

Peres, M. A., Macpherson, L. M. D., Weyant, R. J., Daly, B., Venturelli, R., Mathur, M. R., Listl, S., Celeste, R. K., Guarnizo-Herreño, C. C., Kearns, C., Benzian, H., Allison, P., & Watt, R. G. (2019). Oral diseases: A global public health challenge. *Lancet (London, England)*, *394*(10194), 249–260. [https://doi.org/10.1016/S0140-6736\(19\)31146-8](https://doi.org/10.1016/S0140-6736(19)31146-8)

Peres, M. A., Peres, K. G., Boing, A. F., Bastos, J. L., Silva, D. A., & González-Chica, D. A. (2014). Saúde bucal no EpiFloripa: Estudo prospectivo das condições de saúde de adultos de Florianópolis, Sul do Brasil. *Revista Brasileira de Epidemiologia*, *17*(2), 571–575. <https://doi.org/10.1590/1809-4503201400020021>

Pihlstrom, B. L., Michalowicz, B. S., & Johnson, N. W. (2005). Periodontal diseases. *Lancet (London, England)*, *366*(9499), 1809–1820. [https://doi.org/10.1016/S0140-6736\(05\)67728-8](https://doi.org/10.1016/S0140-6736(05)67728-8)

Rehm, J., Samokhvalov, A. V., Neuman, M. G., Room, R., Parry, C., Lönnroth, K., ... & Popova, S. (2009). The association between alcohol use, alcohol use disorders and tuberculosis (TB). A systematic review. *BMC public health*, *9*, 1-12.

Rossetti, M. B., Britto, R. R., & Norton, R. D. C. (2009). Prevenção primária de doenças cardiovasculares na obesidade infantojuvenil: efeito anti-inflamatório do exercício físico. *Revista Brasileira de Medicina do Esporte*, *15*, 472-475.

Sanchez, G. A., Miozza, V. A., Delgado, A., & Busch, L. (2013). Relationship between salivary leukotriene B 4 levels and salivary mucin or alveolar bone resorption, in subjects with periodontal health and disease. *Journal of periodontal research*, *48*(6), 810-814.

Van Dyke, T. E., & Serhan, C. N. (2003). Resolution of inflammation: A new paradigm for the pathogenesis of periodontal diseases. *Journal of Dental Research*, *82*(2), 82–90. <https://doi.org/10.1177/154405910308200202>.

AURICULAR ACUPUNCTURE AS A COMPLEMENTARY THERAPY ON  
QUALITY OF LIFE AND ADVERSE CLINICAL EFFECTS MANIFESTED  
BY PATIENTS ON HEMODIALYSIS: A NARRATIVE REVIEW

DOI: 10.56041/9786599841835-2

**PUHLE, Josiano G.**

Universidade Comunitária da Região de Chapecó (Unochapecó)  
Chapecó - Santa Catarina

<https://orcid.org/0000-0003-1607-6571>

**HOFFMANN, Alessandra Y.**

Universidade Federal da Fronteira Sul (UFFS)  
Chapecó - Santa Catarina

<https://orcid.org/0000-0002-1875-4324>

**WEBER, Pâmela L.**

Universidade Federal da Fronteira Sul (UFFS)  
Chapecó - Santa Catarina

<https://orcid.org/0000-0002-0215-7728>

**SILVA, Keroli E. T.**

Universidade Federal da Fronteira Sul (UFFS)  
Chapecó - Santa Catarina

<https://orcid.org/0000-0001-5737-057X>

**DALAGNOL, Angela M. K.**

Universidade Federal da Fronteira Sul (UFFS)  
Chapecó - Santa Catarina

<https://orcid.org/0000-0002-3779-0419>

**CORRALO, Vanessa S.**

Universidade Comunitária da Região de Chapecó (Unochapecó)  
Chapecó - Santa Catarina

<https://orcid.org/0000-0003-4234-4875>

**RESENDE, Débora T. S.**

Universidade Federal da Fronteira Sul (UFFS)  
Chapecó - Santa Catarina

<https://orcid.org/0000-0002-3813-7139>

\* Corresponding Author: [puhlejosianoguilherme@gmail.com](mailto:puhlejosianoguilherme@gmail.com)

## **ABSTRACT**

Auricular acupuncture is a technique of Traditional Chinese Medicine, widely used as an auxiliary treatment in several diseases, aiming at the improvement of symptoms and clinical condition, being applied as a complementary alternative to drug treatment. The present study is an investigation of the results of research on the effects of auricular acupuncture on chronic kidney disease, considering hemodialysis treatment. Considered a global health problem due to the high number of incidence and deaths, chronic kidney disease has hemodialysis as a treatment method, which aims to supply compromised kidney function in more advanced stages of the disease. During and after hemodialysis sessions, patients commonly experience adverse symptoms, such as pain, headache, cramps, and hypotension/hypertension, which are associated with treatment conditions and which generally affect their perception of quality of life. Regarding the use of auricular acupuncture as a complementary non-pharmacological treatment tool for the control and reduction of adverse hemodialysis symptoms, good and promising results can be expected, considering the modulation of markers involved in inflammatory processes.

**Keywords:** Acupuncture Ear. Chronic Kidney Failure. Signs and Symptoms.

## **1. INTRODUCTION**

Chronic kidney disease is characterized by a slow and progressive decrease in the kidneys' ability to filter metabolic wastes from the blood, and which in some cases can occur acutely acute manner. The occurrence of the disease is observed in a variable period, determined by associated and associated and triggering conditions such as hypertension, diabetes mellitus and glomerulopathies (Drawz; Rahman, 2015).

According to the Ministry of Health (Brasil, 2014), in its Clinical Guidelines for the care of patients with chronic kidney disease in the Brazilian National Health System, the disease is considered a serious public health public health, because the

incidence and prevalence are increasing considerably and the cost of treatment becomes high, demonstrating the need for preventive actions and treatment.

One of the most effective alternatives for the treatment of renal failure is hemodialysis, which consists of a blood filtration technique performed by a machine capable of retaining toxins and other metabolic components other metabolic components, performing the basic function of the kidneys (Sociedade Brasileira de Nefrologia, 2020). It is analyzed that both the chronic health condition and the dynamics of treatment, are stressful factors that can disrupt the routine and expectations of these patients, causing a considerable impact on their quality of life, which will lead to more difficulties during treatment (Bezerra; Hora; Gil, 2018).

An alternative adopted for the management of patients is auricular acupuncture, showing positive results in clinical improvement and positive results in clinical improvement and treatment of symptoms arising from various diseases and health conditions, such as chronic pain, treatment of diabetes, allergies, and musculoskeletal problems. In view of the physical and psychological impairment of patients who are on hemodialysis, auriculotherapy is used as an auxiliary treatment through the perception of improvement of patients, as well as by its proven immune modulation (Yeh et al., 2014; Hou et al., 2015; Alimi, Chelly, 2018; Melo et al., 2019; Lu, Li, 2020).

In this sense, auricular acupuncture shows itself as a practical and efficient tool for the treatment of patients with chronic kidney disease who are on hemodialysis. Besides having a non-invasive method of use and evaluation, it provides improvement in the perception of quality of life and clinical improvement with regard to adverse symptoms that hemodialysis symptoms that hemodialysis treatment provides, such as blood pressure disorders, headache muscle pain, anxiety, and depression.

## **2. PATHOPHYSIOLOGY OF CKD**

The clinical diagnosis of chronic kidney disease is performed by measuring the Glomerular Filtration Rate (GFR), and GFR values lower than 60 mL/min/1.73 m<sup>2</sup> for three continuous months are sufficient to confirm the disease. Once the diagnosis is

established, the measurement of the severity of the disease is performed through albuminuria, in which if this rate is less than 30mg/g it is considered normal, between 30mg/g and 300mg/g it is moderately high, and above of 300 mg/g is severely elevated (KDIGO, 2013).

As a result of renal decompensation, many patients have a worsening condition, developing chronic renal failure, requiring replacement therapies, namely: kidney transplantation, dialysis and/or hemodialysis<sup>8</sup>. Hemodialysis is defined by the active and external filtration of the blood, removing excess fluids and toxins from the body. It is performed in a hospital environment for 3 to 4 hours, three times a week. It occurs through the introduction of venous accesses in the patient, directing the blood to the hemodialysis machine, which then performs external filtration, removing an average of 1 to up to 4 liters of liquid (Fleming, 2011; KDIGO, 2013; Santos et al., 2018).

### **3. QUALITY OF LIFE AND ADVERSE CLINICAL EFFECTS OF HEMODIALYSIS**

Hemodialysis is configured as an effective and important method, with regard to the maintenance of patients who are in this condition, however, sometimes this type of treatment is also characterized by its debilitating treatment is also characterized by its debilitating potential, because it affects and interferes in various segments of the individual subjected to this practice (Santos et al., 2018). Thus, it is analyzed that both the chronic health condition and the dynamics of treatment of these patients are factors stressors that can disrupt the routine and expectations of these patients, often causing social often causing social problems such as isolation, unemployment, abandonment of leisure activities and physical exercises (Bezerra et al., 2018).

Patients undergoing hemodialysis treatment are subject to some complications and/or interurrences during and even after the hemodialysis session, and these can be serious, if there is no perception and interruption of the event, or of a simpler and less complex nature. Among the main disorders are hypotension, headache and cramps (Sands et al., 2014).

Episodes of cramps usually occur before the onset of arterial hypotension. Its pathophysiology is still not very clear, it ends up being related to the low levels of

carnitine (an amine that facilitates the transport of fatty acids into the mitochondria that are eliminated through the urine) filtered during hemodialysis, which occurs associated with the imbalance between ultrafiltration and vascular filling, with hypotension, low dry weight and the use of a low-sodium dialysis solution as predisposing factors for involvement (Lessa et al., 2018).

The pathophysiology of hypotension in hemodialysis is related to the ultrafiltration rate, the drop in osmolarity and the reduction in intravascular volume, which cause a reduction in cardiac output and, consequently, interfere with peripheral vascular resistance. Factors such as food intake, abundant use of antihypertensive drugs and blood loss at the level of machine connections also predispose to hypotensive conditions (Sands et al., 2014).

Another complication presented by patients during the hemodialysis procedure and reported after the end of therapy is headache, which has a bilateral pulsation in the frontal region, characterized by variable intensity (Kudoh et al., 2013). Most of the time, the condition is accompanied by crises of muscle pain and fatigue, noticeable in different regions of the body, evidencing the high use of analgesic drugs for relief (Marques et al., 2013).

Moreover, pain is also one of the adverse effects of this therapy, being it in various places of the body, where according to the analytical cross-sectional study of Marques et al. (2016), about 40% of hemodialysis patients make use of drugs for pain relief, yet, this same research shows that this condition has repercussions in physical limitations that influence their daily lives.

The quality of life of patients with chronic kidney disease undergoing hemodialysis is significantly lower in comparison to people who are not affected by the disease and/or those who do not undergo any treatment. The physical and psychological domains are compromised and altered, in view of all the adverse clinical conditions and intercurrent events presented by the patients in question and as a result of the conjunctures of this treatment (Jesus et al., 2019).

#### **4. AURICULAR ACUPUNCTURE: PHYSIOLOGY AND IMMUNE MODULATION MECHANISM**

The mechanical stimulation performed during auricular acupuncture enables nerve signaling and consequently remotely affects the function of internal organs according to the corresponding points that have been stimulated. Depending on the stimulation, it is possible to reduce inflammatory processes in individuals who experience an event called a cytokine storm, a mechanism in which a series of immune responses is triggered so that the body rapidly releases a set of inflammatory proteins. For such effects, the treatment time, the points to be stimulated and the intensity of stimulation must be considered (Hou et al., 2015).

The inflammatory process is commonly associated with increased temperature, redness, swelling, pain and loss of function. During auricular acupuncture, vasoactive mediators, cytokines and neuropeptides can be modulated, given the regulation and distribution of blood to organs and tissues affected by inflammation (Abdi et al., 2012).

The peptide linked to the calcitonin gene is a potent vasodilator, with physiological and pathological effects on inflammatory processes. Studies show that techniques such as systemic acupuncture and auricular acupuncture can regulate the release of substance P and neurokinin. Furthermore, anti-inflammatory substances such as interleukin (IL)-10 are produced by such techniques (Abdi et al., 2012; Melo et al., 2019).

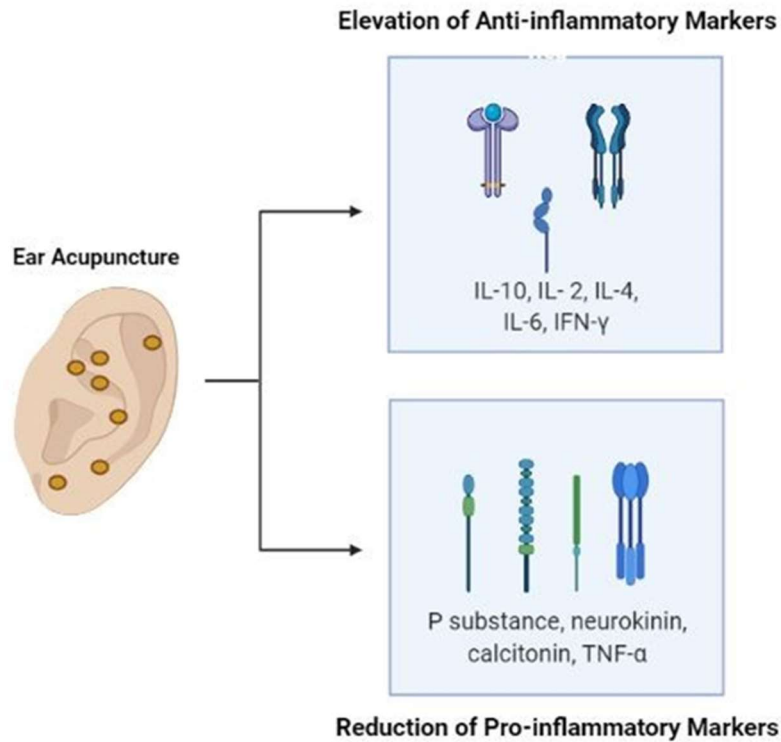
The levels of interferon (IFN) - gamma, IL-2, IL-4 and IL-6 were found to be elevated after the application of auricular acupuncture, while markers such as tumor necrosis factor (TNF) - alpha were reduced. Therefore, there is a balance between pro-inflammatory cytokines and anti-inflammatory cytokines (Zijlstra et al., 2003; Lu, Li, 2015).

## **5. THE EFFECT OF AURICULAR ACUPUNCTURE DURING HEMODIALYSIS TREATMENT**

Considering that patients undergoing hemodialysis have symptoms and adverse clinical effects, which may be related to the imbalance between inflammatory and anti-inflammatory components, triggering a systemic inflammatory condition.

Auricular acupuncture, through its immune modulation, can be a useful tool in the complementary treatment of these patients (Watkins & Maier, 2005; Lin et al., 2015).

**Figure 1.** Immune modulation of auricular acupuncture in adverse hemodialysis symptoms



**Figure 1.** Immune modulation of auricular acupuncture in adverse hemodialysis symptoms. Stimulation of the ear using the auricular acupuncture technique triggers an increase in anti-inflammatory markers concomitantly with a decrease in inflammatory components, acting as a regulator of inflammatory processes linked to the adverse effects of hemodialysis treatment.

Stimulation of the auricle triggers nerve responses that are transmitted via peripheral and cranial nerves to the central nervous system, resulting in the release of neurotransmitters involved in pain mechanisms. This process causes the descending neural pathway to release endorphins in the posterior horn of the spinal cord, constituting an obstacle for the propagation of the painful stimulus through the CNS (Artioli et al., 2019).

In addition, studies in individuals with cramps and pain showed that after the application of auricular acupuncture, there was a reduction in pro-inflammatory



markers (TNF- $\alpha$ ) and, consequently, a reduction in pain, given that cytokines, as disease-inducing agents, present themselves as mediators of immune communication with the nervous system, in order to modulate pain conditions (Watkins & Maier, 2005; Lin et al., 2015).

Another common complication during hemodialysis treatment is instability in blood pressure levels, due to an increase in the concentrations of highly inflammatory substance P and neurokinin. This condition, which can be regulated through auricular acupuncture, in view of the increase in the concentration of IL-10 anti-inflammatory component, together with the concentration of nitric oxide (NO) after the use of the technique, resulting in an increase in arteriolar diameter, the which triggers a positive effect on blood pressure regulation (Loaiza et al., 2002; Zijlstra et al., 2003).

Besides physiological alterations, patients on hemodialysis present alterations in the perception of quality of life, due to all the circumstances and consequences that their health condition provides. Having their quality of life altered, one can see a clinical management with greater difficulties, considering the difficulties, considering the impacts that the decrease in quality of life can cause on the physical and on the physical and mental health of these patients (Bezerra et al., 2018; Santos et al., 2018).

Referring to auricular acupuncture, it is possible to notice a significant improvement in the perception of quality of life by patients on hemodialysis. Improvement in the social, physical and psychological domains is perceptible, physical and psychological domains, denoting that it is an effective treatment when used as an intervention aiming at improving the quality of life and health of patients with chronic kidney disease. This is justified by the fact that the biomolecular modulation provided by auricular acupuncture changes and/or reduces the symptoms that compromise the quality of life of these patients (Wang et al., 2014).

## 6. CONCLUSIONS

It is observed that with the data obtained from the literature so far, it appears that auricular acupuncture can be a useful and effective tool as a supporting treatment in hemodialysis patients. In view of its biomolecular modulation and the regulation of immunological components of the organism, which results in the reduction of conditions and symptoms arising from the treatment, auricular acupuncture, as it is a non-invasive therapy and with significant improvements in the quality of life of patients, it is an alternative to be considered by clinics and hospitals that perform hemodialysis, contributing to an offer of comprehensive care and attention.

Another important point is the suggestion of elaborating clinical trials that evaluate molecular patterns related to adverse hemodialysis symptoms and the effect of auricular acupuncture as a control tool in the alteration of these molecular markers. Furthermore, It is noteworthy that, in the future, the authors intend to study other actions of auricular acupuncture in a supposed improvement of urea and creatinine dosages, glomerular filtration rate, as well as regarding the production of reactive oxygen species and in the inflammation of individuals undergoing hemodialysis, with a view to clinical improvement, quality of life and the production of significant scientific materials.

**STATEMENTS:** The present work has neither financing nor financial incentives for its elaboration and publication. Furthermore, it has no conflict of interest.

## REFERENCES

Abdi, H., Abbasi-Parizad, P., Zhao, B., Ghayour-Mobarhan, M., Tavallaie, S., Rahsepar, A. A., ... & Ferns, G. A. (2012) Effects of Auricular Acupuncture on Anthropometric, Lipid Profile, Inflammatory, and Immunologic Markers: A Randomized Controlled Trial Study. *J Altern Complement Med.* 18(7), 668–677. doi: 10.1089/acm.2011.0244.

Alimi D., & Chelly J.E. (2018) New universal nomenclature in auriculotherapy. *J Altern Complement Med.* 24(1),7-14. doi: 10.1089/acm.2016.0351.

Artioli, D. P., Tavares, A. L. F., & Bertolini, G. R. F. (2019) Auriculotherapy: neurophysiology, points to choose, indications and results on musculoskeletal pain

conditions: a systematic review of reviews. *Braz J Pain.* 2(4). doi: <https://doi.org/10.5935/2595-0118.20190065>

Brasil. Ministério da Saúde (2014). *Diretrizes Clínicas para o Cuidado ao Paciente com Doença Renal Crônica – DRC no Sistema Único de Saúde*. Brasília – DF.

Bezerra, R. M.; Hora, A. C. C. F. & Gil, M. M. (2015). *Hemodiálise e a experiência de mudança de vida*. Associação educativa Unievangélica, 3º congresso internacional de pesquisa, ensino e extensão (CIPEEX).

Drawz, P., & Ragman, M. (2015) Chronic Kidney Disease. *Ann Intern Med.*162(11). doi: 10.7326/AITC201506020.

Fleming, G. M. (2011) *Renal replacement therapy review: past, present and future*. *Organogenesis.* 7(1), 2–12. doi: 10.4161/org.7.1.13997

Hou, P. W., Hsu, H. C., Lin, Y. W., Tang, N. Y., Cheng, C. Y., & Hsieh, C. L. (2015) The history, mechanism, and clinical application of auricular therapy in traditional Chinese medicine. *Evid Based Complement Alternat Med.* doi: 10.1155/2015/495684.

Jesus, N. M., Souza, G. F. D., Mendes-Rodrigues, C., Almeida, O. P. D., Rodrigues, D. D. M., & Cunha, C. M. (2019) Qualidade de vida de indivíduos com doença renal crônica em tratamento dialítico. *Jornal Brasileiro de Nefrologia.* 41(3), 364-374. <https://doi.org/10.1590/2175-8239-JBN-2018-0152>

KDIGO. Kidney Disease: Improving Global Outcomes - CKD Work Group. KDIGO 2012: *Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease*. v.3, n.1, p. 1–150, 2013

Kudoh, Y., Aoyama, S., Torii, T., Chen, Q., Nagahara, D., Sakata, H., & Nozawa, A. (2013) Hemodynamic Stabilizing Effects of L-Carnitine in Chronic Hemodialysis Patients. *Cardiorenal Med.* 3(3), 200–217. <https://doi.org/10.1159/000355016>

Lessa, S. R. D. O., Bezerra, J. N. D. M., Barbosa, S. M. C., Luz, G. O. D. A., & Borba, A. K. D. O. T. (2018) Prevalência e fatores associados para ocorrência de eventos adversos no serviço de hemodiálise. *Texto Contexto Enferm.*, 27(3), 1-11 doi: <https://doi.org/10.1590/0104-07072018003830017>

Lin, W. C., Yeh, C. H., Chien, L. C., Morone, N. E., Glick, R. M., & Albers, K. M. (2015) The Anti-Inflammatory Actions of Auricular Point Acupressure for Chronic Low Back Pain. *Evid Based Complement Alternat Med.* doi: 10.1155/2015/103570.

Loaiza, L.A. (2002) Electro-acupuncture stimulation to muscle afferents in anesthetized rats modulates the blood flow to the knee joint through autonomic reflexes and nitric oxide. *Auton Neurosci.* 97(2). doi: [https://doi.org/10.1016/S1566-0702\(02\)00051-6](https://doi.org/10.1016/S1566-0702(02)00051-6)

Lu Y., Li G. (2020) Auricular acupuncture induces FNDC5/irisin and attenuates obese inflammation in mice. *Acupunct Med.* 38(4), 264-271. doi: 10.1136/acupmed-2017-011405

Marques, V. R., Benetti, P. E., Benetti, E. R. R., Rosanelli, C. L. S. P., de Fátima Colet, C., & Stumm, E. M. F (2016) Pain intensity assessment in chronic renal patients on hemodialysis. *Rev Dor.* 17(2). doi: 10.5935/1806-0013.20160023

Melo, G. A. A., Aguiar, L. L., Silva, R. A., Pereira, F. G. F., Silva, F. L. B. D., & Caetano, J. Á. (2020) Efeitos da acupuntura em pacientes com insuficiência renal crônica: revisão sistemática. *Revista Brasileira de Enfermagem.* 73(4), 1-9. doi: <https://doi.org/10.1590/0034-7167-2018-0784>

Melo, R. N. R., Francisco, S. C., Moura, C. D. C., Loudon, K., Sawada, N. O., Chaves, É. D. C. L., ... & Garcia, A. C. M. (2019) Auriculotherapy to control chemotherapy-induced nausea and vomiting in patients with cancer: protocol of a systematic review. *Syst Rev.* 8(206). doi: 10.1186/s13643-019-1124-3

Sands, J. J., Usvyat, L. A., Sullivan, T., Segal, J. H., Zabetakis, P., Kotanko, P., ... & Diaz-Buxo, J. A (2014) Intradialytic hypotension: Frequency, sources of variation and correlation with clinical outcome: Intradialytic hypotension: risk-variation. *Hemodial Int.* 18(2), 415–422. doi: 10.1111/hdi.12138.

Santos, V. F. C. D., Borges, Z. N., Lima, S. O., & Reis, F. P. (2018). Percepções, significados e adaptações à hemodiálise como um espaço liminar: a perspectiva do paciente. *Interface-Comunicação, Saúde, Educação*, 22, 853-863. doi: <https://doi.org/10.1590/1807-57622017.0148>

Sociedade Brasileira de Nefrologia. Hemodiálise - SBN. Disponível em: <https://www.sbn.org.br/orientacoes-e-tratamentos/tratamentos/hemodialise/> Acesso em: 28 dez. 2022.

Wang, S., Chen, Z., Fu, P., Zang, L., Wang, L., Zhai, X., ... & Zhang, Y. (2014) Use of Auricular Acupressure to Improve the Quality of Life in Diabetic Patients with Chronic Kidney Diseases: A Prospective Randomized Controlled Trial. *Evidence Based Complement Altern Med*, doi: 10.1155/2014/343608

Watkins, L. R., Maier, S.F. (2005) Immune regulation of central nervous system functions: from sickness responses to pathological pain. *J Intern Med.* 257(2), 139–155. doi: 10.1111/j.1365-2796.2004.01443.x.

Yeh, C. H., Chiang, Y. C., Hoffman, S. L., Liang, Z., Klem, M. L., Tam, W. W., ... & Suen, L. K. P. (2014) Efficacy of Auricular Therapy for Pain Management: A Systematic Review and Meta-Analysis. *Evidence-Based Complementary and Alternative Medicine*, 2014, 1–14. doi: 10.1155/2014/934670