assays in cell culture.

RESULTS: No significant differences were found in weight, tumor size or metastasis. Significant effects were found in the immune responses in study one but no additional effects were found in study two. In study one, human biofield treatment significantly reduced percentage of CD4⁺CD44^{lo}CD25⁺ and percentage of CD8⁺ cells, elevated by cancer in the lymph nodes, to control levels determined by FACS analysis. In the spleen, only CD11b⁺ macrophages were increased with cancer, and human biofield therapy significantly reduced them. Of 11 cytokines elevated by cancer, only interferon- γ , interleukin-1, monokine induced by interferon- γ , interleukin-2 and macrophage inflammatory protein-2 were significantly reduced to control levels with human biofield therapy.

CONCLUSION: Human biofield therapy had no significant effect on tumor size or metastasis but produced significant effects on immune responses apparent in the down-regulation of specific lymphocytes and serum cytokines in a mouse breast cancer model.

Keywords: biological therapy; breast cancer; immune system; integrative medicine; cytokine; energy medicine

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1 Introduction

1.1 Breast cancer

One of the most common forms of cancer in women in the world is breast cancer. Each year in the United States, more than 200 000 women develop breast cancer and more than 40 000 women die from the disease. Men are also diagnosed with breast cancer but it is less common in men—approximately 2 000 men per year are diagnosed with breast cancer and 400 men will die from the disease. The majority of cancer patients use integrative medicine to help relieve symptoms from cancer and its treatment for it: such as fatigue, loss of appetite, difficulty with sleeping and eating, stress, and depleted immune system^[1,2,3]. Although energy medicine is a small part of these integrative medicine therapies, a recent study demonstrated that cancer patients reported the highest benefit ($P < 0.004$) with energy medicine compared to other integrative medicine therapies^[1]. Evidence-based research is needed to determine the efficacy of these therapies. Therefore, the aim of this study was to assess the effect of energy medicine in a preclinical model of breast cancer in mice. Our hypothesis was that energy medicine would have effects on tumor growth, metastasis and immune function.

1.2 Energy medicine

Energy medicine is one of the domains in integrative medicine that is focused on the human biofield being able to promote well-being and health. The concept of a human biofield in energy medicine has its origins in many different ancient cultures with the development of numerous types of biofield therapies—Reiki, external Qi therapy, Healing touch, Therapeutic touch, etc., but only recently has Western science begun evaluating the potential of these therapies. Energy medicine has a substantial history of clinical trials that reflects the safety of this intervention and some beneficial therapeutic effects. For example, in clinical studies with a particular energy medicine modality, Therapeutic touch, this energy medicine modality was shown to decrease anxiety of patients in various clinical settings^[4-6], decrease pain^[7-10], diminish anxiety and pain^[11,12], improve functional ability in patients with arthritis^[8,13], enhance personal well-being^[14], and facilitate rest/sleep^[4,15,16]. In addition, energy medicine treatments had positive effects on the immune system in patients with stress and anxiety^[11,17], and on hematocrits and hemoglobin in human subjects^[18]. Particular well-known healers have been recruited to treat cell cultures and have shown significant effects^[19-22], while other studies have used groups of practitioners to elicit significant effects^[23-29]. Since energy medicine is practiced on individuals without known medical issues, it was also important to determine if pretreatment with human

biofield therapy on subjects prior to a procedure or health issue would have an effect. Therefore, the second arm of our study was undertaken with pretreatment.

1.3 Mechanism

The mechanism for human biofield therapies is not known but electromagnetic fields are considered to be a component^[30,31]. In biology, electromagnetic fields emitted by the heart and brain, and other organs are well-accepted. Medicine and science measure the pattern of these electromagnetic biofields to monitor the health of the heart and brain through electrocardiograms, electroencephalograms and magnetoencephalograms. Pulsed electromagnetic fields (EMFs) have been shown to inhibit tumor growth and tumor angiogenesis in animals^[32,33]. In a breast cancer model in mice, EMFs significantly reduced tumor growth and the extent of vascularization with increased tumor necrosis in animals^[32,34]. There have also been reports that continuous exposure to EMF can enhance the growth rates of transformed cells in culture for some human epithelial cancers^[34]. EMFs have been shown to enhance the effects of chemotherapy^[35-37]. In human biofield studies, very low EMFs have been detected from the hands of practitioners^[38-40]. Therefore, the effect of energy medicine on other living creatures, such as mice, being partly due to EMFs might not be unexpected. In other studies, forces outside of the electromagnetic spectrum have been considered a component of the human biofield^[41].

1.4 Rationale for study design

A breast cancer model in mice derived from an aggressive 4T1 mouse mammary carcinoma was used to study the effect of energy medicine on cancer^[42]. Breast cancer tumors develop after 66c14 cells are injected into the mouse. This cell line is a thioguanine-resistant variant of line 66 and these cells are able to metastasize into lymph nodes. Isolation and culture of cells from the lymph nodes in the presence of 6-thioguanine allows the survival of metastasized 66c14 cells, which grow in colonies that can be counted as an index of metastasis. The growth of the tumor depends on the secretion of growth factors, cytokines/chemokines to enhance cell proliferation and invasiveness, angiogenesis, leading to inflammation and recruitment of immune cells including macrophages, which in turn secrete additional cytokines. During metastasis, cells and factors eventually migrate into other tissues through the blood stream and can be found in organs such as the spleen. To survey for any major changes in serum cytokine/chemokine markers, thirty-two cytokines were screened using a commercially available kit. A broad spectrum of lymphocytes and macrophages were also analyzed in the spleen and lymph nodes by fluorescent-activated cell sorting (FACS) to identify major changes in immune cells. This study is

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