

**Table S1** Condensed table of the 14 studies with detailed data.

Author (Year)	Biofield Therapy	Population (n)	Study Design	Control	Dose	Type of Intervention	Biomarkers	Biomarker Results	Clinical Results	Observations
Akpinar et al. (2025) [1]	Reiki	Patients undergoing autologous BMT (n = 21 Reiki; n = 21 Control).	Prospective RCT	Usual care (no intervention).	30 min/day, days 0, 1 (in-person) and 2 (distance) post- BMT.	With touch and at a distance.	PCT, CRP, Neutrophils, Platelets, Hb, Ht.	<ul style="list-style-type: none"> <li>• PCT: Significant reduction in the Reiki group vs. increase/stability in the control group (p &lt; 0.05).</li> <li>• CRP/Neutrophils/Platelets: Numerically better values in Reiki, but not statistically significant.</li> <li>• Hb/Ht: No differences.</li> </ul>	Pain (VAS): Significantly greater pain reduction in the Reiki group on days 1 and 2 post- BMT (p = 0.002; p < 0.001).	Small sample; simple blinding only; proposed mechanism via neuroimmune and inflammatory modulation.
Bai et al. (2021) [2]	1. Qigong External Qi 2. Qi from Herb (Astragali Radix) 3. RPV- Field (Torsion Field).	<i>In Vitro</i> : M-1 mouse kidney cells <i>In Vivo</i> : Female C57BL/6J mice (8 months old) (n = 3 per group for animal study).	Pre-Clinical Study ( <i>In Vitro</i> and <i>In Vivo</i> ).	<i>In Vitro</i> : Untreated cells (for each Qi source) <i>In Vivo</i> : Mice administered water only.	1. Qigong External Qi: Single 15-min session 2. Astragali Radix: Cells: 50 µg/ml for 4 h. Mice: 0.20 ml/10 g daily for 7 days (intragastric) 3. RPV-Field: Cells: Exposure for 48 h.	No touch (for Qigong and RPV interventions) .	Primary: Telomere length (qPCR) Secondary: Telomerase activity (ELISA), TERT gene expression (qPCR).	<ul style="list-style-type: none"> <li>• TERT Expression (Cells): Significantly increased by Qigong Master's Qi at 4 h (34%) and 24 h (24%).</li> <li>Astragali Radix decreased it at 4 h (28%). RPV-field had no effect.</li> <li>• Telomerase Activity (Cells): Slight, non-significant increase (16%) only with Qigong Master's Qi at 4 h.</li> </ul>	Not Applicable (Pre- clinical study)	Strengths: Investigated three different "Qi" sources. Used modern molecular biomarkers (telomere length, TERT) and included both <i>in vitro</i> and <i>in vivo</i> experiments. Limitations: Very small animal sample size (n = 3/group). Short duration of effects in cells (≤24 h). No sham control for the Qigong or RPV

• Telomere Length (Mice Organs): Astragali Radix significantly increased telomere length in heart, liver, spleen, and lung (33-34%) but not in kidney, brain, or muscle.

interventions (only untreated controls). The nature of the “Qi” or RPV field is not well-defined or standardized.

<b>Carneiro et al. (2018) [3]</b>	Spiritist “Passe”	Preterm newborns (NBs) in nursery (n = 13 SP; n = 12 Control).	Randomize d, Double-Blind Controlled Trial.	Sham “Passe” (Laying on of hands with healing intention but no spiritual component).	3 sessions (1×/day) of 10 min each, over 3 consecutive days.	No touch (hands 10-15 cm from body).	Salivary Cortisol	• Cortisol: A strong trend (p = 0.05) for lower cortisol levels in the SP group compared to the control group across the study period.	Pain (NIPS): No significant differences (scores were minimal at baseline) Length of Stay: Shorter average stay for SP group (12.6 vs. 23.2 days), but the difference was not statistically significant (p = 0.295).	Pilot study with a small sample size—unique population (preterm infants). The sham control was an active intervention (healing intention), making the specific effect of the spiritual component (“passe”) the variable tested. Non-contact intervention.
<b>Cohen et al. (2024) [4]</b>	Bengston Energy Healing Method	Human pancreatic cancer cells (PANC-1) <i>in vitro</i> (n = 40 sessions for	Experiment al, double-blind, 2 × 2 (treatment vs. no treatment;	1. Dead cells or medium-only (no cells) for human physiology comparison	60 sessions total (6 sessions/day for 10 days) Each session: 15 min treatment (5 min still, 5 min	No touch (distance of ~12 inches from cells)	Intracellular Ca <sup>2+</sup> , tubulin, β-actin	• Ca <sup>2+</sup> increased over time in both BT and sham, but the increase was significantly less in the BT group (p = 0.03).	Not Applicable (Preclinical <i>in vitro</i> study)	Single case study (1 practitioner, 71 years old); double-blind; possible instrumental biases; Granger analysis showed bidirectional association

live cell treatment, n = 20 for control cell treatment, n = 40 for sham control cells).	live cells vs. control) case study.	2. Sham-treated control cells (person mimicking movements/dis tance) for cellular outcome comparison.	movement allowed, 5 min still) preceded and followed by 2 min baseline.	• No significant differences for Tubulin or $\beta$ -actin between BT and sham. • Invasion assay (48 h post-BT): BT significantly reduced invasiveness vs. sham (p < 0.0001).	between EEG and cellular markers; not directly applicable to humans; small effect; recognized methodological limitations.
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<b>Gronowi cz et al. (2015) [5]</b>	Therapeuti c Touch (TT)	Female BALB/c mice with injected 66c14 mammary carcinoma cells. (Study 1: n = 16 TT, n = 16 Mock, n = 8 PBS; Study 2: n = 12 TT, n = 12 Mock, n = 8 PBS).	Pre-Clinical Animal Study	Mock Treatment (CA): Mice placed in apparatus for 10 min, 2 $\times$ /week with a non-TT person present. PBS Control (PBS): Mice injected with vehicle (PBS), no treatment.	Study 1 (TT1): 10- min sessions, 2 $\times$ /week for 26 days (started 24 h postinjection) Study 2 (TT2): 10- min sessions, 2 $\times$ /week for 2 weeks before injection and continued for 29 days postinjection.	Non-Contact (hands 2-10 inches from apparatus).	Serum Cytokines: IL- 1 $\alpha$ , IL-1 $\beta$ , MIG, MIP- 2, IFN- $\gamma$ , IL-2, IL-4, IL-5, IL-12(p40), IP- 10, M-CSF (32-plex panel) Immune Cells (FACS): %CD4+CD44 hiCD25+, %CD44hiCD25- lymphocytes; %CD11b+ macrophages Tumor Markers: PCNA	• Metastasis: TT significantly reduced metastasis to lymph nodes compared to mock (p < 0.05). • Cytokines: Cancer elevated 11 cytokines. TT significantly reduced IL-1 $\alpha$ , IL-1 $\beta$ , MIG, and MIP-2 to control (PBS) levels. • Immune Cells: TT significantly decreased splenic %CD4+CD44hiCD25- + and %CD44hiCD25- lymphocytes, and %CD11b+ macrophages. TT increased	Primary Tumor: No significant difference in tumor volume or mouse weight between TT and mock groups Metastasis: Significant reduction in metastasis	Strengths: Two independent studies, blinded analysis for FACS/cytokines/metastasis , use of a mock control Limitations: Pre-clinical animal model; results may not directly translate to humans. The primary tumor size was unaffected. The exact nature of the biofield mechanism is unknown. The mock control may not fully account for the psychosocial effect of a human presence.
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(proliferation),  
TUNEL (apoptosis)  
Metastasis:  
Clonogenic assay of  
popliteal lymph  
nodes.  
splenic %CD44loCD25-  
lymphocytes. In lymph  
nodes, TT reduced cancer-  
elevated %CD44loCD25+  
lymphocytes to control  
levels.  
• Tumor Markers: No  
significant differences in  
tumor proliferation (PCNA)  
or apoptosis between TT  
and mock groups.

Jain et al. (2012) [6]	Energy Chelation (Biofield Healing)	Fatigued breast cancer survivors (stages I-IIIa) (n = 27 Healing; n = 30 Mock; n = 19 Control).	Blinded RCT	Mock Healing (identical hand positions, no healing intent) and Waitlist.	8 sessions (2x/week) of 1 hour each, over 4 weeks.	Hands-on touch	Diurnal cortisol slope (variability).	• Cortisol Slope: Significant decrease (increased variability) for Biofield Healing vs. both Mock Healing and Control (p < 0.04; Cohen's d = 0.58). Driven by increased AM cortisol. Belief did not impact results.	Fatigue (MFSI-sf): Significant reduction in both Biofield (d = 1.04) and Mock (d = 0.68) groups vs. Control (p < 0.02). No significant difference between active groups QOL (FACT-B): Improved for Biofield vs. Control (p = 0.01; d = 0.76). Belief predicted QOL improvement (p = 0.004) but not	Excellent blinding (75% thought they received real healing). Effects on fatigue attributed partly to non- specific factors (touch, rest). Effect on cortisol slope is specific to biofield intervention, independent of belief.
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fatigue or cortisol

Depression: No

significant effects.

<b>Jhaveri et al. (2008) [7]</b>	Therapeutic Touch (TT)	Human osteoblastic cells; n = 3 different lineages (passages 3-6).	<i>In vitro</i> experiment al study.	No TT (unmanipulated plate)	10 minutes per session, 1 session/day, for 10 days.	No touch (approx. 5-10 cm above the cells).	DNA (quantification by PicoGreen), alkaline phosphatase (activity), calcium deposition (Alizarin Red).	<ul style="list-style-type: none"> <li>• Significant increase in DNA synthesis (<math>p &lt; 0.05</math>).</li> <li>• Increased alkaline phosphatase activity (<math>p &lt; 0.05</math>).</li> <li>• Increased calcium mineralization (<math>p &lt; 0.01</math>).</li> </ul>	Not applicable ( <i>in vitro</i> study)	<i>In vitro</i> study with three osteoblastic cell lines; certified TT applicator; limited sample; lack of clinical evaluation; study suggests osteoinductive potential of TT in human cells.
<b>Kent et al. (2020) [8]</b>	Reiki	Mouse intervertebral disc (IVD) cells <i>in vitro</i> (n = 2 cell plates per group, experiments in duplicate).	Laboratory <i>in vitro</i> study	Sham (practitioner with no knowledge of biofield therapy, instructed to have distracting thoughts).	10-minute sessions, once daily for 3 successive days.	No touch (practitioner's hands placed under cell plate tray inside a light-tight box).	Collagen I (COL1) gene expression, Collagen II (COL2) gene expression, Aggrecan gene expression, Biophoton Emission (BE).	<ul style="list-style-type: none"> <li>• Gene Expression: Reiki significantly increased COL2 and aggrecan gene expression compared to sham (<math>p &lt; 0.05</math>). COL1 increased but not significantly.</li> <li>• Biophoton Emission: Reiki significantly increased post-treatment photon emission compared to its own pre-treatment levels and to post-treatment sham levels (<math>p &lt; 0.05</math>). No</li> </ul>	Not Applicable ( <i>in vitro</i> study)	Strengths: Use of a custom light-tight box and PMT for precise BE measurement; dual design measuring both BE and cellular anabolic response; sham control.  Limitations: Used only one Reiki practitioner; cannot definitively distinguish if posttreatment emission is spontaneous BE or delayed luminescence; internal validity of stress model (TNF- $\alpha$ ) was inconsistent on day 1.

								difference during treatment.		Relevant: Proposes posttreatment photon emission as a potential method to quantify biofield therapy effect Suggests photon pattern/communication may be more important than sheer quantity.
<b>Kokubo et al. (2007) [9]</b>	Laying-on-of-hands (Qigong master), Prayer	Pairs of cucumber pieces (n = 15 Exp/Ctrl pairs Healing; n = 15 pairs NonTx; n = 16 pairs Thermal).	<i>In vitro</i> experiment al study with paired samples.	Non-Treatment (immediate measurement) & Active Control (Thermal stress at 40°C for 30 min).	Laying-on-of hands: 15-30 min/session Prayer: 5 min/session at 1.2 m distance (Single session per sample pair).	Non-contact (Hands near but not touching dish; prayer at a distance).	iophoton emission intensity (counts/10,000 pixels/18 h).	Healing group Exp > Ctrl (p = 0.002). Index J [ln(IE/IC)] significantly higher in Healing (0.255) vs Non-Tx (-0.106; p = 0.0005) and Thermal (0.034; p = 0.037). No difference Non-Tx vs Thermal (p = 0.164).	Not applicable ( <i>in vitro</i> study)	Strengths: Active control to rule out thermal effects; objective blinded measurement; paired samples control variability; long measurement period Limitations: Healer not blinded; small number of intervention sessions; generalization to humans uncertain. Proposes a standard <i>in vitro</i> method for biofield therapy evaluation.
<b>Lutgendorf et al. (2010) [10]</b>	Healing Touch (HT)	Women with cervical cancer undergoing	RCT	Relaxation (active) and Usual Care	4x/week, ~25min/session, for 6 weeks	With and without touch	NKCC, NKAUC, %NK, WBC, RBC	• NKCC/NKAUC: Group*time interaction (p < 0.05). Minimal decrease in HT, marked decrease in	Mood: Greater reduction in depression in HT vs. RT/UC (p < 0.05)	Small sample; no patient blinding; HT group received more sessions;

chemoradiati  
on (n = 17 HT;  
n = 17 RT; n =  
17 UC).

RT and UC. HT > RT/UC at  
week 6 (p = 0.002)  
• %NK, WBC, RBC:  
Decrease in all groups,  
with no difference  
between groups.

QOL/Fatigue: No dif  
Toxicities/Delay: No  
dif.

effect not mediated by  
depression.

<b>Running et al. (2022) [11]</b>	Healing Touch (HT)	University students (n = 21 Exp; n = 21 Ctrl).	Randomize d Controlled Trial.	Watched a demonstration video.	Single 20-minute session	Mixed (hands-on and hands- off).	Salivary cortisol, IL- 6, Systolic BP, Diastolic BP.	Significant pre-post reduction in all biomarkers (p < 0.05). Greater reduction in SBP and DBP for Exp vs. Ctrl (p < 0.05). No significant between- group difference for cortisol or IL-6.	Significant pre-post reduction in self- reported stress (VAS 05) for entire sample (p = 0.0002) No significant between-group difference after adjustment.	Small sample. No blinding. Different positions during intervention (supine vs. seated). Baseline differences in BP and stress between groups.
<b>Wilkinso n et al. (2002) [12]</b>	Healing Touch (HT)	Mixed- diagnosis adults (n = 22 total; n = 10 w/more trained practitioners; n = 12 w/less trained practitioners)	Mixed- method repeated measures (quasi- experiment al & naturalistic) .	No Treatment (NT) - rested on table for 30 min with practitioner present.	2 sessions (1 HT, 1 HT+); 30-45 min each; over 2 weeks.	Mixed (hands-on and hands- off).	Secretory Immunoglobulin A (sIgA).	Clients of more trained practitioners had significant sIgA increase over series (p = 0.021). No significant sIgA change for clients of less trained practitioners.	Significant stress reduction after both HT and HT+ (p = 0.0003) 59% reported health enhancement. 55% of clients with pain reported relief Themes: relaxation, connection, awareness.	Small sample. No blinding Practitioner training level impacted sIgA results Placebo scores did not predict overall response Heterogeneous sample (various health complaints).

Yan et al. (2004) [13]	External Qi of Yan Xin	Primary retinal neurons from 0-2 days old Sprague- Dawley rats, cultured <i>in vitro</i> (n of replicates per group ranged from 3 to 9).	Laboratory <i>in vitro</i> study with dual-blind design.	Sham-operated procedure in the tissue culture room (no real Qi emission).	1 session of 10 min of Qi emission, applied 30 min before toxic stimulus (H <sub>2</sub> O <sub>2</sub> ) in most experiments.	No touch (distance; emitter in a separate locked room).	Cell Viability (MTT assay), Apoptosis (TUNEL assay, DNA laddering), PI3K enzyme activity, IGF-I gene expression (Northern Blot).	<ul style="list-style-type: none"> <li>Significantly prevented H<sub>2</sub>O<sub>2</sub> induced cytotoxicity (MTT, p &lt; 0.05).</li> <li>Significantly inhibited H<sub>2</sub>O<sub>2</sub> induced apoptosis (TUNEL, p &lt; 0.05; prevented DNA laddering).</li> <li>Dramatically increased PI3K activity (3.5× at 30 min, 6× at 1 h, 3× at 24 h; p &lt; 0.05), remained high post- H<sub>2</sub>O<sub>2</sub>.</li> <li>Upregulated IGF-I mRNA expression (significant at 1 h), blocked H<sub>2</sub>O<sub>2</sub>-induced downregulation.</li> </ul>	Not Applicable ( <i>in vitro</i> study)	<p>Strengths: Dual-blind design (assistants and data analyst blinded, Qi provider not involved in assays).</p> <p>Limitations: Single cell type (rat retinal neurons), mechanism of action unknown, single dose tested.</p> <p>Relevant: Explores molecular mechanisms (PI3K/IGF-I pathway) for biofield therapy effects.</p>
	Life Sciences Technology (YXLST)									
Yan et al. (2006) [14]	External Qi of Yan Xin	Human pancreatic cancer cells (BxPC3 line) and human fibroblasts in culture. (Exact n not specified; experiments	Pre-Clinical <i>in vitro</i> Study	Untreated cells (same conditions, no Biofield exposure).	Protocol 1 (Apoptosis): Single 5-min session Protocol 2 (Lysis): Three 5-min sessions, with 25- min intervals between them (total protocol duration: 65 min).	No touch (cells were transferred to a treatment room for exposure).	Phospho-Akt, Phospho-ERK1/2, PI3K activity, NF-κB activity (EMSA), Caspase-3/8/9 cleavage, PARP cleavage, DNA fragmentation, Sub- G1 cell population, LDH release.	<ul style="list-style-type: none"> <li>BxPC3 (Cancer): Significant inhibition (~80%) of basal Akt/ERK1/2 phosphorylation, PI3K activity, and constitutive NF-κB activity (p &lt; 0.01).</li> <li>Abolished EGF-induced ERK1/2 and TNF-α-induced NF-κB activation. Induced apoptosis (↑ subG1</li> </ul>	Not Applicable (Preclinical <i>in vitro</i> study)	<p>Strengths: Clear differential effect (cytotoxicity in cancer cells vs. no damage in normal cells). Robust molecular methodologies</p> <p>Limitations: <i>In vitro</i> study; clinical relevance not established. Mechanism of action not elucidated.</p> <p>Randomization/blinding</p>
	Qigong (YXQ)									



repeated 3-6 times).	population to 31.6%, DNA fragmentation, caspase/PARP cleavage). <ul style="list-style-type: none"><li>• Three sessions caused complete cell lysis (max LDH release)</li><li>• Fibroblasts (Normal): Transient activation of Akt/ERK1/2 phosphorylation (peak at 1 h, <math>p &lt; 0.05</math>), no change in PI3K activity. No apoptosis or lysis markers were detected.</li></ul>	not applicable. Control is untreated, lacks a sham placebo.
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Summary of the 14 studies included in the review, detailing authors, Biofield Therapy modalities, populations studied, study designs, control groups, dosages, types of intervention, biomarkers analyzed, main results and methodological observations.

\*Note: Studies range from randomized controlled trials (RCTs) to preclinical investigations *in vitro* and in animal models, focusing on inflammatory, immunological, hormonal, and oxidative stress biomarkers.

## References

1. Akpinar NB, Unal N, Alıncak G, Pörücü C, Yurtsever S, Karadurmus N. The power of Reiki: Its effects on pain and biochemical parameters in patients undergoing bone marrow transplantation: A randomized prospective controlled study. *Pain Manage Nurs*. 2025; 26: e24-e30.
2. Bai XM. A preliminary study of the effects from different sources of Qi on telomeres. *Biomed J Sci Tech Res*. 2021; 33: 25683-25686.
3. Carneiro ÉM, Barbosa LP, Bittencourt AC, Hernández CG, Timóteo RP, Almeida CD, et al. Effects of spiritist “passe” (spiritual healing) on stress hormone, pain, physiological parameters and length of stay in preterm newborns: A randomized, double-blind controlled trial. *J Complement Integr Med*. 2018; 15: 20180015.
4. Cohen L, Delorme A, Cusimano A, Chakraborty S, Nguyen P, Deng D, et al. Examining the effects of biofield therapy through simultaneous assessment of electrophysiological and cellular outcomes. *Sci Rep*. 2024; 14: 29221.
5. Gronowicz G, Secor Jr ER, Flynn JR, Jellison ER, Kuhn LT. Therapeutic touch has significant effects on mouse breast cancer metastasis and immune responses but not primary tumor size. *Evid Based Complement Alternat Med*. 2015; 2015: 926565.
6. Jain S, Pavlik D, Distefan J, Bruyere RR, Acer J, Garcia R, et al. Complementary medicine for fatigue and cortisol variability in breast cancer survivors: A randomized controlled trial. *Cancer*. 2012; 118: 777-787.
7. Jhaveri A, Walsh SJ, Wang Y, McCarthy M, Gronowicz G. Therapeutic touch affects DNA synthesis and mineralization of human osteoblasts in culture. *J Orthop Res*. 2008; 26: 1541-1546.
8. Kent JB, Jin L, Li XJ. Quantifying biofield therapy through biophoton emission in a cellular model. *J Sci Explor*. 2020; 34: 434-454.
9. Kokubo H, Yamamoto M, Kawano K. Standard evaluation method of non-contact healing using biophotons. *J Int Soc Life Inf Sci*. 2007; 25: 30-39.
10. Lutgendorf SK, Mullen-Houser E, Russell D, DeGeest K, Jacobson G, Hart L, et al. Preservation of immune function in cervical cancer patients during chemoradiation using a novel integrative approach. *Brain Behav Immun*. 2010; 24: 1231-1240.
11. Running A, Hildreth L, John-Henderson N. Bioenergy for stress relief in university students: A randomized controlled trial. *J Community Health Nurs*. 2022; 39: 1-11.
12. Wilkinson DS, Knox PL, Chatman JE, Johnson TL, Barbour N, Myles Y, et al. The clinical effectiveness of healing touch. *J Altern Complement Med*. 2002; 8: 33-47.
13. Yan X, Shen H, Zaharia M, Wang J, Wolf D, Li F, et al. Involvement of phosphatidylinositol 3-kinase and insulin-like growth factor-I in YXLST-mediated neuroprotection. *Brain Res*. 2004; 1006: 198-206.
14. Yan X, Shen H, Jiang H, Zhang C, Hu D, Wang J, et al. External Qi of Yan Xin Qigong differentially regulates the Akt and extracellular signal-regulated kinase pathways and is cytotoxic to cancer cells but not to normal cells. *Int J Biochem Cell Biol*. 2006; 38: 2102-2113.