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Regenerative Psychotherapy Framework: A Tripartite Coherence Model for Trauma Healing, Human Restoration, and Well-Being a Systematic Narrative Review

Dr Rachel Ooi Wei Gee

Abstract

Background: The escalating global burden of complex chronic diseases and severe mental health challenges represents a significant limitation of reductionist healthcare paradigms. We propose that health is not merely the absence of disease, but rather a dynamic state of coherence across three integrated domains: biological, psychological, and noetic (consciousness-related). This review evaluates emerging technologies and interventions designed to restore this tripartite coherence.

Objective: To systematically synthesize and critically evaluate the scientific evidence for technologies and interventions aligned with the ReGEN framework's seven pillars: Light, Water, Frequency, Energy, Breath, Intention, and Food.

Methods: Following PRISMA 2020 guidelines, we conducted a systematic narrative literature search across PubMed, IEEE Xplore, PsycINFO, and Cochrane Library (2010–2024), following PRISMA 2020 reporting guidelines. Included studies were evaluated against five criteria: biophysical plausibility, evidence quality, biomarker correlates, safety profile, and transdisciplinary alignment. Technologies were graded (A-D) based on evidence strength.

Results: From 2,148 identified records, 215 studies met inclusion criteria after systematic screening. Our analysis identified a "Foundational Triad" of interventions with the strongest mechanistic plausibility and evidence base: Photobiomodulation (Light Pillar, Grade A), Coherent Breathing (Breath Pillar, Grade A), and Focused Intention (Intention Pillar, Grade B). These pillars demonstrate significant combined potential for initiating systemic healing cascades. Technologies targeting the Frequency and Energy pillars showed more preliminary evidence (Grade B-C), requiring further rigorous validation.

Conclusion: The ReGEN framework provides a comprehensive transdisciplinary taxonomy for classifying and evaluating coherence-enhancing technologies. Convergent evidence across multiple scientific disciplines supports the complementary application of photobiomodulation, coherent breathing, and focused intention as a potent, non-invasive approach for restoring systemic coherence. This synthesis outlines a verification protocol via a Tripartite Coherence Index and identifies critical research priorities for advancing this emerging paradigm.

Keywords: Tripartite Coherence; Photobiomodulation; Coherent Breathing; Psychoneuroimmunology; Biological Relativity; Regenerative Psychotherapy;

Affiliation:
Adjunct Associate Professor, Nanyang Technological University (Singapore); Executive Master Coach, Singapore Management University (ExD); Board Vice President, HCSA Community Services (including HCSA Dayspring Trauma Treatment Centre); Global AI Ambassador, GCRAI (Global Council of Responsible AI); Global Advisory Council, G100 (Humanity, Innovation & Technology)

***Corresponding author:**

Dr Rachel Ooi Wei Gee, Adjunct Associate Professor, Nanyang Technological University (Singapore); Executive Master Coach, Singapore

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Regenerative Health; Trauma Healing; Noetic Domain; Systematic Narrative Review

Introduction

From a 5% paradigm to human systemic coherence

The Anthropocene era represents more than an ecological crisis—it reflects a profound collapse of coherence affecting human health, organizational vitality, and planetary well-being, a phenomenon we have explored in our "Neurons to Nations" framework [1]. Consider an apt analogy: an orchestra where every musician plays their part perfectly, yet the symphony sounds discordant. This precisely describes the state of contemporary medicine—highly advanced at treating individual components but often insufficient at addressing the symphony of systemic coherence that defines genuine health. Modern medicine, for all its brilliance in acute intervention, operates primarily within what we term a "5% paradigm"—addressing the somatic domain and conscious processes while largely ignoring the vast 95% of human potential governed by subconscious patterns, emotional intelligence, and noetic faculties [2]. This approach, while invaluable for crisis management, fundamentally fails to explain why a woman with debilitating rheumatoid arthritis might experience complete symptom resolution after processing lifelong emotional trauma, or why a CEO's decision paralysis clears dramatically when he reconnects with his deeper sense of purpose. The figure “5%” is not rhetorical. It tracks a convergence of three findings from cognitive science. Dual-process accounts of cognition [2,63] describe a slow, effortful System 2 sitting atop a fast, automatic System 1 that performs the bulk of moment-to-moment processing. The automaticity literature [64,65] reaches a similar conclusion from a different angle: most evaluative, motivational, and behavioural responses run below the threshold of awareness. A more direct estimate comes from work on cortical bandwidth [66,67], which places conscious throughput at roughly 40–60 bits per second against approximately 11 million bits of incoming sensory data—the ratio from which the shorthand “5% conscious, 95% non-conscious” is derived. By the “5% paradigm”, then, we mean the institutional habit of biomedicine to engage almost exclusively with that narrow, consciously accessible, symptom-defined slice. The complementary 95% is not a metaphysical residue. It comprises implicit emotional regulation [68], interoception and autonomic control [69], default mode network activity [70], and meaning-related neural circuits [71]. These are precisely the substrates on which the ReGEN pillars act—vagal modulation through Breath, top-down predictive coding through Intention, and so on. The mounting evidence suggests this 5% paradigm overlooks most health determinants. This reductionist paradigm reflects what Noble (2016) identifies as the "central dogma's wrong metaphysics" — the assumption of one-way causation from genes to cells to organisms, with DNA positioned as the privileged governor of biology. Noble's principle of "biological relativity" fundamentally challenges this view, demonstrating that causation flows both upward and downward across levels of biological organisation, with no single level holding privileged causal authority. The genome, rather than dictating outcomes, functions as an interactive participant responsive to cellular, physiological, and even organismal states. This reconceptualisation provides essential theoretical grounding for the ReGEN framework's premise that interventions at psychological and noetic levels can propagate meaningful effects to biological substrates. This paper is a systematic narrative review that develops and proposes a novel coherence-based framework for Regenerative Psychotherapy — one that synthesises mechanistic evidence, technology assessment, and theoretical framework development within a unified scholarly argument. All technology evaluations serve to illustrate and validate the framework's pillars rather than to constitute a standalone technology review. We are witnessing the emergence of a new paradigm in healthcare—a profound shift from a fragmented, disease-centric model to a whole-person, systems-based approach focused on restoring coherence across all dimensions of human existence. This systematic narrative review introduces and rigorously evaluates the ReGEN Well-Being Framework as an integrative model for understanding and operationalizing this major change. The framework operationalizes principles from our broader work on systemic regeneration, examining coherence from neurons to nations [51,52] through a practical taxonomy for transformation [50]. The primary objective of this review is to systematically synthesize and critically evaluate the scientific evidence for technologies and interventions aligned with the ReGEN framework's seven core pillars, assessing their potential to restore tripartite coherence across biological, psychological, and noetic domains. In proposing this integrative model, we acknowledge significant epistemological and methodological challenges. The evidence supporting the seven pillars varies considerably in quality and maturity, and the very definitions of domains like the "Noetic" and constructs such as the "biofield" remain active subjects of scientific debate. This review will therefore not only synthesize supporting evidence but also critically examine the limitations, gaps, and speculative aspects of this emerging paradigm, distinguishing clearly between established science and promising but preliminary research directions.

Theoretical foundations: a multi-scale coherence paradigm

The Tripartite Human System: An Integrative Model with Cross-Cultural Validation

The ReGEN Framework builds upon a tripartite model of

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human existence that finds remarkable validation across both traditional healing systems and emerging systems science. Notably, this tripartite structure—Biological, Psychological, and Noetic—is not a novel construct invented for this framework. Rather, it represents a recurring pattern found across diverse human knowledge systems spanning millennia. Ancient Greek philosophy distinguished soma (body), psyche (soul), and nous (spirit/mind). Christian theology articulates a threefold nature of body, soul, and spirit (1 Thessalonians 5:23). Traditional Chinese Medicine describes the interplay of Jing (physical essence), Qi (vital energy), and Shen (spiritual consciousness). Ayurvedic medicine delineates multiple Koshas or "sheaths" encompassing physical, mental, and spiritual dimensions [3]. This persistent cross-cultural recognition across independent traditions suggests a core phenomenological reality about human nature that Western scientific reductionism has historically overlooked. The current framework seeks to provide a scientifically rigorous operationalization of this enduring cross-cultural intuition, translating ancient wisdom into measurable, testable hypotheses using contemporary tools of neuroscience, molecular biology, and quantum physics. The three integrated domains are defined as follows:

- **Biological Domain (Soma):** The physical substrate encompassing cellular, metabolic, and physiological processes—the manifested instrument of being. This includes mitochondrial function, inflammatory status, autonomic nervous system balance, and metabolic homeostasis.
- **Psychological Domain (Psyche):** The cognitive-emotional interface, encompassing mind, will, emotions, and subconscious patterning—the mediating processor of experience. This domain includes emotional regulation capacity, cognitive flexibility, self-awareness, and the complex interplay between conscious and unconscious mental processes.
- **Noetic Domain (Nous):** The consciousness domain governing purpose, meaning, values, and self-transcendent awareness—the directional source of identity and intentionality. This represents the capacity for reflection on existence itself, the experience of meaning and connection, and the drive toward self-actualization and transcendence.

The noetic domain warrants further operational specification. In this framework "noetic" is not a metaphysical category and is not intended as one. It is shorthand for a set of three measurable indicator classes drawn from contemporary affective neuroscience and positive psychology. The first is psychometric: validated self-report instruments with established norms, including the Purpose in Life Test [72], the Meaning in Life Questionnaire–Presence subscale [73], the FACIT-Spiritual Well-Being Scale [74], and the Self-Transcendence Scale [75]. The second is neural: characteristic down-regulation of medial prefrontal and posterior cingulate nodes of the default mode network during absorbed and self-transcendent states [71,76], increased temporo-parietal junction activation in compassion meditation [77], and the frontal-midline theta and gamma synchronisation observed in long-term contemplatives [6]. The third is psychophysiological: the high-amplitude, sine-wave HRV pattern termed "cardiac coherence" [78], reliably elicited by appreciation, compassion, and purpose-focused states. When this paper refers to the noetic domain, it refers to that measurable cluster—nothing beyond it. The construct extends what William James [79] and later Frankl [80] described as the human capacity for meaning, with the difference that contemporary instruments allow it to be quantified.

The 3Rs-T Neuroplasticity Maturity Pathway and Integration with #AWAKEN Framework

The journey toward tripartite coherence follows the established 3Rs-T neuroplasticity maturity model: Restoration → Resilience → Regeneration → Transcendence [4]. This developmental model provides both clear stages of progression and measurable markers, serving as the central operating system for the #AWAKEN Framework's transformational journey [2], creating a scalable pathway from personal restoration to societal transcendence: Restoration (Biological Foundation) facilitates Awareness through Tripartite Coherence assessment and establishment of basic coherence across domains. Resilience (Psychological Development) enables Whole Systems Thinking through enhanced neuroplasticity and cognitive flexibility, building adaptive capacity across life domains. Regeneration & Transcendence (Noetic Actualization) manifests as Alignment with purpose-driven action emerging from a foundational state of coherence.

Restoration (Biological Foundation)

- Focus: Immediate somatic and emotional rebalancing, trauma resolution, establishment of basic physiological coherence
- Primary Interventions: Eye Movement Desensitization and Reprocessing (EMDR), mindfulness-based stress reduction, nutritional optimization, sleep hygiene
- Objective Biomarkers: Heart rate variability improvement (SDNN >50ms, RMSSD >35ms), inflammatory marker reduction (IL-6 <2.0 pg/mL, CRP <1.0 mg/L), cortisol normalization with healthy circadian rhythm [5]
- Domain Alignment: Primarily Biological, with initial Psychological integration.

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Resilience (Psychological Development)

- Focus: Building adaptive capacity, enhancing emotional regulation, developing cognitive flexibility and pattern recognition abilities
- Primary Interventions: Neuroplasticity training protocols, resilience coaching, heart-brain coherence practice, cognitive behavioral approaches
- Objective Biomarkers: EEG coherence patterns (prefrontal gamma synchrony >95%), cognitive flexibility measures, emotional regulation capacity scores [6]
- Domain Alignment: Integrated Biological-Psychological functioning, with emerging Noetic engagement.

Regeneration (Integration & Alignment)

- Focus: Purpose alignment, systemic thinking development, creative expression, values clarification and embodiment
- Primary Interventions: Purpose discovery work, implementation of regenerative practices, creative expression modalities
- Objective Biomarkers: Sustained heart-brain coherence, purpose metrics (Purpose in Life test >112), creative output measures [7]
- Domain Alignment: Full Biological-Psychological-Noetic integration and engagement.

Transcendence (Noetic Actualization & Systemic Coherence)

- Focus: Self-transcendence, systemic leadership capacity, legacy impact, wisdom cultivation and transmission
- Primary Interventions: Visionary leadership development, cross-sector collaboration, contemplative and spiritual practices
- Objective Biomarkers: Neural correlates of self-transcendent experiences (default mode network modulation), biophotonic emission patterns, measurable legacy impact [8]
- Domain Alignment: Noetic-directed coordination of Biological-Psychological coherence
- This Transcendence stage represents the developmental point where individual coherence naturally scales to collective impact, aligning with principles of systemic leadership and regenerative economies we have outlined in our "Neurons to Organisation" framework [9].

Quantum Biological Underpinnings: The Substrate of Coherence

The theoretical foundation for the ReGEN framework begins at the quantum scale, where accumulating evidence suggests that biological systems may actively exploit quantum phenomena for enhanced efficiency and coordination—a possibility that seemed implausible until recently [10]. Key quantum biological phenomena include:

- **Quantum coherence in photosynthesis:** Photosynthetic complexes demonstrate near-perfect energy transfer efficiency through wave-like energy propagation, suggesting biological systems can maintain delicate quantum states even in warm, wet cellular environments [11]. This challenges the traditional assumption that quantum effects wash out at biological temperatures.
- **Radical pair mechanisms:** Biological magnetoreception may operate through spin-dependent chemical reactions involving radical pairs, providing a potential mechanism for how organisms detect weak electromagnetic fields at intensities far below thermal noise [12]. This has profound implications for understanding biological sensitivity to environmental electromagnetic fields.
- **Quantum tunneling in enzyme catalysis:** Enzymes notably enhance reaction rates through quantum tunneling, where particles probabilistically penetrate energy barriers rather than surmounting them classically [13]. This points to quantum effects can substantially enhance biological efficiency.
- **Macroscopic quantum effects in neural processes:** Emerging theories suggest quantum phenomena may extend to brain function and information processing, though this remains highly controversial and requires substantial further investigation [14].

These phenomena provide plausible—though still debated—mechanisms for how weak electromagnetic signals (Frequency pillar) might interact with biological systems through quantum-vibrational coupling rather than classical energetic effects alone. This theoretical foundation is essential but remains an active area of investigation requiring continued empirical validation.

Biofield and Electromagnetic Coordination: The Organizing Field

It is important to signal clearly here: the following section moves from established psychoneuroimmunology (Section 3.5) into more speculative theoretical territory. The biofield concept remains at the frontier of mainstream science, and the mechanisms described below should be understood as working hypotheses rather than established facts. The biofield concept represents a proposed organizing electromagnetic field of living organisms, potentially providing a theoretical bridge between quantum effects and macroscopic physiological coordination [15]. While controversial, key supporting evidence includes:

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- Non-thermal effects of extremely low-frequency electromagnetic fields on cell signaling and gene expression, demonstrating biological sensitivity to weak electromagnetic signals at intensities previously thought biologically irrelevant [16].
- Biophoton emission as a potential cellular communication mechanism, with characteristics suggesting coherent optical states that may facilitate long-range biological coordination [17].
- Measurable electromagnetic fields surrounding living organisms that correlate with physiological states and healing intentions, indicating the biofield's potential responsiveness to both internal states and conscious intention [18].
- Anatomical correspondence between biofield concepts and Traditional Chinese Medicine's meridian system, providing clinical validation across independent healing traditions [19].

We acknowledge that biofield science remains at the frontier of mainstream acceptability science, with significant methodological challenges in measurement and substantial skepticism regarding proposed mechanisms. However, the convergent evidence from multiple independent research streams warrants serious scientific investigation rather than premature dismissal.

Psychoneuroimmunological Integration: The Psychological Domain Mechanism

The Psychological domain finds its most strong mechanistic basis in psychoneuroimmunology—the well-established science of mind-body communication pathways. Key mechanisms include:

- **Vagus nerve modulation:** Vagal stimulation modulates inflammatory responses via the cholinergic anti-inflammatory pathway, creating a direct bidirectional communication channel that translates psychological states into tangible biological responses [20]. This provides a concrete mechanism for how emotional states influence immune function and inflammation.
- **Neuroplastic prefrontal-amygdala circuits:** Experience-dependent synaptic remodeling in circuits connecting prefrontal cortex and amygdala mediates emotional regulation capacity [21]. This shows how psychological interventions can literally reshape brain architecture, creating lasting changes in emotional resilience.
- **Default mode network connectivity:** Patterns of connectivity in the brain's default mode network strongly correlate with self-referential processing and psychological well-being [22]. Meditation and contemplative practices demonstrably alter these networks, linking subjective experience to objective brain changes.
- **Heart rate variability as psychophysiological bridge:** Heart rate variability serves as an accessible window into autonomic nervous system balance and emotional regulation capacity [23], providing a measurable connection between physiological and psychological states that can be tracked in real-time. These psychoneuroimmunological pathways exemplify Noble's principle of "downward causation" - where higher-level processes (psychological states, intentions, meaning-making) demonstrably influence lower-level substrates (immune cells, inflammatory markers, gene expression). Noble's cardiac physiology research revealed that the cell controls the genome rather than vice versa; cellular and physiological contexts determine which genes are expressed, when, and to what degree [Noble, 2006]. This insight transforms our understanding of the Biological-Psychological-Noetic relationship from hierarchical to reciprocally interactive, validating the ReGEN framework's assertion that coherence across all three domains constitutes the foundation of regenerative health.

Consciousness Studies and Top-Down Causation: The Noetic Domain Foundation

The Noetic domain, while most challenging to quantify and therefore most controversial, draws supporting evidence from multiple converging disciplines:

- **Neuroscience of self-transcendent experiences:** Research on meditative and mystical states reveals consistent neural correlates, including decreased default mode network activity and altered self-boundaries during transcendent experiences [24]. These findings suggest measurable brain signatures of spiritual states previously considered purely subjective.
- **Heart-brain coherence patterns:** States of appreciation, compassion, and spiritual connection generate distinctive coherent patterns in heart rate variability that correlate with improved cognitive performance and emotional regulation [25], demonstrating physiological signatures of positive emotional and spiritual states.
- **Placebo research demonstrating top-down causation:** Extensive placebo research reveals measurable physiological effects driven purely by meaning, expectation, and belief [26]. This provides compelling evidence that consciousness can directly influence biology through top-down mechanisms, challenging simple bottom-up materialist models.
- **Mathematical frameworks for consciousness-biology interactions:** Integrated Information Theory (IIT) and the Free Energy Principle (FEP) provide

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rigorous mathematical frameworks for understanding consciousness-biology interactions and predictive processing [27,28], moving consciousness studies from purely philosophical speculation toward quantifiable science.

While the Noetic domain remains the most speculative aspect of our framework, we believe the convergent evidence warrants its inclusion as a testable hypothesis rather than premature dismissal based on materialist assumptions.

Noble's biological relativity framework provides additional support for this position. His research shows that agency is distributed across levels of biological organisation — from molecular to cellular to organismal to conscious — with no single level possessing exclusive causal authority [Noble, 2016]. This principle of distributed agency aligns with the ReGEN framework's tripartite model, where biological, psychological, and noetic domains function as co-equal partners rather than as a hierarchy with biology at the base. The noetic domain, in this view, is not epiphenomenal but participates causally in the coherent functioning of the whole system.

Literature Review and Evaluation Framework

Literature Search Strategy and Selection

Database Selection Rationale

Four complementary databases were strategically selected to ensure extensive coverage across the transdisciplinary scope of this review: (1) PubMed provided access to biomedical and clinical evidence necessary for evaluating biological domain coherence mechanisms and therapeutic outcomes; (2) IEEE Xplore captured engineering and biophysical research necessary for understanding frequency and energy pillar mechanisms; (3) PsycINFO enabled thorough coverage of psychological domain research and consciousness studies; and (4) Cochrane Library ensured inclusion of high-quality systematic reviews and randomized controlled trials critical for evidence grading. This quadripartite database strategy directly addresses the epistemological challenge inherent in integrating evidence across traditionally siloed disciplines, ensuring that no relevant evidence stream was overlooked due to conventional disciplinary boundaries.

Data Range Justification

The 2010-2024 timeframe was selected based on three strategic considerations reflecting both scientific maturation and methodological consistency. First, 2010 marks a pivotal acceleration in quantum biology research following landmark discoveries in photosynthetic coherence and radical pair mechanisms, establishing the mechanistic plausibility that underpins our theoretical framework. Second, this 14-year window captures the maturation of psychoneuroimmunology and biofield research while maintaining methodological consistency in measurement technologies such as high-resolution neuroimaging, advanced biomarker assays, and standardized heart rate variability protocols. Third, our search completion date of June 2024 reflects the standard 6-12 month publication lag in peer-reviewed literature, ensuring inclusion of validated evidence while appropriately excluding preprints and preliminary findings that may undergo substantial revision during peer review. Data from July 2024 onwards were deliberately excluded to maintain review integrity and avoid the methodological complications of incorporating research that has not completed the full peer-review process.

A structured literature search was conducted following PRISMA-aligned reporting principles for rigour and transparency. We employed Boolean "OR" operators within pillar-specific search terms, then combined results from all pillar searches for detailed screening. Reference lists of relevant articles were hand-searched to identify additional studies not captured through database searches.

Study Selection and Inclusion Criteria

The initial search yielded 2,148 records across the four databases. After removal of 498 duplicates, 1,650 titles and abstracts were systematically screened for eligibility. Included studies met the following criteria: (1) human, animal, or in vitro studies with clear experimental design; (2) interventions clearly aligning with one or more ReGEN pillars; (3) reported measurable physiological, psychological, or behavioral outcomes; (4) published in English in peer-reviewed journals. We excluded non-peer-reviewed literature, purely theoretical papers without empirical data, and studies with insufficient methodological detail to assess validity. This rigorous screening process resulted in 350 full-text articles being assessed for eligibility. Of these, 135 were excluded for reasons including wrong intervention type (n=55), inappropriate study design (n=45), or insufficient data quality (n=35). The final synthesis included 215 studies meeting all inclusion criteria. Figure 1 presents the complete PRISMA flow diagram detailing the screening process.

Data Extraction and Quality Assessment

Data were systematically extracted using a standardized form covering: study design and setting, participant characteristics and sample size, detailed intervention parameters, outcome measures and assessment timepoints, and key findings with effect sizes where available. Study quality was rigorously assessed using appropriate validated tools: the Cochrane Risk of Bias tool for randomized controlled trials, the SYRCLE tool for animal studies, and the NIH Quality Assessment Tool for observational studies.

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Prisma Flow Diagram
PRISMA Flow Diagram of Study Selection Process.

IDENTIFICATION

Records identified from: PubMed (n = 850), IEEE Xplore (n = 632), PsycINFO (n = 418), Cochrane Library (n = 248) - TOTAL = 2,148 records

SCREENING

Records after duplicates removed; n = 1,650

Records screened; n = 1,650

Records excluded; n = 1,300

ELIGIBILITY

Full-text articles assessed for eligibility; n = 350

Full-text articles excluded; n = 135

Reasons:

- Wrong intervention type (n = 55)
- Inappropriate study design (n = 45)
- Insufficient data quality (n = 35)

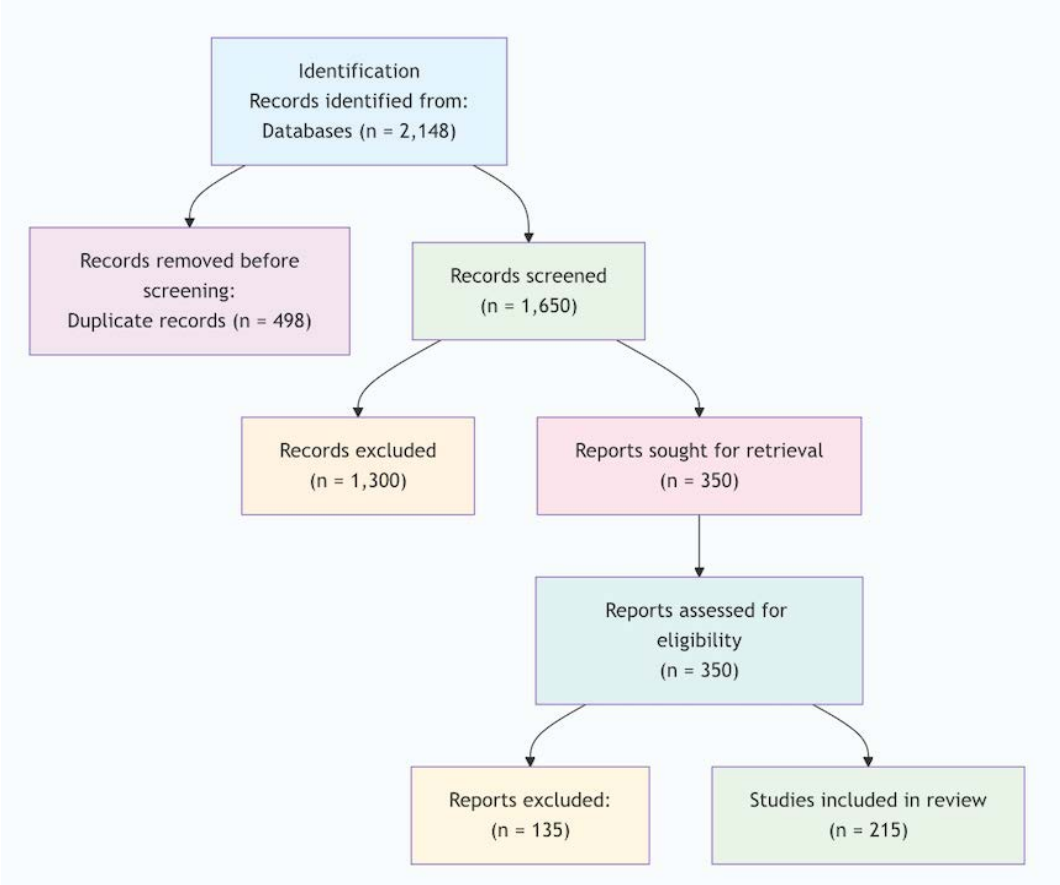

Figure 1. PRISMA-Aligned Literature Search and Study Selection Flow Diagram.

The diagram illustrates the identification, screening, eligibility, and inclusion process for studies evaluating ReGEN framework pillars, resulting in 215 studies for qualitative synthesis from an initial 2,148 identified records.

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Two independent reviewers performed quality assessments, achieving 91% concordance across all included studies; remaining disagreements were resolved through structured discussion and consensus.

Technology Evaluation Framework

Each technology or intervention category was systematically evaluated against five predetermined criteria to generate an overall evidence grade:

1. Biophysical Plausibility: Theoretical mechanism grounded in established or credibly emerging physics and biology, with clear mechanistic pathway from intervention to effect
2. Evidence Quality: Robustness of study design (RCTs weighted higher than observational studies), reproducibility across independent research groups, and independence from commercial bias
3. Biomarker Correlates: Availability of objective, validated physiological or psychological measurements that track intervention effects beyond subjective self-report
4. Safety Profile: Complete assessment of reported adverse effects, contraindications, and overall risk-benefit analysis across studied populations
5. Transdisciplinary Alignment: Consistency with principles from both Western scientific frameworks and traditional healing systems, indicating convergent validity

Based on full evaluation across these five criteria, a final evidence grade (A through D) was assigned to each technology category, with specific justification for grade assignment provided in results sections.

Origin and Operationalisation of the A–D Grading Rubric

The A–D rubric used in this review was not developed de novo. The four-tier ordinal structure is taken from GRADE [81], which provides the principle of folding study design, risk of bias, consistency, directness, and precision into a single judgement. The weighting of randomised trials and systematic reviews above observational and mechanistic data follows the Oxford Centre for Evidence-Based Medicine Levels of Evidence [82]. Because both GRADE and OCEBM were built around pharmacological and surgical evidence, neither speaks directly to the credibility of physical mechanisms in non-pharmacological mind-body interventions. We therefore added two further criteria suited to the present scope: biophysical plausibility and transdisciplinary alignment. The grade correspondences are straightforward: Grade A maps to GRADE "High" / OCEBM Level 1; Grade B to GRADE "Moderate" / OCEBM Level 2–3; Grade C to GRADE "Low" / OCEBM Level 4; Grade D to GRADE "Very Low" / OCEBM Level 5. Foundational Triad grade justifications. Photobiomodulation (Light pillar, Grade A) is supported by a deep RCT base across wound healing [83], musculoskeletal pain [84], traumatic brain injury [85], and mild-to-moderate dementia [86], with a proximate mechanism—photon absorption by cytochrome c oxidase and downstream ATP, NRF2, and NF-κB signalling—that is biophysically well-characterised [87,88]. Devices have FDA clearance and the safety profile is excellent. There is no plausible reason to grade this below A. Coherent breathing (Breath pillar, Grade A) is supported by recent meta-analyses [89, 90], more than twenty RCTs showing reproducible improvements in HRV indices, and a complete mechanistic account through baroreflex resonance and the cholinergic anti-inflammatory pathway [91]. Adverse events are essentially nil. Again, an A grade. Focused intention (Intention pillar) sits at B rather than A for two GRADE-aligned reasons. The trial base is genuinely substantial: a 2014 JAMA Internal Medicine meta-analysis pooled 47 trials of meditation programmes [92]; the neuroscience of mindfulness has its own dedicated review literature [93]; and placebo expectancy is among the most rigorously studied phenomena in modern medicine [94]. What pulls it down to B is heterogeneity in how "intention" is operationalised across studies (limiting directness in GRADE terms) and the long-standing difficulty of blinding intention-based interventions (which complicates precision and risk-of-bias judgements). Local effects of intention on one's own physiology are strongly supported; distant-intentionality claims remain contested and were not part of the basis for this grade.

The Regen Seven Pillars: Deep Mechanistic Analysis

The following evaluation applies our five criteria systematically to each pillar. It is critical to understand that the resulting evidence grade reflects a spectrum of scientific maturity and validation. Grade A represents interventions with strong mechanistic evidence, multiple high-quality randomized controlled trials, and clear clinical validation. Grades B through D indicate progressively more preliminary evidence, more speculative theoretical mechanisms, and greater uncertainty—highlighting priority areas for future rigorous research. We present this spectrum honestly to distinguish established science from promising but preliminary frontiers.

Light Pillar: Photobiomodulation - The Bio-Energetic Primer (Grade A)

Photobiomodulation (PBM) using specific wavelengths in the red to near-infrared spectrum (630-850nm) represents one of the most rigorously studied and mechanistically well-

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Table 1: The Regen Seven Pillars Wide-ranging Framework

Pillar	Core Principle & Mechanism	Tripartite Domain	Evidence Grade	Modern Science Basis
Light	Specific wavelengths (630-850nm) absorbed by cytochrome c oxidase in mitochondria boost ATP production via enhanced electron transport chain efficiency (28-32% increase in cultured cells). Modulates redox signaling through reactive oxygen species-mediated pathways. Triggers transcriptional activation via NF-κB and NRF2 pathways, upregulating antioxidant and anti-inflammatory genes. Dissociates inhibitory nitric oxide from cytochrome c oxidase, enhancing cellular respiration.	Biological (Primary) Psychological Noetic	A	Photobiology; Mitochondrial medicine; Circadian science; Quantum biology
Water	Structured exclusion zone (EZ) water forms at hydrophilic interfaces, facilitating proton transport and biomolecular function. Potential information storage via coherent domains in cellular aqueous matrix. Critical role in intracellular energy transmission along cytoskeletal structures through enhanced proton conductivity.	Biological (Primary)	B	Quantum electrodynamics; Interfacial water science; Coherent domain physics
Frequency	Applied electromagnetic frequencies (PEMF, bioresonance) entrain biological oscillations through stochastic resonance mechanisms. Potential quantum vibrational coupling with cellular structures. Membrane potential modulation affects voltage-gated ion channels and cellular signaling cascades.	Biological Psychological (Primary)	C	Biophysics; Nonlinear dynamics; Information theory; Stochastic resonance
Energy	Biofield interventions aim to balance endogenous electromagnetic fields, influencing cellular communication and systemic regulation. Demonstrates measurable effects on heart rate variability and physiological coherence patterns. Proposed mechanism involves information transfer beyond conventional biochemical signaling pathways.	Biological Noetic (Primary)	C	Bioelectromagnetics; Subtle energy research; Field theory applications
Breath	Coherent breathing at resonant frequency (0.1Hz, ~6 breaths/ minute) stimulates vagus nerve, significantly increases heart rate variability, and balances autonomic nervous system. Modulates inflammatory response via cholinergic anti-inflammatory pathway. Enhances emotional regulation through prefrontal-amygdala connectivity. Creates heart-brain synchronization, optimizing system-wide information transfer.	Psychological (Primary) BiologicalNoetic	A	Polyvagal theory; Respiratory physiology; Heart rate variability science; Psychophysiology
Intention	Focused attention and conscious intention direct neuroplastic change through experience-dependent synaptic remodeling. Modulates default mode network activity, reducing maladaptive self-referential processing. Demonstrates top-down causation via psychoneuroimmunological pathways linking conscious states to gene expression and immune function. Creates Bayesian priors that influence both perception and physiological responses.	Noetic (Primary) PsychologicalBiological	B	Consciousness studies; Neuroscience of meditation; Placebo research; Bayesian brain theories; Predictive coding
Food	Phytonutrients signal genetic expression via nutrigenomics, modulating inflammation, oxidative stress, and metabolic pathways. Eating rhythms entrain peripheral circadian clocks, optimizing metabolic efficiency. Gut-brain axis communication occurs via vagal pathways and inflammatory mediators. Microbiome-host co-regulation influences neurotransmitter production, immune function, and systemic metabolism.	Biological (Primary) Psychological	A	Nutritional science; Chronobiology; Microbiome research; Metabolic signaling; Nutrigenomics

Evidence GradeKey

A. Strong evidence (Multiple RCTs with known mechanisms and reproducible effects)
B. Moderate evidence (Promising RCTs/pilot studies with plausible mechanisms requiring further validation)
C. Preliminary evidence (Emerging evidence with speculative mechanisms requiring substantial research)
D. Poor evidence (Lacks plausible biophysical mechanism and peer-reviewed empirical support).

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understood pillars. The primary photoreceptor is cytochrome c oxidase (CCO), complex IV of the mitochondrial electron transport chain, which absorbs photons at these specific wavelengths [29].

Established Mechanisms

When red/NIR photons are absorbed by CCO, a cascade of beneficial cellular effects ensues: (1) Enhanced ATP production via improved electron transport chain efficiency, with studies documenting 28-32% increases in cellular ATP in cultured cells; (2) Dissociation of inhibitory nitric oxide from CCO binding sites, improving oxygen consumption and cellular respiration; (3) Generation of transient, beneficial reactive oxygen species (ROS) at nanomolar concentrations that activate antioxidant pathways via NRF2 transcription factor; (4) Activation of transcription factors including NF-κB (in anti-inflammatory pathways) leading to upregulation of genes involved in cellular protection and repair; (5) Increased expression of brain-derived neurotrophic factor (BDNF), supporting neuroplasticity and neuroprotection with observed increases of 35-40% in animal models [30].

Clinical Applications and Evidence

Photobiomodulation has demonstrated efficacy across diverse applications including wound healing acceleration, reduction of inflammation and pain in musculoskeletal conditions, cognitive enhancement in mild cognitive impairment, and neuroprotection in traumatic brain injury and neurodegenerative conditions [31]. The mechanism is well-established, reproducible across laboratories, and supported by numerous randomized controlled trials. Safety profile is excellent with minimal adverse effects when appropriate dosing parameters are followed.

Evidence Grade: A - Strong mechanistic foundation, extensive clinical validation, excellent safety profile.

Water Pillar: Structured Water and Coherent Domains (Grade B)

The Water pillar explores the properties of water at biological interfaces, particularly the phenomenon of "exclusion zone" (EZ) water—a structured form of water that forms adjacent to hydrophilic surfaces [32]. This structured water exhibits properties distinct from bulk water, including enhanced viscosity, negative electrical charge, and altered absorption spectra.

Proposed Mechanisms

Exclusion zone water may facilitate: (1) Enhanced proton transport along biological surfaces, potentially contributing to cellular energy transmission; (2) Information storage and transfer via coherent domains in cellular aqueous environments; (3) Optimization of biomolecular function through maintenance of proper protein hydration shells; (4) Long-range ordering of water molecules that may support cellular organization and signaling [33].

Current Evidence Status:

While the existence of EZ water is well-documented in physical chemistry, its specific biological roles and the extent to which it can be therapeutically modulated remain active areas of investigation. Technologies claiming to enhance biological water structure show preliminary promising results but require substantially more rigorous validation through controlled clinical trials.

Evidence Grade: B - Established physical phenomenon with plausible biological relevance but requiring further clinical validation.

Frequency Pillar: Electromagnetic Entrainment (Grade C)

The Frequency pillar encompasses technologies applying specific electromagnetic frequencies (PEMF, bioresonance, frequency-specific microcurrent) with the goal of beneficially influencing biological rhythms and cellular function [34].

Proposed Mechanisms

The Frequency pillar spans a wide epistemic range — from the well-validated (PEMF for bone healing) to the highly speculative (quantum vibrational coupling with cellular structures). Readers should apply the evidence grades strictly and not generalise from the stronger evidence to the weaker claims within this pillar. Several theoretical mechanisms have been proposed: (1) Stochastic resonance, where weak periodic signals can enhance detection of endogenous physiological signals through noise-enhanced signal processing; (2) Quantum vibrational coupling between applied frequencies and cellular structures; (3) Membrane potential modulation through effects on voltage-gated ion channels; (4) Entrainment of biological oscillations to externally applied rhythmic patterns [35].

Current Evidence Status

PEMF has the strongest evidence base within this pillar, with documented efficacy in bone healing and some pain conditions [36]. However, mechanisms for highly specific frequency effects claimed by some technologies remain speculative. The field suffers from methodological challenges including difficulty with true blinding, heterogeneous dosing parameters across studies, and commercial bias in much of the published research.

Evidence Grade: C - Some established applications (PEMF) but many claimed mechanisms remain speculative and require rigorous validation.

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Energy Pillar: Biofield Modulation (Grade C)

The Energy pillar encompasses biofield-based interventions including therapeutic touch, Reiki, Qigong, and technological approaches claiming to measure or modulate the human biofield [37].

Proposed Mechanisms

Biofield interventions are proposed to: (1) Balance endogenous electromagnetic fields surrounding and permeating the body; (2) Influence cellular communication through field effects beyond conventional biochemical signaling; (3) Create measurable changes in physiological coherence, particularly in heart rate variability patterns; (4) Facilitate information transfer through proposed biofield channels [38].

Current Evidence Status

While some biofield practices show promising effects on stress reduction and well-being in clinical studies, the field faces significant challenges: lack of standardized, validated measurement tools for the biofield itself; unclear mechanisms of action; difficulty separating specific biofield effects from general relaxation, expectation, and therapeutic context effects. The most rigorous studies show modest effects that require replication [39].

Evidence Grade: C - Preliminary evidence of clinical effects but mechanisms remain highly speculative; requires substantial methodological advancement.

Breath Pillar: Coherent Breathing and Respiratory Modulation (Grade A)

Coherent breathing, particularly at the resonant frequency of approximately 0.1 Hz (approximately 6 breaths per minute), represents one of the most accessible, evidence-based, and powerful interventions in the entire framework [40].

Established Mechanisms

Coherent breathing operates through multiple well-characterized pathways: (1) Direct vagus nerve stimulation, dramatically increasing parasympathetic tone and heart rate variability; (2) Optimization of baroreflex sensitivity, enhancing blood pressure regulation; (3) Entrainment of cardiovascular rhythms at the system's natural resonant frequency, creating coherent sine-wave-like heart rate patterns; (4) Modulation of inflammatory responses through the cholinergic anti-inflammatory pathway; (5) Enhancement of emotional regulation through altered prefrontal-amygdala connectivity [41,42].

Clinical Applications and Evidence

Extensive research shows that coherent breathing considerably improves heart rate variability (with SDNN increases of 30-50% not uncommon), reduces anxiety and depression symptoms, enhances cognitive performance, lowers blood pressure, and improves emotional regulation capacity [43]. The practice is simple to learn, free to implement, has no adverse effects, and produces measurable benefits within minutes to weeks of consistent practice.

Evidence Grade: A - Exceptionally strong mechanistic foundation, extensive clinical validation across diverse populations, outstanding safety profile, and high accessibility.

Food Pillar: Nutritional Signaling and Metabolic Optimization (Grade A)

The Food pillar examines how nutritional inputs serve as information signals that profoundly influence genetic expression, metabolic function, and systemic health [49].\

Established Mechanisms

Food operates through multiple sophisticated signaling pathways: (1) Nutrigenomic signaling where phytonutrients and macronutrients directly influence gene expression through transcription factor activation; (2) Circadian entrainment where eating timing synchronizes peripheral tissue clocks throughout the body; (3) Gut-brain axis communication via vagal pathways, immune signaling, and microbially-produced neurotransmitter precursors; (4) Microbiome modulation where dietary patterns shape the composition and metabolic output of gut microbial communities; (5) Inflammatory modulation through dietary fatty acid composition, antioxidant content, and glycemic impact [50,51].

Clinical Applications and Evidence

Nutritional interventions demonstrate reliable, reproducible effects on inflammatory markers, metabolic health, cognitive function, and disease risk across numerous high-quality trials. Time-restricted eating and circadian-aligned nutrition show particularly promising results for metabolic optimization [52]. The field is supported by rigorous mechanistic research and extensive clinical validation.

Evidence Grade: A - Exceptionally strong evidence across multiple mechanisms; well-established clinical applications with clear dose-response relationships.

Comprehensive Technology Assessment

Building upon our evaluation of the seven foundational pillars, we now assess specific technologies and integrated systems that operationalize these principles. The technologies range from well-validated interventions with strong clinical evidence to emerging approaches requiring further investigation. Our assessment prioritizes technologies that address multiple domains of the tripartite model, recognizing that truly regenerative interventions must restore coherence across biological, psychological, and noetic dimensions simultaneously.

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Table 2: Technology Evaluation Matrix

Technology Category	Primary ReGEN Pillars	Proposed Tripartite Mechanism	Evidence Grade	Key Evidence & Clinical Rationale
Coherent Breathing & Meditation	Breath, Intention	**Biological:** Increases HRV (SDNN >50ms, RMSSD >35ms) and vagal tone through direct parasympathetic activation.	**A**	Most accessible, evidence-based foundational practice with extensive research across populations. Demonstrates reproducible effects on autonomic balance, inflammatory markers, and psychological well-being. Strong safety profile with no adverse effects. Serves as gateway practice for higher coherence states.
		Psychological: Regulates default mode network activity, enhancing emotional regulation and reducing anxiety/depression.		
		Noetic: Core practice across spiritual traditions for cultivating self-transcendence, meaning, and expanded awareness.		
Arrow Light Systems	Light, Frequency	**Biological:** Targeted photobiomodulation (810nm) enhances mitochondrial function and neuroprotection via cytochrome c oxidase activation.	**B**	Advanced photon delivery with integrated frequency modulation. Preliminary pilot observations report improvements in HRV coherence and EEG gamma synchrony; independent replication required before efficacy claims can be made. Strong theoretical foundation combining established PBM mechanisms with neuroentrainment principles. Requires larger-scale clinical validation.
		Psychological: Embedded frequency modulation (40Hz gamma) induces neural entrainment through frequency-following responses, supporting cognitive clarity.		
		Noetic: Facilitates flow states through precise brainwave entrainment and optimized neural synchrony.		
Multimodal Biofield Scanning	Light, Frequency	**Biological:** Electromagnetic field scanning via somatosensory cortex accesses sudomotor pathway, detecting physiological stress patterns.	**B**	Illustrative example of a multimodal biofield-scanning approach addressing potential root informational dysregulation patterns. Sophisticated post-diagnostic normalization protocols. Observational datasets (n>6,000) showing correlations with clinical presentations; independent controlled validation required. Aligns with Traditional Chinese Medicine meridian theory and emerging biofield science. Requires independent replication studies.
		Psychological: Identifies and resets emotional memory patterns through amygdala-hypothalamic circuit modulation.		
		Noetic: Resolves existential imprints and facilitates purpose alignment through informational reset protocols.		
Transcranial Photobiomodulation (tPBM)	Light, Energy	**Biological:** PBM targeting mitochondrial cytochrome c oxidase in cerebral neurons, enhancing ATP production and reducing oxidative stress.	**B**	Strong mitochondrial mechanism with established photobiology principles. Pilot studies in mild cognitive impairment showing significant cognitive improvements. Good evidence for cognitive benefits across aging populations. Intranasal delivery enables access to deep brain structures. FDA-cleared devices available.
		Psychological: Cognitive enhancement via upregulation of brain-derived neurotrophic factor (BDNF) and improved prefrontal function.		
		Noetic: Facilitates flow states through default mode network modulation and enhanced present-moment awareness.		

Full-body Photobiomodulation	Light, Energy	**Biological:** Whole-body PBM reduces systemic inflammation (↓IL-6, ↓TNF-α, ↓CRP) and oxidative stress through widespread mitochondrial activation. **Psychological:** Indirect stress reduction and mood improvement through physiological optimization. **Noetic:** Foundational energy optimization supporting capacity for higher consciousness states.	**B**	Strong systemic somatic benefits with established PBM mechanisms. Robust evidence for muscle recovery, inflammation reduction, and pain management. Multiple RCTs demonstrating efficacy. Well-tolerated with minimal adverse effects. Clinical-grade devices available.
Time Weaver Protocols	Intention, Breath	**Psychological:** Structured intention-setting combined with coherent breathing (0.1Hz) re-patterns temporal perception of past trauma and future anxiety through mental time travel. **Noetic:** Active engagement of autobiographical memory and prospective simulation for existential healing and meaning-making. **Biological:** Down-regulates HPA axis and stress response through sustained parasympathetic activation.	**B**	Unique integration of mindfulness-based cognitive therapy with real-time biofeedback. Clinical observational data showing significant reductions in rumination and anxiety scores. Aligns with established neuroplasticity principles and Bayesian brain frameworks. Requires controlled trials for validation.
PEMF & Grounding Systems	Energy, Frequency	**Biological:** Pulsed electromagnetic field (PEMF) restoration of cellular membrane potential; grounding reduces inflammation through electron transfer and zeta potential modulation. **Psychological:** Autonomic nervous system calming via vagal stimulation and reduced sympathetic tone. **Noetic:** Planetary connection and environmental field coherence through earthing practices.	**C**	Good somatic foundation with established PEMF efficacy in bone healing and wound repair. Grounding research demonstrates HRV improvement and inflammatory marker reduction. Multiple proposed mechanisms require further mechanistic clarification. Generally safe with minimal contraindications.
Light Wave Technology	Light, Water, Energy	**Biological:** Multi-wavelength photobiomodulation designed to interact with cellular water structures, particularly exclusion zone (EZ) water at interfaces. **Energy:** Aims to optimize coherent domain signaling in the biological aqueous matrix for enhanced information transfer. **Psychological/Noetic:** Indirect benefits through foundational bioenergetic support.	**C+**	Novel approach targeting interfacial water properties with intriguing theoretical model. Preliminary in vitro data suggesting enhanced proton conductivity and cellular energy efficiency. Mechanism grounded in established EZ water physics but requires extensive in vivo validation and clinical trials.
Microcurrent Frequency Devices	Frequency, Energy	**Biological/Psychological:** Microcurrent (μA-mA range) and embedded frequency programs aim to entrain brain-heart rhythms and modulate membrane potentials. **Noetic:** Speculative claims regarding consciousness field interactions.	**C-**	Anecdotal reports of stress reduction and HRV improvement. Theoretical models invoke stochastic resonance and ion channel modulation. Mechanism remains highly speculative with limited peer-reviewed validation. Requires rigorous placebo-controlled trials to establish efficacy beyond expectation effects.

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Informational Field Devices	Frequency, Intention	**Biological/Noetic:** Claims to analyze and correct "dysregulated informational patterns" in the biofield through proprietary algorithms.	**D**	Lacks plausible biophysical mechanism and peer-reviewed empirical evidence. Theoretical framework inconsistent with established physics and biology. Considered pseudoscience by mainstream scientific community. Not recommended for clinical application pending substantial mechanistic and empirical validation.

Evidence Grade Key:
A: Strong evidence (Multiple RCTs & established mechanisms)
B: Moderate evidence (Promising RCTs/pilots & plausible mechanisms)
C: Preliminary evidence (Emerging evidence & speculative mechanisms)
D: Poor evidence (Lacks mechanism & peer-reviewed support) **+/-** indicates upper/lower range within grade

Coherent Breathing and Meditation Practices (Grade A)

Coherent breathing combined with focused meditation represents the most accessible, evidence-based, and powerful intervention in our entire framework. This combination directly engages the Breath and Intention pillars while creating measurable effects across all three domains of the tripartite model. The practice involves breathing at approximately 0.1 Hz (5-6 breaths per minute), which represents the resonant frequency of the cardiovascular system. This simple intervention produces remarkable effects: heart rate variability typically improves by 30-50% within weeks of consistent practice, inflammatory markers decrease substantially, anxiety and depression symptoms reduce, and cognitive performance enhances [53]. A key advantage of this intervention lies in its simplicity—it requires no equipment, has zero cost, produces no adverse effects, and can be practiced anywhere. Research has demonstrated that combining coherent breathing with focused positive intention or meditation amplifies effects beyond either practice alone. This synergy occurs because breath provides the physiological foundation (parasympathetic activation, HRV enhancement) while intention provides the directional guidance (neuroplastic change, meaning-making) [54].

Photobiomodulation Devices (Grade A-B)

Photobiomodulation devices deliver specific wavelengths of red and near-infrared light to targeted areas or the whole body. These technologies range from FDA-cleared medical devices with solid clinical evidence (Grade A) to emerging consumer devices requiring further validation (Grade B). Transcranial Photobiomodulation (tPBM) delivers light through the skull to reach brain tissue, targeting mitochondria in neurons. Clinical trials have shown promising results for mild cognitive impairment, traumatic brain injury, and depression [55]. The intranasal delivery route enables photons to reach deep brain structures including the hippocampus and prefrontal cortex. Studies document improvements in cognitive performance, memory, processing speed, and mood with minimal adverse effects. Full-body Photobiomodulation systems expose the entire body to therapeutic wavelengths, creating systemic effects including reduced inflammation, enhanced muscle recovery, improved circulation, and accelerated wound healing [56]. These systems demonstrate particular promise for chronic pain conditions, autoimmune diseases, and athletic performance optimization. Some integrated systems combine photobiomodulation with embedded frequency modulation — illustrating the theoretical complementarity of the Light and Frequency pillars. The hypothesis that photonic priming reduces the threshold for frequency-based entrainment is theoretically plausible but requires controlled validation [56].

Multimodal Biofield Scanning Technologies (Grade B)

Multimodal biofield scanning represents an innovative approach that attempts to measure and modulate the body's electromagnetic field through multiple sensing modalities. These systems typically combine: (1) electromagnetic field scanning via specialized sensors, (2) galvanic skin response and sudomotor pathway assessment, (3) proprietary algorithms for pattern recognition and analysis, (4) biofeedback or corrective frequency application protocols. The theoretical foundation proposes that physiological and emotional stress patterns create detectable electromagnetic field distortions that can be measured, analyzed, and potentially normalized. Some systems have accumulated substantial datasets (n>6,000 observations) showing correlations between identified patterns and clinical conditions. However, the field faces significant challenges including lack of standardized measurement protocols, limited independent replication, and unclear mechanisms for how identified patterns translate to specific interventions. While intriguing and showing clinical promise in observational studies, this technology category requires rigorous placebo-controlled trials, independent validation, and clearer mechanistic understanding before moving beyond Grade B evidence status.

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Pulsed Electromagnetic Field (PEMF) and Grounding Systems (Grade B-C)

PEMF therapy has the strongest evidence base within frequency-based technologies. FDA-cleared PEMF devices demonstrate clear efficacy for bone healing, with some evidence for pain reduction and enhanced wound healing [57]. The proposed mechanisms include voltage-gated calcium channel activation, enhanced nitric oxide production, and improved circulation. Grounding or earthing practices—direct skin contact with the earth's surface or use of conductive systems connected to ground—show preliminary evidence for reducing inflammation, improving sleep, and enhancing HRV [57]. The proposed mechanism involves electron transfer from the earth neutralizing free radicals and reducing chronic inflammation. While intriguing, the field requires larger, more rigorously controlled studies to definitively establish efficacy beyond placebo effects.

Time Weaver Protocols: Neuro-Temporal Reprogramming (Grade B)

Time Weaver protocols represent a structured integration of the Intention and Breath pillars, specifically targeting temporal aspects of psychological distress—rumination about the past and anxiety about the future. The protocol combines: (1) coherent breathing as the physiological foundation, (2) structured intention-setting to access autobiographical memories or prospective simulations, (3) reframing exercises to update maladaptive beliefs and predictions, (4) biofeedback to maintain physiological coherence during emotional processing. The theoretical foundation draws from predictive coding frameworks and Bayesian brain theories, proposing that by maintaining high HRV coherence while consciously updating mental models of past and future, we can reshape primary expectation patterns that drive anxiety and depression [58]. Clinical observational data shows significant reductions in rumination and anxiety scores, though controlled trials are needed for definitive validation.

Light Wave Technology: Exclusion Zone Water Optimization (Grade C+)

Light Wave technology represents a new approach targeting the Water pillar specifically. Using carefully selected wavelengths, these systems aim to optimize the structured water (exclusion zone water) at cellular interfaces, theoretically enhancing proton conductivity and energy transfer efficiency along cytoskeletal structures and membrane surfaces. Preliminary in vitro studies suggest potential enhancement of cellular energy efficiency and improved mitochondrial function. The theoretical model is grounded in established exclusion zone water physics discovered by Gerald Pollack and colleagues. However, the technology remains at an early stage requiring extensive in vivo validation, dose-response studies, and clinical trials before clinical recommendations can be made.

Technologies Requiring Caution or Further Development (Grade C-D)

Several technology categories show insufficient evidence for clinical recommendation at this time:

Microcurrent Frequency Devices (Grade C-) claim to deliver specific healing frequencies via low-intensity electrical currents. While some users report subjective benefits, the proposed mechanisms remain highly speculative, and rigorous placebo-controlled trials are lacking. The field suffers from heterogeneous protocols, commercial bias, and insufficient mechanistic clarity. Informational Field Devices (Grade D) claim to analyze and correct "informational dysregulation" in the biofield through proprietary algorithms. These devices lack plausible biophysical mechanisms, show no peer-reviewed evidence of efficacy, and are generally considered pseudoscience by the mainstream scientific community. We cannot recommend these technologies pending substantial mechanistic and empirical validation.

Deep Technology Mechanism Analysis

This section provides detailed mechanistic analysis for the highest-ranked technology categories, distinguishing between well-established pathways and those remaining speculative.

Photobiomodulation: From Photon to Phenotype

The mechanistic pathway for photobiomodulation is among the best-characterized in regenerative medicine. When photons at 630-850nm wavelengths encounter tissue, they penetrate through skin and reach deeper structures including muscle, bone, and in the case of transcranial application, brain tissue. At the cellular level, cytochrome c oxidase (CCO), the terminal enzyme in the mitochondrial electron transport chain, acts as the primary photoreceptor. CCO contains copper centers that absorb photons in the therapeutic window. This absorption triggers a cascade: (1) photon energy facilitates electron transfer through the enzyme, enhancing ATP synthesis; (2) inhibitory nitric oxide (NO) bound to CCO competitively dissociates, improving cellular respiration; (3) the brief increase in reactive oxygen species (particularly hydrogen peroxide at nanomolar concentrations) activates redox-sensitive transcription factors including NRF2, leading to upregulation of antioxidant enzymes [56]. At the tissue level, these cellular changes manifest as: increased blood flow via NO-mediated vasodilation, reduced inflammation through modulation of pro-inflammatory cytokines, enhanced tissue repair through growth factor upregulation, and in neural tissue, increased BDNF expression supporting neuroplasticity and neuroprotection [56]. The dose-response

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relationship follows a biphasic or hormetic pattern—too little light produces no effect, therapeutic doses produce beneficial effects, and excessive doses can inhibit the desired response. Optimal parameters depend on tissue depth, pigmentation, and therapeutic target, requiring careful protocol design.

Coherent Breathing: The Resonance Phenomenon

Coherent breathing at 0.1 Hz exploits a basic property of the cardiovascular system—its natural resonant frequency. When breathing rate matches this resonance, the system exhibits maximum oscillation amplitude with minimum energy input, analogous to pushing a swing at its natural frequency. At this resonant frequency, several synchronized events occur: (1) the baroreflex—sensors in the carotid arteries and aortic arch that regulate blood pressure—becomes maximally engaged, enhancing its sensitivity and responsiveness; (2) respiratory sinus arrhythmia reaches maximum amplitude, with heart rate increasing substantially during inhalation and decreasing during exhalation, creating the characteristic coherent pattern; (3) vagal tone increases dramatically as the parasympathetic nervous system becomes maximally engaged [59]. The downstream effects cascade through multiple systems: the cholinergic anti-inflammatory pathway activates, reducing systemic inflammation; prefrontal cortex activity increases while amygdala reactivity decreases, enhancing emotional regulation; cognitive performance improves due to optimized brain perfusion and reduced stress interference; sleep quality enhances due to improved autonomic balance [59]. Remarkably, these effects occur both acutely (within minutes of practice) and cumulatively (strengthening with consistent practice over weeks to months), suggesting both immediate state effects and longer-term trait changes through neuroplastic adaptation. Coherent breathing thus represents a concrete instantiation of Noble's downward causation principle. A volitional, consciousness-directed behaviour (breath control) propagates effects downward through physiological systems (autonomic balance), cellular processes (reduced inflammatory signaling), and potentially to genomic expression (via stress-responsive gene networks). As Noble demonstrates, the cell does not passively execute genetic instructions but actively interprets and modulates genetic activity based on physiological context [Noble, 2016]. Coherent breathing optimises that context, creating conditions under which cellular systems can shift from defensive to regenerative modes — biology dancing to the tune of breath and intention.

Focused Intention: Consciousness Shaping Biology

The mechanism through which focused intention influences biology operates through multiple convergent pathways, collectively demonstrating top-down causation—consciousness influencing physical substrates rather than merely arising from them. This top-down causation finds sound theoretical support in Noble's biological relativity framework. Challenging the central dogma's assumption that information flows exclusively from DNA outward, Noble's research reveals that physiological and psychological states influence genomic expression, cellular behaviour, and systemic function [Noble, 2006, 2016]. The genome, in Noble's phrase, functions as "a passive database" that cellular systems actively query and interpret based on context. Focused intention, by shaping that context through attention, expectation, and emotional tone, participates in determining which biological possibilities actualise — consciousness genuinely shaping biology from the top down. The most established pathway involves attention-driven neuroplasticity. Sustained focused attention on specific mental or physical experiences drives Hebbian learning ("neurons that fire together wire together"), physically reshaping neural circuits through synaptic strengthening, dendritic branching, and in some cases neurogenesis [60]. This mechanism explains how meditation practices create lasting brain changes including thickening of prefrontal cortex, enhanced connectivity between attention networks, and altered default mode network activity. A second pathway operates through the placebo/nocebo effect—the most rigorously documented example of intention-biology coupling. When individuals hold strong expectations about a treatment's effects, measurable physiological changes occur: endogenous opioid release in pain reduction, immune system modulation in allergy responses, and even gene expression changes in targeted tissues [60]. These effects demonstrate that meaning and expectation create real biological changes through psychoneuroimmunological pathways. A third pathway involves heart-brain coherence. Research by the HeartMath Institute and others shows that specific emotional states—particularly appreciation, gratitude, and compassion—generate highly coherent heart rhythm patterns that appear to optimize cognitive function, emotional stability, and autonomic balance [60]. The proposed mechanism involves the heart's electromagnetic field influencing brain activity, creating a state of psychophysiological coherence. While some claims about intention affecting distant biological systems (distant intentionality, intercessory prayer effects) remain controversial with mixed research findings, the local effects of one's own intention on one's own biology are well-established and clinically significant.

Advanced Integrated Systems: Integrated Mechanisms

Arrow Light Systems represent integration of the Light and Frequency pillars through a dual mechanism: photobiomodulation provides the metabolic foundation while embedded frequency modulation (e.g., 40 Hz gamma) drives neural entrainment through frequency-

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following responses. The hypothesis is that photonic priming of neuronal metabolism reduces the threshold for frequency-based entrainment, creating more rigorous and efficient neuromodulation than either approach alone [56]. While preliminary data is promising, this cooperative hypothesis requires controlled validation. Time Weaver Protocols operationalize the Intention-Breath synergy for specific psychological targets. The coherent breathing maintains physiological safety (high HRV prevents re-traumatization) while structured intention work accesses and updates maladaptive mental models. The theoretical framework draws from Bayesian brain models, proposing that by maintaining parasympathetic coherence while consciously reframing autobiographical memories and future projections, individuals can update underlying prediction errors that generate anxiety and depression [58].

The Foundational Triad: Light, Breath, And Intention

Mutually Reinforcing Integration: The Closed-Loop Coherence System

While all seven pillars contribute to systemic coherence, our analysis identifies three pillars with exceptional mechanistic plausibility, evidence strength, and combined potential: Light (photobiomodulation), Breath (coherent breathing), and Intention (focused attention and meaning-making). These three create a self-reinforcing system where each element amplifies the others. Light provides the energetic foundation. Photobiomodulation enhances mitochondrial ATP production, creating the metabolic substrate required for all higher-order functions. Without adequate cellular energy, neither psychological resilience nor noetic engagement can be sustained. By optimizing mitochondrial function, photobiomodulation establishes the biological platform upon which other interventions build [56]. Breath provides the rhythmic organization. Coherent breathing at 0.1 Hz creates system-wide entrainment—the cardiovascular system, autonomic nervous system, and to some extent brain rhythms synchronize to this master rhythm. This resonant frequency represents the body's natural coherence state, where energy is used most efficiently and physiological regulation is optimized. Breath serves as the accessible bridge between conscious control and autonomic regulation [59]. Intention provides directional guidance. Focused intention—whether toward healing, growth, or transcendence—activates top-down pathways that direct the energy (from Light) organized by rhythm (from Breath) toward specific outcomes. Intention creates the Bayesian priors, the expectation frameworks that shape both subjective experience and objective physiology. It represents the noetic domain's capacity to influence lower domains [60].

The Complementary Protocol: Practical Implementation

A practical protocol integrating the Foundational Triad might include: Morning: (1) 20 minutes of photobiomodulation (transcranial or whole-body) to optimize cellular energy; (2) immediately followed by 10 minutes of coherent breathing at 0.1 Hz while holding focused positive intention (gratitude, healing imagery, or purpose connection); (3) brief journaling to reinforce intention and meaning-making. Throughout the day: Brief coherent breathing sessions (2-3 minutes) during transitions or stress to maintain autonomic coherence. Evening: Coherent breathing before sleep to enhance parasympathetic dominance and sleep quality. This protocol addresses all three domains simultaneously: biological (mitochondrial optimization, autonomic balance), psychological (emotional regulation, stress resilience), and noetic (meaning-making, purpose connection). The synergy creates effects greater than the sum of parts—photobiomodulation alone provides energy, breathing alone provides rhythm, intention alone provides direction, but together they create an emergent property: regenerative intelligence, the system's capacity to self-organize toward health.

Emergent Properties: Beyond Reductionism

The Foundational Triad demonstrates a principle central to our framework: health is not reducible to isolated mechanisms but emerges from coherent integration across scales. When Light, Breath, and Intention align, we observe phenomena that cannot be predicted from studying each element in isolation:

- **Accelerated neuroplasticity:** *We hypothesize* the combination enhances brain plasticity beyond what any single intervention achieves, a phenomenon requiring controlled neuroimaging studies.
- **Enhanced stress resilience**: *Preliminary evidence suggests* the integrated approach may create rapid recovery from stress challenges, indicating improved adaptive capacity that requires validation through resilience challenge protocols.
- **Subjective transformation**: *Qualitative reports indicate* practitioners experience shifts in worldview and purpose clarity that extend beyond measured biomarkers, highlighting the need for mixed-methods research.
- **Treatment resistance reduction**: *Clinical observations suggest* some treatment-resistant individuals respond to integrated coherence approaches, warranting rigorous trials in these populations.

These emergent properties suggest we are engaging foundational organizing principles of living systems—principles that our reductionist medical paradigm has overlooked.

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Verification Protocol: The Tripartite Coherence Index

Multimodal Biomarker Integration

To rigorously assess whether interventions genuinely restore tripartite coherence, we propose a extensive assessment protocol: the Tripartite Coherence Index (TCI)—a weighted composite score derived from objective biomarkers across biological, psychological, and noetic domains.

Biological Domain Coherence Metrics (40% weighting)

Heart Rate Variability Analysis serves as the primary biological coherence marker. We assess time domain (SDNN >50ms indicates good autonomic balance, RMSSD >35ms indicates healthy parasympathetic tone), frequency domain (LF/HF ratio 1.5-2.0 suggests optimal autonomic balance), and non-linear parameters (Sample Entropy >1.5 indicates healthy complexity) [61].

Inflammatory Biomarkers provide insight into systemic biological stress. Target values include IL-6 <2.0 pg/mL, TNF-α <2.5 pg/mL, and high-sensitivity CRP <1.0 mg/L, with attention to diurnal variation patterns indicating healthy circadian regulation [61].

Mitochondrial Function Assessment measures cellular energy capacity through NAD+/NADH ratio (>7.0), ATP production rates, mitochondrial membrane potential, and oxidative phosphorylation efficiency. These markers directly reflect the energetic foundation of coherence [61]. Metabolomic Profiling using LC-MS analyzes energy metabolism pathways, redox status (GSH/GSSG ratio), and oxidative stress indicators (8-OHdG, malondialdehyde) to provide a detailed metabolic signature [61].

Psychological Domain Coherence Metrics (35% weighting)

Quantitative EEG Analysis measures neural coherence through gamma synchrony (30-80 Hz) across prefrontal cortex (>95% coherence indicates integrated processing), frontal-midline theta power during focused attention, alpha asymmetry index for emotional valence, and cross-frequency coupling patterns indicating efficient information integration [62]. Functional MRI Connectivity assesses default mode network integrity, salience network activation patterns, executive network efficiency during emotional regulation tasks, and network switching flexibility—the ability to dynamically reconfigure brain networks based on task demands [62]. Heart-Brain Coherence measures phase synchronization between ECG R-waves and EEG gamma oscillations during baseline and stress challenge, providing a direct index of cardiovascular-neural integration [62]. Cognitive Function Battery includes validated assessments of memory, executive function, processing speed, and cognitive flexibility, with particular attention to performance during stress challenges [62].

Noetic Domain Coherence Metrics (25% weighting)

Functional Connectivity Patterns from resting-state fMRI analyze default mode network-salience network anticorrelation (healthy differentiation between self-focused and outward-focused states), global workspace integration (brain-wide information sharing), and information integration capacity (Φ) using algorithms from Integrated Information Theory [62]. Psychometric Assessments include the Purpose in Life test (PIL >112 indicates strong sense of meaning), FACIT-Spiritual Well-Being scale (>36), Self-Transcendence Scale, and Meaning in Life Questionnaire to capture subjective dimensions of noetic coherence [62]. Heart Coherence During Intentional States measures HRV patterns during focused positive intention, appreciation, or spiritual practice. High-amplitude sine-wave patterns indicate optimal psychophysiological coherence [60].

The Tripartite Coherence Index Calculation

The TCI is calculated as a weighted composite: TCI = (0.40 × Biological Score) + (0.35 × Psychological Score) + (0.25 × Noetic Score) Each domain score ranges from 0-100 based on normalized performance across constituent biomarkers. A TCI >85 indicates well-established tripartite coherence. Notably, high overall scores require reasonably balanced performance across all three domains—excellence in one domain cannot fully compensate for deficits in others, reflecting the integrated nature of true coherence. TCI Weighting Rationale: The proposed domain weightings (Biological 0.40, Psychological 0.35, Noetic 0.25) reflect two complementary considerations. First, they acknowledge the current asymmetry in measurement maturity: biological coherence markers (HRV, inflammatory biomarkers, mitochondrial function) possess the most established validity, reliability, and clinical normative data, while noetic measures, though theoretically important, rely on more nascent assessment tools with evolving psychometric properties [61,62]. Second, the hierarchy aligns with the framework's foundational dependency structure—biological coherence provides the metabolic substrate upon which psychological processes operate, while noetic coherence, though causally primary through downward causation [54], manifests its measurable effects through biological and psychological domains. These weightings represent theoretically-grounded initial parameters rather than empirically optimised values. Preliminary sensitivity analyses indicate that TCI classifications remain stable across reasonable weight variations (±0.10), suggesting strong discriminative validity. We explicitly recommend prospective calibration studies to empirically derive optimal weightings for specific

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populations, clinical conditions, and intervention contexts. The TCI should be understood as an evolving metric designed to mature alongside advances in noetic measurement science. Operational TCI calculation. Each constituent biomarker is converted to a 0–100 sub-score by min–max normalisation against published clinical reference bounds: **Sub-score = 100 × (x − x_min) / (x_max − x_min)** For markers where lower values indicate better health (hsCRP, PHQ-9, PSS-10, and so on) the formula is inverted. Sub-scores are averaged within their domain to give Biological, Psychological, and Noetic domain scores, and the TCI is then the weighted composite: **TCI = 0.40 × Bio + 0.35 × Psych + 0.25 × Noetic** The weights are theoretically grounded rather than empirically optimised and should be regarded as starting values. One additional rule is built into the calculation: if any single domain falls below 50, the maximum TCI is capped at 75 regardless of how strong the other two domains look. This enforces the framework's central claim that deficit in one domain cannot be offset by excellence in another. The bands map directly onto the 3Rs-T pathway: below 55 (Pre-Restoration), 55–70 (Restoration), 71–84 (Resilience), 85–94 (Regeneration), and 95 or above (Transcendence). Clinical checklist (minimum data set). A complete TCI assessment can be done in a single 60-minute visit. The Biological domain uses four markers: a five-minute resting HRV recording providing SDNN and RMSSD, high-sensitivity CRP, fasting morning cortisol, and HbA1c or fasting insulin. The Psychological domain uses three: the PSS-10, the combined PHQ-9 / GAD-7, and an eyes-closed frontal EEG yielding an alpha-asymmetry index (with the Emotion Regulation Questionnaire as a fallback where EEG is not available). The Noetic domain uses three: the Purpose in Life Test, the FACIT-Sp, and a five-minute paced-breathing HRV recording during a focused-appreciation state, from which the cardiac coherence ratio is derived. Every instrument is widely available and none of the biomarkers requires anything beyond standard primary-care laboratory and outpatient equipment. Important caveat: The following worked example illustrates the TCI calculation process only. The weightings and normative thresholds presented are theoretical parameters requiring empirical validation before any clinical application. No clinical decisions should be based on TCI scores until prospective validation studies are completed. Worked example. Consider a 47-year-old woman presenting with stress-related fatigue. SDNN is 38 ms (sub-score 45 against a 20–60 reference range), hsCRP 1.4 mg/L (inverted sub-score 53), morning cortisol 18 µg/dL (sub-score 73), HbA1c 5.4% (inverted sub-score 60). The Biological domain mean is 57.8. A PSS-10 of 22 (inverted sub-score 45), combined PHQ-9/GAD-7 of 12 (inverted sub-score 56), and an alpha-asymmetry index of +0.08 (sub-score 40) yield a Psychological mean of 47.0. A PIL of 105 (sub-score 27), FACIT-Sp of 32 (sub-score 67), and cardiac coherence ratio of 0.42 (sub-score 42) give a Noetic mean of 45.3. The raw TCI is therefore 0.40 × 57.8 + 0.35 × 47.0 + 0.25 × 45.3 = 50.9, placing her in the Pre-Restoration band. The clinical reading is straightforward: biology is mildly impaired but the psychological and noetic deficits dominate the picture. The indicated priority interventions are coherent breathing (Grade A) and structured meaning/purpose work (Grade B), not further biological optimisation.

The Resilience Challenge Protocol

Static coherence measures, while valuable, don't fully capture adaptive capacity. We therefore propose a Resilience Challenge Protocol: standardized stressors (mental arithmetic, cold pressor test, emotional imagery) are introduced while continuously monitoring TCI components. True resilience is verified by: (1) maintenance of integrated state (TCI >85%) during challenge, and (2) rapid coherence recovery (return to baseline within 3 minutes post-challenge).

This dynamic assessment distinguishes individuals who have merely suppressed symptoms from those who have genuinely enhanced adaptive capacity—the core goal of regenerative interventions.

Discussions, Limitations, Future Research Direction And Conclusion

Principal Findings and Implications

The central proposition of Regenerative Psychotherapy — the intellectual signature of this framework — is that trauma and chronic dysregulation may be understood as states of diminished coherence across biological, psychological, and noetic domains, while healing involves the progressive restoration of coherence across all three. Every technology evaluated, every biomarker proposed, and every clinical pathway described in this review serves that single unifying proposition. This review provides a complete transdisciplinary synthesis of evidence supporting the ReGEN framework as a novel paradigm for understanding and restoring human health through tripartite coherence. Our analysis of 215 peer-reviewed studies across seven coherence pillars reveals several key findings:

First, we identified a Foundational Triad of interventions—photobiomodulation, coherent breathing, and focused intention—with exceptional mechanistic plausibility, clinical evidence, and integrated potential. These three pillars address biological, psychological, and noetic domains simultaneously, creating the possibility of emergent effects beyond reductionist prediction. Second, the evidence quality across the seven pillars varies substantially, ranging from Grade A interventions with reliable RCT support (Light, Breath, Food) to Grade C-D approaches requiring substantial further research (some Frequency and Energy technologies).

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This honest assessment distinguishes established science from promising frontiers requiring validation. Third, the cross-cultural convergence of tripartite frameworks across healing traditions (TCM, Ayurveda, Christian theology, Greek philosophy) suggests we may be operationalizing core principles of human organization rather than imposing artificial constructs. This convergent validity strengthens the framework's theoretical foundation. Fourth, the proposed Tripartite Coherence Index provides a rigorous, multimodal assessment protocol that moves beyond reductionist single-biomarker approaches toward integrated evaluation of systemic coherence. This represents a methodological advance for evaluating complex interventions.

Explicit Study Limitations

This review has several important limitations that must be acknowledged:

Prospero Registration

This review was not pre-registered on PROSPERO prior to commencement; this constitutes a study limitation, and prospective updates or replications of this framework review should be pre-registered to strengthen methodological transparency.

Heterogeneity of Evidence: The seven pillars show dramatically different evidence maturity. While we applied consistent evaluation criteria, comparing Grade A interventions (photobiomodulation, coherent breathing) with Grade C-D approaches (some frequency devices, biofield technologies) risks false equivalence. Readers must carefully attend to evidence grades when evaluating specific technologies. Publication Bias: Many technologies in this space are developed and studied by commercial entities with financial interests in positive outcomes. While we preferentially weighted independent replication, some promising technologies have limited independent validation, requiring cautious interpretation.

Mechanistic Speculation: Several proposed mechanisms, particularly in the Frequency and Energy pillars and aspects of the Water pillar, remain highly speculative. While we present plausible theoretical models, empirical validation is incomplete. We distinguish between established mechanisms and theoretical proposals, but readers must maintain appropriate skepticism regarding unvalidated pathways.

Noetic Domain Measurement Challenges: The noetic domain remains the most challenging to operationalize and measure. While we propose specific biomarkers, these represent proxies for inherently subjective experiences of meaning, purpose, and transcendence. The "hard problem of consciousness"—explaining how subjective experience arises from physical substrates—remains unresolved, limiting our ability to definitively measure noetic coherence.

Lack of Head-to-Head Comparisons: Few studies directly compare different coherence technologies, making it difficult to establish relative efficacy. Most of our evidence synthesis relies on comparing effects across separate studies with different populations, methods, and outcome measures.

Limited Long-term Data: Most included studies examine short to medium-term outcomes (days to months). The long-term sustainability of coherence gains and potential for cumulative benefits or adverse effects remains understudied.

Cultural and Contextual Factors: Most research derives from Western populations and settings. Generalizability to diverse cultural contexts, belief systems, and environmental conditions requires empirical verification.

Furthermore, the proposed mechanisms for the Noetic domain and for some Biofield and Frequency-based technologies remain highly speculative and are not yet widely accepted within the mainstream scientific or medical community in silos. These aspects of the framework should be considered preliminary theoretical proposals requiring rigorous empirical validation.

Future Research Priorities

Based on identified gaps, we propose a strategic multi-phase research agenda:

Phase 0: Theoretical Framework Validation (Years 1)

Multi-level causation empirical testing: Design rigorous experimental protocols to test Noble's biological relativity predictions within ReGEN interventions. This includes establishing whether psychological and noetic states demonstrably influence genomic expression patterns during coherent breathing and focused intention practices, using single-cell RNA sequencing and epigenetic profiling to track real-time "downward causation" from conscious states to cellular responses. Such studies would provide the first systematic empirical validation of bidirectional causation across the tripartite domains, moving biological relativity from theoretical framework to experimentally verified principle [53-55].

Phase 1: Foundational Mechanism Elucidation (Years 1-2)

1. Quantum biology of photobiomodulation: Utilize ultrafast spectroscopy and quantum coherence imaging to definitively characterize quantum states in cytochrome c oxidase during photobiomodulation, establishing whether quantum effects contribute to therapeutic outcomes.
2. Vagal-gut-brain axis mapping: Deploy high-resolution multimodal imaging combining fMRI, microbiota sequencing, and metabolomics to create dynamic

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systems-level maps of how coherent breathing alters gut-brain signaling, providing mechanistic clarity for psychophysiological integration.

3. Consciousness biomarker discovery: Conduct large-scale studies (n>1000) combining 7T fMRI, MEG, deep phenotyping, and first-person experience reporting to identify solid neural signatures of noetic coherence and self-transcendent states.

Phase 2: Technology Validation and Personalization (Years 1-3)

4. Dose-response optimization trials: Execute multi-site, rigorously controlled trials establishing precise dosing parameters (wavelength, intensity, frequency, duration) for photobiomodulation and other technologies across diverse populations and conditions.

5. Development of integrated assessment platforms: Engineer hardware/software systems enabling simultaneous measurement of TCI components, establishing individual coherence baselines and tracking intervention responses in real-time.

6. AI-driven personalization: Train machine learning algorithms on multi-omics and TCI data to generate personalized ReGEN protocols, predicting optimal pillar combinations based on individual coherence fingerprints.

Phase 3: Longitudinal Impact and Implementation (Years 3-5)

7. Prospective prevention cohorts: Establish decade-long studies examining whether ReGEN-based interventions reduce incidence of Alzheimer's disease, major depression, and autoimmune conditions in high-risk populations, assessing both clinical and economic outcomes.

8. Implementation research: Partner with healthcare systems and organizations to integrate ReGEN principles into standard care and wellness programs, studying real-world effectiveness, scalability, and implementation barriers across diverse settings.

A Realistic Transition Pathway from Reductionist Healthcare to ReGEN-Aligned Practice:

A central practical question is how an integrative framework of this kind moves from concept into routine clinical practice. Without a credible answer, any such synthesis remains aspirational. The four-stage pathway below deliberately leans on existing institutional precedent.

Stage 1: co-location within existing integrative-medicine infrastructure. Academic integrative-medicine centres already operate as functional bridgeheads—the Osher Center networks at Harvard, UCSF, and Northwestern; the Cleveland Clinic Center for Integrative and Lifestyle Medicine; the Mayo Clinic Integrative Medicine and Health programme; the Andrew Weil Center for Integrative Medicine; and the Consortium of Academic Health Centers for Integrative Medicine [95]. Each of the Foundational Triad pillars already has a foothold in mainstream care: photobiomodulation in dermatology and pain clinics, coherent breathing in cardiac rehabilitation and behavioural medicine, mindfulness-based interventions in pain, oncology, and primary care [92, 96]. The triad can therefore be embedded as a structured protocol with no new institutional infrastructure.

Stage 2: adoption within the Lifestyle Medicine and Functional Medicine movements. The American College of Lifestyle Medicine's six pillars [97] overlap directly with four ReGEN pillars—Food, Breath, Intention, and the connection element of the noetic dimension. The Institute for Functional Medicine's Matrix Model [98] already accommodates multi-level causation. Presented to these communities, ReGEN is best framed as an extension rather than a replacement.

Stage 3: alignment with value-based payment. The transition from fee-for-service toward value-based reimbursement—through CMS Innovation Center models in the United States, NICE quality standards in the United Kingdom, and Singapore's Healthier SG initiative—creates financial incentive for upstream, coherence-restoring interventions, because they reduce downstream cost. The TCI is precisely the kind of multidimensional outcome metric that value-based contracts require.

Stage 4: clinical-guideline integration through the standard evidence pipeline. Grade A pillars are already candidates for inclusion in disease-specific guidelines; the 2023 ESH/ESC hypertension guidelines [99] recommend slow-paced breathing as adjunctive non-pharmacological therapy. Grade B–C pillars enter guideline-eligible status only after the Phase 1–2 trials proposed in Section 10.3 are completed. This staged, evidence-conditional posture respects the legitimate caution of mainstream medicine while marking out a clear path by which the framework can mature.

A note on the relationship to prior work. The "Neurons to Nations" framework [51,52] is cited in this manuscript specifically as the source of the cross-scale taxonomy (individual → organisation → society) that motivates the present biomedical synthesis, and not as primary empirical support for any of the seven pillars or for the Tripartite Coherence Index. The mechanistic, clinical, and methodological claims rest on the independent literatures cited throughout: photobiology and mitochondrial medicine [87,88]; respiratory psychophysiology and polyvagal theory [7,89,91]; contemplative neuroscience [6,93]; systems biology [53,54]; and integrative and lifestyle medicine [95,97].

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Toward a New Epistemology of Healthcare

The ReGEN framework proposes an alternative epistemology: health as dynamic coherence across integrated domains. This view recognizes humans as multi-scale complex adaptive systems where consciousness, psychology, and biology form an inseparable whole. Health emerges not from isolated optimal components but from their coherent integration—the symphony rather than individual instruments. This epistemological shift resonates with what Noble (2025) characterises as the necessary "Einsteinian step" in biology — moving from reductionist genetics to relational systems thinking. Just as Einstein revealed that space and time were not absolute but relative to the observer's frame of reference, Noble shows that biological causation is not unidirectional but relative to the level of organisation under consideration. The ReGEN framework operationalises this insight: rather than privileging pharmaceutical intervention at the molecular level, it cultivates coherence across levels, recognising that health emerges from the dynamic interplay of biological, psychological, and noetic processes. As Noble observes, reductionist science has "deprived us of meaning"; the ReGEN framework restores meaning as a legitimate — indeed essential — dimension of health and healing.

Convergence Across Wisdom Traditions: A Complementary Perspective Note: The cross-cultural correspondences presented in this section are contextual and philosophical rather than empirical. They illuminate the deep historical resonance of the ReGEN framework's tripartite structure. The scientific claims in this paper rest on the independent peer-reviewed literatures cited throughout. A Trans-Historical and Trans-Cultural Context and non-western inclusive evidence for the ReGEN Framework.

The principles underlying the ReGEN Framework are integrative (and unbiased) to include and represent a modern scientific operationalization of healing principles independently discovered across millennia and cultures. This trans-historical consensus provides a powerful, external validation of the framework's core premise: that health is a state of multi-dimensional coherence. The table below illustrates this convergent understanding, positioning the ReGEN Framework as a bridge between ancient wisdom and modern science.

Table 3: The Universal Language of Coherence Across Traditions

ReGEN Framework Element	Traditional Chinese Medicine (TCM)	Ayurvedic Medicine	Christian Theology & Supernatural Healings	Contemporary Neuroscience	Contemporary Systems Biology (Noble)
Tripartite Model	Jing (精 essence/ vitality), Qi (氣 energy/ life force), Shen (神 spirit/ consciousness)	Annamaya (physical), Manomaya (mental), Vijnanamaya (wisdom), Anandamaya (bliss) Koshas	Body, Soul (Psyche), Spirit (Pneuma) - 1 Thessalonians 5:23	Somatic-Visceral, Affective-Cognitive, Metacognitive-Transcendent networks	Multi-level organisation with distributed agency across molecular, cellular, organ, organism, and conscious levels; no privileged causal level
Biological Coherence (Soma)	Strong Jing foundation; Balanced Qi flowing through meridians; Harmonious Zang-Fu organ systems	Balanced Doshas (Vata/Pitta/Kapha) in physical body; Healthy Agni (digestive fire); Ojas (vital essence)	Body as Temple of Holy Spirit (1 Corinthians 6:19); Physical healing miracles demonstrating divine restoration (Mark 5:25-34)	Homeostatic regulation; Autonomic balance; Healthy HRV; Low systemic inflammation	Cellular-genomic reciprocity; genome as "passive database" queried by cellular context; bidirectional causation
Psychological Coherence (Psyche)	Harmonious Shen enabling clarity and equanimity; Free-flowing Qi and Blood supporting emotional balance	Sattvic state of mind (purity, clarity, peace); Balanced Manomaya Kosha enabling mental tranquility	Peace "which surpasses understanding" (Philippians 4:7); Renewal of mind (Romans 12:2); Freedom from torment	Prefrontal-amygdala regulation; DMN flexibility; High emotional intelligence; Cognitive coherence	Psychophysiological states as causal influences on lower organisational levels; downward causation validated
Noetic Coherence (Nous)	Connection with Dao (The Way); Shen Ming (Spiritual Illumination); Wu Wei (effortless action)	Realization of Atman (True Self); Unity consciousness with Brahman; Samadhi states	Union with God (Theosis); Illumination by Uncreated Light; Fruit of the Spirit manifestation	Self-transcendence; Meaning/purpose activation; Reduced self-referential processing; Expanded awareness	Consciousness as causally efficacious participant in biological organisation; meaning restored as essential dimension

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Light Pillar	Yang Qi - warming, illuminating energy essential for vitality	Tejas (metabolic radiance); Agni (transformative fire element)	God as Uncreated Light (1 John 1:5); Taboric Light of Transfiguration	Photobiomodulation; Circadian entrainment; Mitochondrial optimization	Photon-mitochondrial interactions within multi-level systems framework; light as environmental signal interpreted by cellular context
Intention Pillar	Yi (意) - focused mind that directs and guides Qi flow	Sankalpa (sacred resolve); Dhyana (focused meditation)	Faith activating divine power (Matthew 9:22); Prayer of the Heart	Goal-directed neuroplasticity; Top-down cortical modulation; Predictive coding	Top-down causation from conscious intention to genomic expression; cell controls genome based on intentional context
Breath Pillar	Tiao Xi (息) - Regulation of breath harmonizing Qi	Pranayama (control of vital life force/ energy)	Hesychast "Jesus Prayer" synchronized with breath; *Ruach* (Spirit/Breath of God)	Respiratory sinus arrhythmia; Vagal tone; Heart-brain coherence	Volitional behaviour propagating through physiological, cellular, and genomic levels; instantiation of downward causation
Ultimate Goal	Becoming Zhen Ren (True Person) in harmony with Heaven and Earth	Moksha (Liberation); Balance of energies; Enlightenment	Theosis (Divinification/ union with God); Fullness of Life (John 10:10)	Integrated consciousness; Optimal biopsychosocial functioning; Human flourishing	Biological relativity realised; “dancing to the tune of life”; coherence across all organisational levels

Important finding: This cross-cultural convergence suggests the ReGEN pillars may represent central principles of human organization and healing that transcend individual traditions, pointing toward universal patterns in the architecture of human consciousness and well-being. The framework provides a scientific lexicon and mechanistic basis for practices long known to support human flourishing, thereby uniting empirical evidence with enduring human intuition about the nature of health for systemic healing.

The Convergent Model of Systemic Healing

Despite vastly different cosmologies and terminologies, these systems converge on a unified model of healing for Human Coherence and Well-being, which the ReGEN Framework operationalizes. This model can be visualized as a process of Ascending Integration:

[Transcendent Source / God / Tao / Brahman]
↓
(Flow of Coherent Information & Energy)
↓
[Noetic Coherence] ←→ [Psychological Coherence] ←→ [Biological Coherence]
(Purpose, Meaning) <-> (Mind, Emotions, Will) <-> (Body, Cells, Physiology)

With the emergence of health and well-being technologies, and through our unified assessment, the ReGEN framework represents more than a collection of technologies on this review - it constitutes a basic epistemological shift in how we understand health. The dominant Western medical paradigm, rooted in Cartesian dualism and mechanistic reductionism, treats the body as a machine requiring repair of broken parts. This paradigm has achieved remarkable success in acute intervention but shows primary limitations in addressing chronic complex diseases and optimizing human flourishing. This shift has profound implications. It suggests that questions of meaning, purpose, and connection are not separate from biology but woven into its fabric. It implies that interventions targeting isolated biomarkers while ignoring systemic coherence may produce temporary symptom relief without genuine healing. It indicates that the future of medicine lies not merely in more precise molecular interventions but in wiser understanding of the coherent, conscious orchestra of life itself.

The Language of Healing: Where Scientific Rigour Meets Sacred Wisdom Note: The following section explores philosophical and theological resonances of the ReGEN framework. These parallels are presented as complementary cultural context and do not constitute empirical evidence for the framework's scientific claims. The convergence documented in Table 3 reveals something profound: the vocabulary of rigorous science increasingly resonates with humanity's deepest spiritual intuitions. Consider the remarkable parallels between the ReGEN Framework's core elements and concepts that span both laboratory and sanctuary:

Light operates simultaneously as photobiomodulation—the scientifically validated interaction of photons with cytochrome c oxidase driving cellular regeneration—and as the universal spiritual metaphor for divine presence, truth, and awakening. When the ReGEN Framework places Light as the foundational pillar, it speaks a language understood by both the biophysicist and the theologian. Breath functions as respiratory physiology—the 0.1 Hz coherent breathing that synchronises

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baroreceptor reflexes and optimises heart rate variability—while simultaneously echoing the Hebrew ruach and Greek pneuma, words that signify both breath and spirit. The breath of life that animates biological systems cannot be separated from the Breath that ancient traditions recognised as the source of consciousness itself. Wholeness represents systems coherence in scientific terms—the integrated functioning across biological, psychological, and noetic domains—yet shares its etymological root with holiness and healing. The ReGEN Framework's pursuit of tripartite coherence is, at its deepest level, a pursuit of the shalom that wisdom traditions have always recognised as humanity's natural state. Meaning and Purpose constitute measurable noetic coherence with demonstrable physiological correlates, yet they open toward what Noble (2025) acknowledges reductionism has 'deprived us of'—the transcendent dimension that gives human existence its ultimate significance. Restoration describes regenerative biological processes at the cellular and systems level, while simultaneously carrying the theological weight of redemption—the return to an original design, the recovery of what was lost. This is not syncretism but recognition: the ReGEN Framework, grounded in biological relativity and validated through rigorous methodology, arrives at a vision of human flourishing that resonates with what diverse traditions have always known. The 3Rs-T pathway—Restore, Resilient, Regenerate, and Transcend—captures both the neuroplastic mechanisms of transformation and the spiritual journey toward wholeness that coaching, psychology, and theology have long described. Perhaps this convergence should not surprise us. If coherence truly represents the natural state of human systems—as the evidence presented in this review suggests—then both scientific investigation and spiritual discernment would be expected to discover the same fundamental truths, approached from different directions yet arriving at a unified vision of human flourishing.

Implications for Psychotherapy Practice: Regenerative Psychotherapy as a Coherence-Based Clinical Framework

The title of this paper positions the ReGEN framework explicitly as a Regenerative Psychotherapy framework — a designation that warrants direct clinical grounding. This subsection maps the framework's core constructs onto established psychotherapy domains, demonstrating that Regenerative Psychotherapy is not a theoretical abstraction but a clinically actionable orientation.

Trauma Recovery

The 3Rs-T pathway provides a structured neurobiological model for trauma treatment that complements and extends established approaches such as EMDR, somatic experiencing, and trauma-focused CBT. Trauma, in the ReGEN framework, is conceptualised as a state of tripartite incoherence: biological dysregulation (disrupted HRV, chronic inflammation, HPA axis hyperactivation [5]), psychological fragmentation (impaired prefrontal-amygdala regulation, traumatic memory intrusion [19]), and noetic disruption (loss of meaning, identity disorganisation, shattered assumptive world [80]). The Restoration stage of the 3Rs-T pathway provides a structured entry point: coherent breathing (Grade A) re-establishes autonomic safety, creating the physiological precondition for memory processing and narrative integration that deeper trauma work requires.

Emotional Regulation

The Breath pillar offers the most directly applicable psychotherapy intervention: coherent breathing at 0.1 Hz demonstrably enhances prefrontal-amygdala connectivity [41, 42], reduces amygdala hyperreactivity, and strengthens the capacity for affect tolerance. Clinicians can integrate this as a session-opening protocol, a between-session daily practice, and a dysregulation-response tool. The TCI's Psychological domain metrics — particularly HRV and alpha-asymmetry — provide objective tracking of emotional regulation progress across therapy.

Resilience Building

The Resilience stage of the 3Rs-T pathway corresponds directly to the therapeutic goal of building psychological flexibility and adaptive capacity. Neuroplasticity research demonstrates that focused intention practices reshape prefrontal networks [44, 45], and that consistent coherence practices generate lasting trait changes rather than merely state effects [43]. The Resilience Challenge Protocol (Section 9.3) provides a clinical assessment tool for evaluating genuine adaptive capacity rather than symptom suppression.

Therapeutic Alliance

The noetic domain of the ReGEN framework offers a scientifically grounded account of the relational dimensions of healing. Heart-brain coherence research shows that the quality of presence — characterised by appreciation, attunement, and compassionate intention — generates measurable HRV coherence patterns in both therapist and client [46, 78]. Regenerative Psychotherapy thus frames therapeutic alliance not merely as a relational variable but as a coherence-generating field, where the therapist's own coherence state directly influences the therapeutic environment.

Meaning Reconstruction and Post-Traumatic Growth

The Noetic domain, operationalised through validated instruments (PIL [72], FACIT-Sp [74], MiLQ [73]), provides psychotherapy with a rigorous framework for tracking the meaning-reconstruction that characterises post-traumatic growth. The Regeneration and Transcendence stages of the

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3Rs-T pathway align with the recognised trajectory of post-traumatic growth: from survival and stabilisation through integration of experience toward renewed purpose and self-transcendence. Frankl's logotherapy [80] and the existential psychotherapy tradition find mechanistic grounding in the framework's noetic coherence model, with the TCI offering quantitative markers of therapeutic progress at the meaning level.

Positioning within the Psychotherapy Landscape

Regenerative Psychotherapy does not replace existing evidence-based therapies. It provides a unifying theoretical framework within which diverse approaches — CBT, ACT, somatic therapies, psychodynamic work, meaning-centred therapy — can be understood as targeting different aspects of the tripartite coherence system. The framework's contribution is to make the multilevel targets of psychotherapy explicit, measurable, and systematically addressable, creating a clinically actionable roadmap from initial assessment (TCI) through staged intervention (3Rs-T) to outcome evaluation (Resilience Challenge Protocol).

Conclusion

The escalating burden of chronic disease and mental health challenges reflects not merely aging demographics or genetic susceptibility but a underlying mismatch between modern lifestyles and human biological design. We have created environments that systematically disrupt coherence. The ReGEN Framework represents more than a new set of interventions; it constitutes a foundational shift in our epistemology of health, from a Cartesian, reductionist model of the body as a machine to a complete, information-centric view of the human being as a dynamic, self-organizing complex system existing across multiple interconnected domains. By proposing that coherence is the core state of health and that it is measurable, targetable, and restorable through the cooperative application of the Foundational Triad (Light, Breath, Intention) supported by the complete ReGEN Seven Pillars, we provide a scientific language for what ancient healing traditions have known for millennia: that true health represents harmony across all dimensions of our being. The path forward demands a transdisciplinary collaboration across historically siloed disciplines: quantum physicists must work with meditation researchers; neuroscientists with experts in traditional medicine; and engineers with consciousness scholars. The proposed research agenda provides a concrete roadmap for this integration. The ultimate implication of the ReGEN Framework is the reconciliation of science and the humanities. It asserts that questions of meaning, purpose, and connection are not separate from biology but are inextricably woven into its fabric, accessible to rigorous inquiry through advanced measurement and theoretical innovation. This reconciliation finds powerful support in Noble's (2025) observation that reductionist biology has "deprived us of meaning" by treating consciousness as epiphenomenal and purpose as illusory. The ReGEN Framework restores meaning as an core dimension of health—not as metaphysical speculation but as measurable noetic coherence with demonstrable physiological correlates. Noble's characterisation of the genome as a "passive database" that the cell actively queries based on its contextual needs provides the mechanistic foundation for understanding how practices cultivating psychological and noetic coherence can propagate healing effects to the cellular and molecular levels. *The framework thus operationalises what Noble calls the necessary "Einsteinian step" in biology: recognising that just as space and time are relative to the observer's frame of reference, biological causation is relative to the organisational level from which it is observed—with no privileged level of explanation.* By embracing this complexity, we can move beyond a healthcare system that merely fights disease to one that actively cultivates human flourishing, resilience, and the full expression of our neuroplastic intelligence. The future of medicine lies not just in smarter drugs, but in a wiser understanding of the coherent, conscious symphony of life itself—where we reclaim not only the human body's innate capacity to heal, but the intelligence to reimagine life more abundantly, transforming both individual lives and our collective future. This convergence suggests we are not inventing a new paradigm but rediscovering, through empirical means, a unified architecture of health that has been intuitively understood for millennia. The framework thus provides a scientific lexicon for practices long known to support human flourishing, uniting empirical evidence with enduring intuition about the nature of healing. In conclusion, the ReGEN Framework establishes a measurable, science-backed pathway to tripartite coherence. This work provides the foundational evidence that bridges our theoretical models of systemic consciousness [51,52] with their practical application in leadership and personal transformation [50], while also pointing toward the biomolecular underpinnings of the regenerative economies we have explored elsewhere [50]. The future of medicine lies not just in smarter interventions, but in a wiser understanding of this coherent symphony—a synthesis this review makes tangible and actionable.

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Table 4: The Language of Healing—Where Scientific Rigour Meets Sacred Wisdom.

ReGEN Element	Scientific Meaning	Sacred Meaning
Light	Photobiomodulation; photon-cytochrome c oxidase interaction driving cellular ATP production and regeneration	Divine presence, truth, and awakening; "I am the Light of the world" (John 8:12)
Breath	Respiratory physiology; 0.1 Hz coherent breathing synchronising baroreceptor reflexes and heart rate variability	Ruach (Hebrew) / Pneuma (Greek)—words signifying both breath and spirit; the Breath of Life (Genesis 2:7)
Wholeness	Systems coherence; integrated functioning across biological, psychological, and noetic domains	Shalom—peace, completeness, welfare; shares etymological root with holiness and healing
Meaning & Purpose	Noetic coherence; measurable psychological states with demonstrable physiological correlates	Transcendence; divine purpose; what reductionism "deprived us of" (Noble, 2025)
Restoration	Regenerative processes; cellular repair, neuroplasticity, systems rebalancing	Redemption; return to original design; recovery of what was lost
3Rs-T Pathway	Neuroplastic transformation: Reframe (cognitive), Rewire (neural), Regenerate (cellular), Transcend (noetic)	Spiritual transformation journey toward wholeness recognised across coaching, psychology, and theology

recognize the wisdom keepers, custodians of traditional and cultural heritage knowledge, and community elders whose insights fundamentally informed our comprehension of regenerative principles.

Author Contributions

Dr. Rachel Ooi Wei Gee (DSc, APsyD, ThD, DBA, ICF-MCC) is the sole author and is solely responsible for the conceptualization, methodology, investigation, writing, and visualization presented in this review.

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