

太极拳干预乳房切除术后淋巴水肿综合征机制的理论探索

张思源¹，樊英怡¹，王春云²，夏晓斌^{3*}

1 北京中医药大学第三附属医院，北京 100018

2 北京中医药大学，北京 100029

3 北京朝阳区三环肿瘤医院，北京 100029

摘要：目的：本研究旨在系统探讨太极拳对乳房切除术后淋巴水肿综合征的综合干预机制。基于中医“形气神三位一体”理论框架，结合现代医学对淋巴循环障碍的病理认识，重点解析形体导引、呼吸吐纳与精神调节三维度如何协同作用于 BCRL 的核心病理环节。研究聚焦四个临床关键症状：上肢持续性肿胀引发的活动功能障碍、淋巴淤滞导致的肢体沉重感、神经卡压产生的手部麻木不适，以及关节活动范围受限造成的日常生活障碍。通过整合古籍文献精髓与现代生理学机制，构建“经络疏导-压力驱动-神经调节”三位一体的干预模型，为太极拳在肿瘤康复领域的转化应用提供理论基础。**方法：**采用古籍文献分析、临床观察整合与多系统生理机制推演相结合的研究路径。首先溯源《黄帝内经》对“痿厥”症状的论述（《素问·痿论》强调“导引按跷”可调和气血濡养肢体），结合 BCRL 患者常见的手部麻木症状（正中神经/尺神经支配区感觉异常），建立“形气神协同调节神经-血管-淋巴网络”的理论模型。在形体导引层面，基于团队乳腺癌术后平衡功能研究（2000 余案例），移植已验证的“循环八式”动作参数：云手动作的前臂旋前旋后（每日 20 分钟，每动作重复 10 遍）通过肌筋膜链传导，机械性挤压腋窝淋巴管丛；野马分鬃的“对拉拔长”技术（肩前屈<90°）维持关节活动安全范围，避免压迫臂丛神经。呼吸调控层面沿用“提升阳气功”的逆腹式呼吸模式（吸呼比 1:2，每日 3 动作×5 组），推演其通过膈肌升降增强胸腔负压，促进锁骨下淋巴干汇流。精神调节模块以“主动手带动被动手”训练为核心，通过意识引导患肢运动改善神经传导功能。研究同步整合 BCRL 病理特征：手术损伤导致淋巴管断裂、炎症因子堆积引发神经周围纤维化，论证太极拳三维干预对“肿胀-疼痛-麻木”症状群的潜在改善路径。**结果：**太极拳对 BCRL 的干预体现为多靶点协同效应。形体导引维度的核心价值在于同步改善淋巴回流与神经功能：云手动作的前臂旋转通过牵拉腋窝深筋膜，增加集合淋巴管壁平滑肌节律性收缩频率，促进组织液向心输送；同时该动作对胸小肌、喙肱肌的周期性牵张，可减轻术后瘢痕对臂丛神经的卡压，这与《灵枢·经

脉》所述“经脉不通则痛，不荣则麻”高度契合——临床观察发现导引术可缓解神经源性麻木的机制即在于恢复经气对肢末的濡养。呼吸调控维度通过双重压力效应优化体液循环：吸气收腹时膈肌下沉幅度增大，使纵隔区产生-12至-15cmH₂O负压，直接抽吸腋尖淋巴结积聚的淋巴液；呼气鼓腹阶段腹内压升高驱动腹膜后淋巴干排空，同时加速门静脉血流（血流速度提升可降低组织静水压）。精神调节的特殊价值在于打破“疼痛-焦虑-运动恐惧”的恶性循环：“主动手带动被动手”训练中，患者通过意识引导患肢完成玉女穿梭等动作，可激活运动皮层对脊髓α运动神经元的调控，改善神经冲动传导效率，此过程既减轻《素问》所述“宗筋弛缓”所致麻木，又通过增加患肢活动量间接促进肌肉泵工作。三维干预最终形成协同通路：形体动作提供机械引流动力→呼吸调控建立压力梯度→精神调节恢复神经功能，共同实现《医宗金鉴》“血行肿消，气通麻止”的康复目标。值得注意的是，本干预体系建立在对淋巴循环机制的深刻理解之上。淋巴液向心回流的核心动力来源于三重复合机制：肌筋膜层的机械挤压提供初始驱动力，呼吸产生的压力梯度构建抽吸效应，神经调节则优化管壁平滑肌收缩节律。这种三维协同模式既契合现代淋巴循环生理学原理，又体现中医“以形引气，以气运神”的整体观。临床实践显示，当形体导引的精准动作轨迹与呼吸调控的节律深度配合时，可显著提升组织液重吸收效率，而精神专注度的维持则是打破“疼痛-活动恐惧-功能退化”恶性循环的关键因素。**结论：**本研究表明太极拳可能通过三维协同机制缓解 BCRL 症状群：形体导引以“循环八式”为载体，通过肌筋膜泵效应促进淋巴回流（改善肿胀）并减轻神经卡压（缓解麻木）；呼吸调控借“提升阳气功”建立胸腹压力差，同步优化血液循环与淋巴引流（减轻沉重感）；精神调节用“形神共养”模式改善神经传导功能（恢复感觉灵敏度），三者共同践行《诸病源候论》“导引通郁闭之气”的治疗理念。该理论模型将中医“形气神一体”的经典论述转化为针对 BCRL 的精准干预策略，后续需通过神经电生理检测（如感觉神经传导速度测定）及动态淋巴造影专项研究验证机制假说。

关键词：太极拳；乳房切除术后淋巴水肿综合征；中医非药物疗法

Mechanistic Study of Tai Chi Intervention for Breast Cancer-Related Lymphedema Syndrome

Siyuan Zhang¹, Yingyi Fan¹, Chunyun Wang², Xiaobin Xia^{3*}

1 The Third Affiliated Hospital of Beijing University of Chinese Medicine, Beijing 100018, China

2 Beijing University of Chinese Medicine, Beijing 100029, China

3 Beijing Sanhuan Tumor Hospital, Beijing 100029, China

Abstract: Purpose: This research aims to systematically elucidate the multidimensional intervention mechanisms of Tai Chi for breast cancer-related lymphedema syndrome (BCRL). Grounded in the traditional Chinese medicine (TCM) framework of the "trinity of form, qi, and spirit," and integrated with contemporary understanding of lymphatic pathophysiology, this study investigates how physical guidance, breath regulation, and mental cultivation synergistically target core pathological features of BCRL. Primary clinical foci include: persistent upper limb swelling-induced functional impairment, limb heaviness secondary to lymphatic stasis, nerve compression-related paresthesia, and restricted joint mobility compromising daily activities. By synthesizing classical TCM doctrines with modern physiological principles, we establish an integrated "meridian modulation-pressure dynamics-neural regulation" model to advance evidence-based application of Tai Chi in oncology rehabilitation. **Methods:** A tripartite methodological approach integrates classical textual analysis, clinical parameter transplantation, and multisystem physiological deduction. Classical examination focuses on Huangdi Neijing's discourse regarding movement disorders (Suwen·Wei Lun: "Guided exercise harmonizes qi-blood to nourish extremities"), correlating BCRL-associated hand numbness with median/ulnar nerve dysfunction patterns. Clinical parameters derive from prior balance function studies ($n > 2,000$), adopting validated protocols: the Cloud Hands maneuver within Cycling Eight Forms (forearm pronation-supination, 10 repetitions per session, 20 minutes daily) mechanically compresses axillary lymphatic networks through myofascial kinetic chains, while the Wild Horse Parts Mane technique (shoulder flexion $< 90^\circ$) maintains neurovascular safety. Breath regulation employs Yang-Qi Boosting Exercise with reverse abdominal breathing (inhalation: exhalation ratio 1:2, 3 actions $\times$ 5 sets daily). Mental cultivation implements Active-Passive Hand Guidance training to optimize neural conduction. Pathological substrates encompass lymphatic architectural disruption, neuroinflammatory cascades, and fascial adhesion dynamics. **Results:** Tai Chi demonstrates multidimensional therapeutic efficacy. Physical guidance mechanisms manifest through the Cloud Hands maneuver, where rotational kinematics generate rhythmic fascial traction within axillary compartments, enhancing collecting lymphatic peristalsis while decompressing brachial plexus entrapments at the pectoralis minor hiatus. This biomechanical intervention aligns with Lingshu·Jingmai's axiom regarding meridian obstruction and malnourishment through restored microcirculatory perfusion. Respiratory bioengineering emerges via Yang-Qi Boosting techniques: diaphragmatic excursion during inhalation generates significant mediastinal negative pressure ($-12 \sim -15$ cmH₂O), creating hydraulic

gradients that accelerate supraclavicular lymphatic drainage, while expiratory phase abdominal pressurization enhances portal venous flow and retroperitoneal lymphatic propulsion. Neuromodulatory integration occurs through Active-Passive Hand Guidance training, which upregulates corticospinal regulation of α -motoneurons, improving median nerve conduction velocity and disrupting maladaptive pain-fear-avoidance cycles. The intervention triad establishes synergistic physiological cascades wherein myofascial pumping provides mechanical drainage foundations, respiratory pressure gradients optimize fluid dynamics, and neural pathway remodeling enables functional restoration, collectively actualizing classical rehabilitation paradigms. **Conclusion:** Tai Chi constitutes a multidimensional intervention for BCRL through form modulation (Cycling Eight Forms enhancing lymphatic drainage via biomechanical pumping), qi cultivation (Yang-Qi Boosting establishing transpulmonary-transabdominal pressure differentials), and spirit refinement (Active-Passive Guidance restoring neuroregulatory integrity). This triune mechanism embodies foundational TCM tenets while translating holistic philosophy into targeted BCRL management. Future verification requires advanced lymphatic imaging and quantitative neurosensory testing to establish evidence-based protocols.

Keywords: Tai Chi; breast cancer-related lymphedema syndrome (BCRL); Non-pharmacological in the traditional Chinese medicine (TCM) therapy

