

Acupuncture in allergic rhinitis

A Mini-Review

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Summary

Acupuncture is a therapy method known for millennia with apparently polygenetic roots. It is traditionally practiced in East Asian countries. During the recent fifty years, it has found wide applications in Europe as well. Today acupuncture is one of the most important parts of modern complementary medicine. Questions concerning the mechanism of action and efficacy of acupuncture, among others in the treatment of allergic rhinitis, still lead to many scientific discussions. This review summarizes the modern understanding of possible mecha-

nisms of acupuncture as well as it presents the current state of clinical studies relating to the efficacy of acupuncture in the treatment of allergic rhinitis.

Further investigations are necessary to confirm acupuncture as an effective therapy of allergic rhinitis.

Cite this as Hauswald B, Yarin YM. Acupuncture in allergic rhinitis. A Mini-Review. *Allergo J Int* 2014; 23: 115–9

DOI: 10.1007/s40629-014-0015-3

Key words

Allergy – allergic rhinitis – acupuncture

History and Fundamentals of TCM and Acupuncture

Acupuncture is a traditional method of healing in Far Eastern Asian medicine and has particularly been practiced in China, Japan, Korea and Vietnam since thousands of years. According to archeological findings, acupuncture appears to have a polygenetic origin and has probably already been known for about five thousand years even in Europe. During studies of the skin of the mummy from the ice of the Ötztal Alps (“Ötzi”), a total of 47 point-like tattoos were found largely in the vicinity of acupuncture points and meridians employed today [1]. The first written report on acupuncture comes from pre-Christian China at the time of the so-called Yellow Emperor Huang Di (governing 2696–2598 B.C.). In Europe the Asian needle and moxibustion technique were introduced and spread by Portuguese and Dutch seamen in the 16th and 17th century. The first European publication about the Asian needle therapy and meridians was published by the Dutch physician Wilhelm ten Rhyne in the year 1683. The term “acupuncture” (from lat.: “acus” = needle and “punctura” = puncture) also stems from him [2–4].

In the following three centuries acupuncture was viewed more as an exotic therapy form in Europe. At the start of the 20th century, however, it and traditional Chinese medicine (TCM) were rediscovered particularly by French, Austrian and German physicians. Since then, TCM and with it acupuncture have found continually increasing clinical employment and first studies on founded hypotheses

Abbreviations

ACUSAR	Acupuncture in seasonal allergic rhinitis
IFN- γ	Interferon γ
IgE	Immunoglobulin E
IL	Interleukin
SIT	Specific immunotherapy
TCM	Traditional Chinese medicine
Th-Zellen	T helper cells
TNF- β	Tumor necrosis factor β

Submitted
April 9, 2012

Accepted
January 7, 2013

German version
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medizin.de/
allergo-journal

and theories on the mechanisms of action of acupuncture have been undertaken. Within the context of these scientific discussions, European forms of acupuncture – what is termed reflex therapies, the ear acupuncture according to Paul Nogier in France [5], the oral acupuncture according to Jochen Gleditsch in Germany [6] and the laser acupuncture – developed on the basis of TCM.

TCM and thus acupuncture are based on the teachings of Daoism, an age-old Chinese philosophy. Health and disease, diagnosis and therapy are viewed as a duality and interaction of two principles or related forces, Yin and Yang. Together with their projection on the five transformation elements, meteorological effects and energy alterations (Qi), all physiologic and pathophysiologic processes in the human body are explained and the appropriate therapies conceived. The energy flow of Qi in the body can be regulated by impacting special skin points (in the following termed acupuncture points). The acupuncture points are connected to each other and certain organs via particular conduction pathways (meridians). The connection to the organs determines the function of the acupuncture points. In classical acupuncture there are 362 acupuncture points and 14 meridians.

Mechanisms of Action of Acupuncture

A morphological substrate of the meridians has not been found to date. However, the acupuncture point as such has in the meantime been studied and characterized anatomically and physiologically. Anatomically, the majority of the acupuncture points (up to 80 %) represent perforations in the superficial body fascia, through which blood vessel and nerve bundles reach the skin embedded in loose connective tissue [7]. It has been shown that these points have a higher density of receptors [8] and to a great extent (up to 71 %) represent myofascial trigger points [3]. From a physiologic viewpoint a higher electric conductivity and ion exchange capacity of the connective tissue can be demonstrated at the acupuncture point [9, 10]. On the skin surface these points display a 10- to 100-fold lower skin resistance and a higher electric capacity [11–13]. On the basis of this knowledge the method of electroacupuncture could be developed [14].

Through clinical studies and in animal models various effects of acupuncture on different organs and organ systems have been described. The peripheral circulation of the skin and of the muscles is supposed to be improved as well as regulatory mechanisms of the vegetative nervous system be modulated [15, 16]. Further, it is assumed that endorphins, enkephalins and dynorphins are released [17, 18].

In the clinical routine acupuncture has proven itself and been established especially in pain therapy and in diseases of the musculoskeletal system [19–

21]. However, also other diseases can be influenced in their chronic or their acute phase. Several times an impact on the immune system has been demonstrated [22]. Acupuncture is assumed to modulate the activity of natural killer cells, lymphocyte proliferation, chemotaxis and phagocytosis [17, 23, 24]. Also a reduction of the eosinophil count in the blood and nasal secretion was observed [25].

Acupuncture and its Effects on the Pathogenesis of Allergy

According to TCM the body's immunity is the function of what is termed the defensive Qi. The main meridians that provide for circulation of the defensive Qi are the lung, colon, stomach and spleen meridian – the meridians of the anterior circulation. Particularly these meridians are addressed in “TCM immunotherapy”. Allergy in the viewpoint of TCM is a “wind” disease that penetrates from externally together with “cold” or “heat” and impedes the defensive Qi flow in the lung, the skin and the mucous membranes. This results in a backup (fullness) or a deficiency (emptiness) of the defensive Qi leading to the development of the typical symptoms of allergies such as swelling, watery secretion, sneezing, allergic eczema and conjunctivitis. The diagnostic approach in TCM and the conclusions gained from this knowledge are difficult to comprehend from the viewpoint of western medicine and have little in common with our perceptions on the pathogenesis of allergy.

In classical immunology and allergology, CD4+ cells play a key role. Studies of the last ten years discovered the diversity of subtypes of these cells. Nonetheless, of prime significance in the development of an allergic disease is the alteration of the ratio of Th1/Th2 cells [22, 26–28]. The predominant CD4+ subtype of Th1 or Th2 cells determines the further development of the immune response. Here the Th1 cells produce the cytokines interleukin(IL)-2, IFN- γ and TNF- β that lead to a cellular immune response, the Th2 cells, in contrast, IL-4, IL-5, IL-10 and IL13 that regulate the development of B cells to plasma cells and their immunoglobulin E (IgE) production [26–30]. In this process increasingly the role of IL-10 as main regulator or marker of allergy is being discussed [31].

Acupuncture is presumably capable of influencing the cytokine profile. Several studies on bronchial asthma [32–34] and allergic rhinitis [35–37] describe both in patients as well as animal models a modulating effect of acupuncture on the cytokine profile with simultaneous improvement of signs and symptoms. It is remarkable that through acupuncture the production of not all cytokines is altered. Particularly affected by acupuncture are IL-10, IL-2 and IFN- γ [32–36]. Beyond these cytokine-modulating effects, some authors also report a reduction of IgE concentrations in the blood [25, 38, 39]. De-

spite the lack of studies on the direct relationship between cytokine alterations and the reduction of symptoms, these studies suggest that this is in fact connected with alterations of cytokine production. The mechanism of these effects is still unclear to day and must be supplemented by further studies.

Acupuncture Studies on Allergic Rhinitis

Allergic rhinitis is a disease with a prevalence of 20–30 % worldwide [40]. In Europe it is 22.7 %, in Germany 20.6 % with a rising trend [41]. In Europe the treatment of allergic rhinitis and its sequels counts for about 1.0–1.5 billion Euros in direct costs and at least one billion Euros in additional indirect costs [42]. Through continual further developments in the field of clinical and pharmacological research in recent years new and improved preparations for specific immunotherapy (SIT) against seasonal and perennial allergens have been developed. In the meantime, these preparations, both for subcutaneous as well for sublingual therapy, have few side effects and complications and are well-tolerated and highly effective in combination with symptomatic therapy. Nonetheless, parallel to these successes, the popularity of and the compliance to acupuncture remains consistently high in many patients with allergic rhinitis: Up to 64 % of the patients utilize acupuncture [43].

The effects of acupuncture with respect to the reduction of allergic symptoms and an improvement of the quality of life have been examined in several studies. Here acupuncture was reported to be effective particularly in the reduction of nasal and conjunctival signs and symptoms with improvement in the quality of life [35, 36, 44, 46, 47]. Not only the classical rhinoconjunctival complaints, but also cutaneous symptoms, such as, for example, pruritus within the context of atopic dermatitis appear to be reduced by acupuncture [48]. Two recent meta-analyses were intended to summarize the results of the existing studies. In the meta-analysis of Lee (2009) [49] of 115 randomized clinical studies only twelve studies met the required criteria. Seven of these were selected for the analysis. The evidence for the efficacy of acupuncture in symptomatic treatment of prevention of allergic rhinitis was of a mixed nature. Results for seasonal allergic rhinitis were not able to demonstrate specific effects of acupuncture. For perennial allergic rhinitis, results offer suggestive evidence for the efficacy of acupuncture. In the second meta-analysis by Roberts (2008) [50] with about the same number of studies worldwide, only seven studies fulfilled the quality criteria. Also the results of this analysis show no clear proof of an effect of acupuncture in the treatment of allergy. In the opinion of the authors no effects were observed in the examined studies that could not be the result of chance.

The author collective critically discussed the methodic problems in the existing studies. The majority of these studies that were not included in the meta-analysis possessed a too small case number, no control groups and no “sham” acupuncture groups. The number of studies that were included in the meta-analysis was, however, too small in comparison to the total study number. Thus the results of these meta-analyses cannot plausibly represent the total study situation on acupuncture in allergic rhinitis.

This results in the urgent necessity of improving the quality of acupuncture studies in allergic rhinitis. Two recently initiated multicenter, randomized controlled studies intend to close this gap. The ACUSAR study (“Acupuncture in seasonal allergic rhinitis”) in Germany, a multicenter study on acupuncture in seasonal allergic rhinitis with 422 patients, has already been concluded. This study examined the efficacy of acupuncture on symptom reduction and improvement of quality of life in comparison to symptomatic therapy with antihistamines and “sham” acupuncture. The results of this study show a statistically significant improvement of quality of life in the verum acupuncture patients [51]. A second study currently being performed in Korea and China with 238 patients and a comparable study design examines the effects of acupuncture on perennial allergic rhinitis [52]. Here already results in the sense of a significant improvement of the rhinitis complaints and the quality of life have been observed [53]. A final evaluation must also first take place.

Conclusions

A direct integration of the principles of TCM in the level of knowledge of modern European medicine is only possible to a limited degree. Many of the proven therapeutic effects of acupuncture remain a challenge for modern science and require further fundamental studies. The efficacy of acupuncture in allergic rhinitis and other allergic diseases, such as asthma or allergic eczema, appears to be due to the cytokine profile regulation of Th1/Th2 cells and particularly in the expression of IL-10, IL-2 and IFN- γ . However, further studies are necessary in order to confirm this hypothesis. The effects of acupuncture have already been demonstrated in several clinical studies. For conclusive proof, at present large multicenter, controlled studies are under way to evaluate the role of acupuncture as complementary therapy of allergic rhinitis.

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Conflicts of interest

The authors declare that no conflict of interest exists..

Cite this as

Hauswald B, Yarin YM. Acupuncture in allergic rhinitis. A Mini-Review. *Allergo J Int* 2014; 23: 115–9
DOI: 10.1007/s40629-014-0015-3

References

- Dorfer L, Moser M, Bahr F, Spindler K, Egarter-Vigl E, Giulién S, Dohr G, Kenner T. A medical report from the stone age? *Lancet* 1999; 354: 1023–5
- Feucht G. Die Geschichte der Akupunktur in Europa. Heidelberg: Karl F. Haug, 1977
- Melzack R, Stillwell DM, Fox EJ. Trigger points and acupuncture points for pain: correlations and implications. *Pain* 1977; 3: 3–23
- Rhijne W. Transisalano-Daventriensis Dissertatio de Arthritide: Mantissa Schematica: De Acupunctura: Et Oratio nes Tres. I. De Chymiae ac Botanicae antiquitate & dignitate: II. De Physiognomia: III. De Monstris. Singula ipsius Authoris notis illustrata. London: Impensis R. Chiswell, 1683
- Nogier P. Handbook to auriculotherapy. Moulins-lès-Metz: Maisonneuve, 1968
- Gleditsch JM. MAPS. MikroAkuPunktSysteme. Stuttgart: Hippokrates, 2004
- Heine H. Akupunkturtherapie: Perforation der oberflächlichen Körperfaszie durch kutane Gefäß-Nerven-Bündel. *Therapeutikon* 1988; 4: 238–44
- Kellner G. Bau und Funktion der Haut. *Dt Ztschr f Akup* 1966; 15: 1–32
- Heine H. Anatomische Struktur der Akupunkturpunkte. *Dt Ztschr f Akup* 1988; 31: 26–30
- Heine H. Funktionelle Morphologie der Akupunkturpunkte. *Dt Ztschr f Akup* 1990; 33: 69–70
- Becker RO, Reichnaamis, M. Electrophysiological correlates of acupuncture points and meridians. *Psychoenergetic Systems* 1976; 29: 245–56
- Maresch O. Das elektrische Verhalten der Haut. *Dt Ztschr f Akup* 1966; 15: 33–50
- Niboyet, EH. La moindre résistance à l'électricité de surfaces punctiformes et de trajets cutanés concordants avec les „points“ et „méridiens“ bases de l'acupuncture. PhD thesis, Marseille: Louis-Jean, 1963
- Portnow FG. Elektropunktur naja Refleksoterapija. Riga: Zinātne, 1987
- Knardahl S, Elam M, Olausson B, Wallin BG. Sympathetic nerve activity after acupuncture in humans. *Pain* 1998; 75: 19–25
- Sandberg M, Lundeberg T, Lindberg LG, Gerdle B. Effects of acupuncture on skin and muscle blood flow in healthy subjects. *Eur J Appl Physiol* 2003; 90: 114–9
- Petti F, Bangrazi A, Liguori A, Reale G, Ippoliti F. Effects of acupuncture on immune response related to opioid-like peptides. *J Tradit Chin Med* 1998; 18: 55–63
- Stux G, Stiler N, Berman B, Pommeranz B. *Akupunktur*, 7. Aufl. Berlin – Heidelberg – New York: Springer, 2008
- Asher GN, Jonas DE, Coeytaux RR, Reilly AC, Loh YL, Motingger-Reif AA, Winham SJ. Auriculotherapy for pain management: a systematic review and meta-analysis of randomized controlled trials. *J Altern Complement Med* 2010; 16: 1097–108
- Molsberger A. Acupuncture in orthopedics. *Orthopade* 2012; 41: 100–5
- Stör W, Irnich D. Acupuncture: basics, practice, and evidence. *Schmerz* 2009; 23: 405–17
- Kim SK, Bae H. Acupuncture and immune modulation. *Auton Neurosci* 2010; 157: 38–41
- Arranz L, Guayerbas N, Siboni L, Fuente M de la. Effect of acupuncture treatment on the immune function impairment found in anxious women. *Am J Chin Med* 2007; 35: 35–51
- Kim CK, Choi GS, Oh SD, Han JB, Kim SK, Ahn HJ, Bae H, Min BI. Electroacupuncture up-regulates natural killer cell activity: identification of genes altering their expressions in electroacupuncture induced up-regulation of natural killer cell activity. *J Neuroimmunol* 2005; 168: 144–53
- Lau BH, Wong DS, Slater JM. Effect of acupuncture on allergic rhinitis: clinical and laboratory evaluations. *Am J Chin Med* 1975; 3: 263–70
- Annunziato F, Romagnani S. Heterogeneity of human effector CD4+ T cells. *Arthritis Res Ther* 2009; 11: 257
- Romagnani S. The Th1/Th2 paradigm and allergic disorders 1998. *Allergy* 1998; 53(46 Suppl): 12–5
- Woodfolk J. T-cell responses to allergens. *Allergy Clin Immunol* 2007; 119: 280–94
- Woodfolk JA. Cytokines as a therapeutic target for allergic diseases: a complex picture. *Curr Pharm Des* 2006; 12: 2349–63
- Cutler A, Brombacher F. Cytokine therapy. *Ann N Y Acad Sci* 1056: 16–29
- Woodfolk JA. Selective roles and dysregulation of interleukin-10 in allergic disease. *Curr Allergy Asthma Rep* 2006; 6: 40–6
- Carneiro ER, Xavier RA, De Castro MA, Do Nascimento CM, Silveira VL. Electroacupuncture promotes a decrease in inflammatory response associated with Th1/Th2 cytokines, nitric oxide and leukotriene B4 modulation in experimental asthma. *Cytokine* 2010; 50: 335–40
- Jeong HJ, Kim BS, Oh JG, Kim KS, Kim HM. Regulatory effect of cytokine production in asthma patients by SOOJI CHIM (Koryo Hand Acupuncture Therapy). *Immunopharmacol Immunotoxicol* 2002; 24: 265–74
- Joos, S, Schott C, Zou H, Daniel V, Martin E. Immunodulatory effects of acupuncture in the treatment of allergic asthma. *J Altern Complement* 2000; 6: 519–25
- Hauswald B, Schmidt Ch, Knothe J, Hüttenbrink KB, Zahnert Th. Effects of acupuncture in treatment of perennial allergic rhinitis in comparison to antihistaminic medication. *Dt Ztschr f Akup* 2009; 52: 31
- Petti FB, Liguori A, Ippoliti F. Study on cytokines IL-2, IL-6, IL-10 in patients of chronic allergic rhinitis treated with acupuncture. *J Tradit Chin Med* 2002; 22: 104–11
- Rao YQ, Han NY. Therapeutic effect of acupuncture on allergic rhinitis and its effects on immunologic function. *Zhongguo Zhen Jiu* 2006; 26: 557–60
- Christensen PA, Lauren LC, Taudorf E, Sørensen SC, Weekes B. Acupuncture and bronchial asthma. *Allergy* 1984; 39: 379–85
- Jianli CJ. The effect of acupuncture on serum IgE level in patients with chronic urticaria. *Tradit Chin Med* 2006; 26: 189–90
- Mösges R, Klimek L. Today's allergic rhinitis patients are different: new factors that may play a role. *Allergy* 2007; 62: 969–75
- Bauchau V, Durham SR. Prevalence and rate of diagnosis of allergic rhinitis in Europe. *Eur Respir J* 2004; 24: 758–64
- Cauwenberge P van, Bachert C, Passalacqua G, Bousquet J, Canonica GW, Durham SR, Fokkens WJ, Howarth PH, Lund V, Malling HJ, Mygind N, Passali D, Scadding GK, Wang DY. Consensus statement on the treatment of allergic rhinitis. European Academy of Allergology and Clinical Immunology. *Allergy* 2000; 55: 116–34
- Schäfer T, Riehle A, Wichmann HE, Ring J. Alternative medicine in allergies – prevalence, patterns of use and costs. *Allergy* 2002; 57: 694–700
- Brinkhaus B, Witt CM, Jena S, Liecker B, Wegscheider K, Willich SN. Acupuncture in patients with allergic rhinitis: a

- pragmatic randomized trial. *Ann Allergy Asthma Immunol* 2008; 101: 535–43
45. Langer H, Hauswald B. Die therapeutische Wirkung der Akupunktur und Laserpunktur bei Patienten mit Rhinopathia pollinosa. *Dt Z Aku* 1989; 32: 109–111
 46. Ng DK, Chow PY, Ming SP et al. A double blind, randomized, placebo-controlled trial of acupuncture for the treatment of childhood persistent allergic rhinitis. *Pediatrics* 2004; 114: 1242–7
 47. Williamson L, Yudkin P, Livingstone R, Prasad K, Fuller A, Lawrence M. Hay fever treatment in general practice: a randomised controlled trial comparing standardised Western acupuncture with sham acupuncture. *Acupunct Med* 1996; 14: 6–10
 48. Pfab F, Kirchner MT, Huss-Marp J, Schuster T, Schalock PC, Fuqin J, Athanasiadis GI, Behrendt H, Ring J, Darsow U, Napadow V. Acupuncture compared with oral antihistamine for type I hypersensitivity itch and skin response in adults with atopic dermatitis: a patient- and examiner-blinded, randomized, placebo-controlled, crossover trial. *Allergy* 2012; 67: 566–73
 49. Lee MS, Pittler MH, Shin BC, Kim JI, Ernst E. Acupuncture for allergic rhinitis: a systematic review. *Ann Allergy Asthma Immunol* 2009; 102: 269–79
 50. Roberts J. A systematic review of the clinical effectiveness of acupuncture for allergic rhinitis. *BMC Complement Altern Med* 2008; 8: 13
 51. Brinkhaus B, Ortiz M, Witt CM, Roll S, Linde K, Pfab F, Niggemann B, Hummelsberger J, Treszl A, Ring J, Zuberbier T, Wegscheider K, Willich SN. Acupuncture in patients with seasonal allergic rhinitis: a randomized trial. *Ann Intern Med* 2013; 158: 225–34
 52. Kim JI, Lee MS, Jung SY, Choi JY, Lee S, Ko JM, Zhao H, Zhao J, Kim AR, Shin MS, Kang KW, Jung HJ, Kim TH, Liu B, Choi SM. Acupuncture for persistent allergic rhinitis: a multi-centre, randomised, controlled trial protocol. *Trials* 2009; 10: 54
 53. Kim JI, Choi JY, Lee MS, Kim TH, Kim AR, Jung SY, Shin MS, Kim KH. Acupuncture for improving chronic rhinosinusitis complicated with persistent allergic rhinitis. A prospective observational study. *Forsch Komplementmed* 2010; 17: 333–5
 54. Michel W. Frühe westliche Beobachtungen zur Akupunktur und Moxibustion. *Sudhoffs Archiv* 1993; 77: 194–222