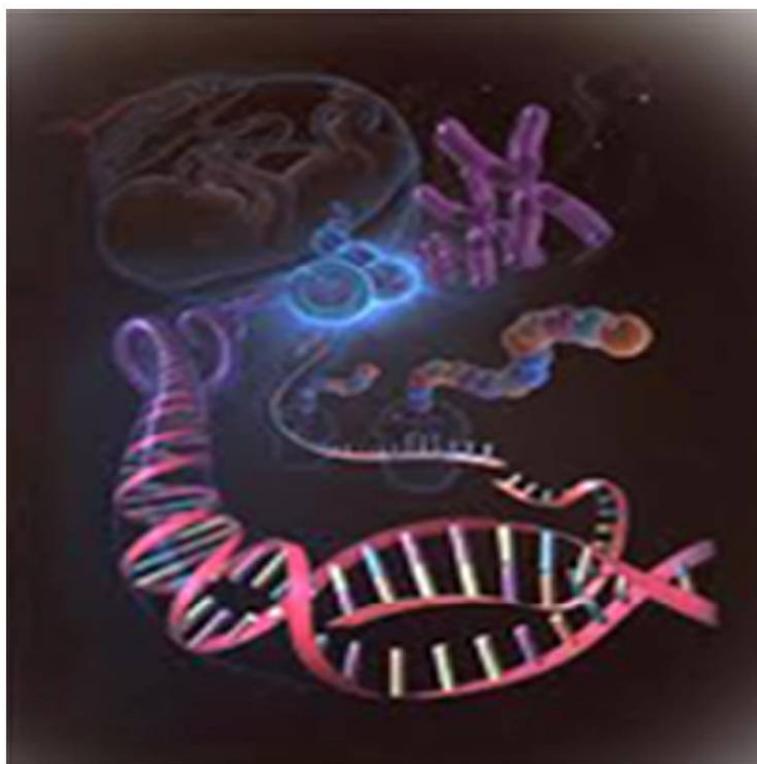




International Journal of Life Sciences Biotechnology and Pharma Research





Review Article

A SHORT REVIEW ON MANAGEMENT OF ASTHMA THROUGH ALTERNATIVE THERAPIES

Ladde Shivakumar^{1*} and Shalam²

*Corresponding Author: **Ladde Shivakumar**, ✉ shivkumarladde@gmail.com

Asthma, a common, chronic lung disease in industrialized countries, is characterized by the production of large quantities of IgE antibody by B cells and a decrease of the IFN-g /IL-4 (Th1/Th2) ratio. Based on various research articles on management of asthma, we reviewed some alternative techniques for management of asthma. Various herbal and Chinese medicine possess their antisthamic activity by reversing histamine induced anaphylactic response, decreased the levels of reactive oxygen species (ROS), T helper (Th)2 cytokines, the total IgE produced by B cells and OVA. Also asthma can prevent through nutritional, life style, Acupuncture technique and Bronchial thermoplasty.

Keywords: Asthma, Herbal remedies, Acupuncture, Thermoplasty.

INTRODUCTION

Asthma can be defined as a lung disorder in which spasms of the bronchial passages restrict the flow of air in and out of the lungs. In today's stressful life there is an increased exposure to number of immunological agents like allergens, dust, pollens, viruses, chemicals that acts as stimuli to liberate mediators these mediators which include leukotrienes, prostaglandins, histamine, IgE etc. are the endogenous chemicals produced in the body which in turn cause bronchoconstriction (www.sciencedaily.com, J P Kowalak *et al* 2001). Another consequence of this

exposure is the generation of free radicals which are the culprits causing oxidative damage leading to shortness in breathing. One of the other common causes of asthma may be hereditary. Commonly Leukotriene modifiers include montelukast (Singulair), zafirlukast (Accolate) and zileuton (Zyflo, Zyflo CR) and Long-acting beta agonists (LABAs) include salmeterol (Serevent Diskus) and formoterol (Foradil Aerolizer) used in management of asthma, but some severe unwanted reaction are associated with them are psychological reactions such as agitation, aggression, hallucinations, depression and

¹ Department of Pharmacology, Shivlingeshwar College of Pharmacy, Amit Nagar, Hasegaon 413512, Dist-Latur (MH).

² Department of Pharmacology, College of Pharmacy, Al Qassim University, Buraidah, KSA.

suicidal thinking. However, they've been linked to severe asthma attacks. LABAs should be taken only in combination with an inhaled corticosteroid (Litonjua AA, *et al.* 2010). Based on various research articles on management of asthma, we reviewed some alternative techniques for management of asthma.

HERBAL THERAPY

Number of herbs are reported in Ayurveda that provides as a whole protection against asthmatic attacks naturally without any side effects and gradually helps you to recover from asthma.

Aegle Marmelos Bael or Bengal quince is a deciduous sacred tree, associated with Gods having useful medicinal properties, especially as a cooling agent.

Albizzia lebeck The decoction of *Shirish* (*Albizzia lebeck*) stem bark was found to be effective against bronchospasm induced by histaminic acid phosphate and shown to exert disodium cromoglycate like action on mast cells. Aqueous extract of both stem bark and flowers significantly reduced ($P < 0.01$) bronchospasm induced by micro-aerosols of histamine acid phosphate (1% solution) and acetylcholine chloride (1% solution in guinea pig bronchi) (Nisha Ojha 2011)

***Alstonia scholaris*:** The extract of *Alstonia scholaris* inhibited the spontaneous movements of rabbit jejunum and contractile effects of acetylcholine and histamine on guinea-pig ileum. Additionally, the extract caused marked reduction of barium chloride-, potassium chloride- and calcium chloride-induced contraction on guinea-pig ileum and pulmonary artery, implying a direct interference of plant extract with the influx of calcium ions into cells. However, the extract has

no detectable effect on mobilization of intracellular calcium. These results coupled with the *in vivo* effects of ethanol extract reveal that the *Alstonia scholaris* leaves possess broncho-vasodilatory activity mediated presumably by prostaglandins, calcium antagonism and endothelium-derived relaxing factor(s) (Shabana Channa *et al.* 2005).

***Amomum compactum soland ex Maton*:** It is widely distributed in Korea, and has been commonly used in Korean traditional medicine to resolve dampness, disperse stuffiness, move qi, warm the middle, increase appetite, and promote digestion. *A. compactum* treatment markedly decreased the number of infiltrating eosinophils and the hypersecretion of mucus when compared with the effects on mice treated with OVA alone. The *A. compactum* treatment dose-dependently decreased the levels of Reactive Oxygen Species (ROS) and T helper (Th)2 cytokines, including interleukin (IL)-4 and IL-5, in the bronchoalveolar lavage fluid (BALF), and a high dose of *A. compactum* effectively reduced the level of total immunoglobulin (Ig)E in the serum. *A. compactum* may have a therapeutic effect on allergic asthma or inflammatory disease (Jin-Ah LEE *et al.* 2010).

Andrographolide: It is traditional Chinese herbal medicines has been shown to possess a strong anti-inflammatory activity and has the potential to be used in allergic lung inflammation. Andrographolide could inhibit extensive infiltration of inflammatory cells in lung and decrease airway hyperreactivity. Andrographolide could inhibit NF- κ B expression in lung and suppress NF- κ B translocation from the cytoplasm to the nucleus of airway epithelial cells. Results implicate the anti-inflammatory mechanisms of Andrographolide are associated with NF- κ B expression in lung and

suppress NF- κ B translocation from the cytoplasm to the nucleus of airway epithelial cells (Jing Li *et al.* 2009).

Asystasia gangetica: The terpenoid compounds in the leaves of *A. gangetica* are likely responsible for the usefulness of the plant's leaves in the management of asthma in traditional medicine practice (Ezike AC *et al.* 2008).

***Benincasa hispida* (Thunb.) Cogn**: Commonly known as ash gourd belonging to Cucurbitaceae family, is employed as a main ingredient in Kusmanda lehyam in Ayurvedic system of medicine. Methanol extract of *Benincasa hispida* (MEBH) showed excellent protection in guinea pigs against the histamine-induced bronchospasm (D. Anil kumar *et al.* 2002).

Coffee and tea: In the 1800s coffee was the treatment of choice for asthma. Epidemiologic data support a relationship between coffee intake and reduced respiratory symptoms that may be mediated through coffee's xanthine content. Caffeine is chemically related to theophylline. Like theophylline, it increases intracellular cyclic adenosine monophosphate (cAMP) and thereby relaxes bronchial smooth muscles. In a large Italian study, adults who drank two to three cups of coffee daily had about 25% less asthma than adults who abstained (Schwarz J 1992). American data support a dose-effect association between coffee intake and a reduced risk of asthmatic symptoms. There are no recent, randomized controlled trials evaluating the effects of caffeine on childhood asthma symptoms, nor on the interaction between coffee, tea, colas, and modern asthma medications.

Coleus forskohlii: This herb is used in Ayurvedic medicine to treat asthma. Like theophylline, it increases intracellular cAMP and is an effective

bronchodilator (Bauer K 1993). Another Ayurvedic herbal remedy, *Tylophora indica*, has proven beneficial in controlled, double-blind cross-over studies, but the most effective dosages and long-term effects on children are unknown (Gupta S 1979).

***Euphorbia lunulata* (Euphorbiaceae)**: It is found in the southeast of China. The whole plants of *E. lanulata* have yielded kaempferol, quercetin, kaempferol 3-O-L-rhamnoside, quercetin 3-O-L-rhamnoside, 6,7-dihydroxycoumarin and maoyancaosu. It has long been used as a traditional crude drug for the treatment of bronchial asthma and chronic bronchitis (Tadahiro Nishimura *et al.* 2005).

Ginkgo biloba: This is one of the most widely used herbal remedies in Europe. Standardized extract of *Ginkgo biloba* (EGb), is sold under several different brand names: Ginkgobil, Rokan, Tanakan, Tebonin, and Kaveri. Ginkgo's active ingredient, ginkgolide, antagonizes Platelet Activating Factor (PAF), and may decrease airway inflammation. Ginkgo is also a powerful antioxidant. Although *Ginkgo biloba* has a long history and a reasonable biochemical rationale, only one small pilot study has evaluated its effectiveness as an asthma remedy. That study found it protective against exercise-induced bronchospasm; it also decreased participants' reactivity to house dust mite antigen (Guinot P *et al.* 1987).

Gyokuheifusan (GHS): Gyokuheifusan (GHS) is a classical formulation of traditional Chinese medicine (TCM) that is usually prescribed to prevent or treat respiratory tract diseases, such as respiratory infection and bronchial asthma. GHS down-regulates the over-production of IgE and IL-4 via a significant and persistent increase

of IFN-g. Yang *et al.*, found that Astragalus Root (a main material of GHS) reduced the secretion of IL-4 by regulating the shift of Th1 to Th2, and the total IgE produced by B cells decreased accordingly. Zhao *et al.* also reported that Astragalus root can significantly promote IFN γ , IgG1, IgG2 and IgG3 production from peripheral blood monocyte (PBMC) *in vitro*, but had no significant effect on the production of IL-4 or IgG4, suggesting that it can modulate Th1/Th2 function and enhance the immuno-function of asthma sufferers by improving Th1-deficiency. GHS is commonly used to treat respiratory diseases in clinical practice in oriental countries, and there is currently much interest in the mechanisms of its effects on the immune system. An understanding of these may provide a pharmacological basis for more effective clinical application of GHS (Su-ping FANG *et al.* 2005).

***Houttuynia cordata*:** *Houttuynia cordata* Thunb, well known as 'E-Sung-Cho' in Korea, has been used for the treatment of Herpes simplex, chronic sinusitis and nasal polyps. Recently, a few papers reported the antileukemic activity, anticancer activity, adjuvant activity, and antioxidant action of *Houttuynia cordata* Thunb water extract (HCWE). The results suggest that *Houttuynia cordata* Thunb water extract (HCWE) may contain the bioactive compounds that inhibit the compound 48/80- or anti-DNP IgE-induced mast cell activation and anaphylactic reactions by blocking of calcium uptake into mast cells, or increasing the cAMP level in mast cells. HCWE also inhibited the local allergic reaction, PCA, activated by anti-dinitrophenyl (DNP) IgE antibody in rats. HCWE reduced the compound 48/80-induced mast cell degranulation and colchicine-induced deformation of rat peritoneal mast cells (RPMC). The purification of the exact anti-anaphylactic

components from HCWE may be beneficial in the treatment of mast cell-mediated allergic diseases (Guang Zhao LI *et al.*, 2005, Li GZ *et al.* 2005).

Kampo medicine Shoseiryuto (Xiao-Qing-Long-Tang in Chinese): Kampo is a traditional Japanese medicine originating from ancient Chinese medicine. Orally administered Kampo prescriptions are believed to be influenced by diet and intestinal microbiota. However, reports on the Kampo administration effects are still limited. Shoseiryuto (TJ-19), which has anti-allergic and anti-inflammatory properties, is a Kampo prescription used clinically for the treatment of allergic bronchial asthma. The accumulation of eosinophils were significantly reduced by 30 mg/day doses of Shoseiryuto. The results indicate a synergistic effect of a Kampo medicine (Shoseiryuto, Xiao-Qing-Long-Tang in Chinese) and lysed *Enterococcus faecalis* FK-23 on allergic responses in mice (Shimada T *et al.*, 2010).

Licorice root (*Glycyrrhiza glaberradix*): Folk medicines around the world use licorice root to treat coughs. The herb's active compounds, glycyrrhetic acid and carbenoxolone, are potent inhibitors of cortisol metabolism, thereby enhancing endogenous and exogenous steroid benefits, this led most clinicians to as an adjunct in asthma treatment. *Glycyrrhiza glabra* (10 mg/kg/ body wt.) was fed to sensitized mice and measured ova-induced Early Airway Response (EAR) and Late Asthmatic Response (LAR). At the end of experiment, the animals were sacrificed and measured OVA specific serum IgE levels. The feeding of *Glycyrrhiza glabra* inhibited significantly both EAR as well as LAR as compared to vehicle treated sensitized mice. OVA specific serum IgE levels were also reduced significantly by the treatment of *Glycyrrhiza glabra*.

NSL, New Delhi (Ram A *et al.*, 2003, Nisha Ojha 2011).

Ma huang (*Ephedra sinica*): This herb has been an asthma remedy in China for over 5,000 years. Ephedrine, ma huang's principle active ingredient, was included in mainstream medical therapies for pediatric asthma until the mid-1980s when it was replaced by more specific β -agonist medications that had fewer cardiovascular side effects. It continues to be a mainstay of natural herbal asthma remedies when used in combination with anti-inflammatory herbs such as licorice root.

***Ocimum sanctum*:** The anti-asthmatic activity of the extract of dried and fresh leaves, and the volatile and fixed oils of *Ocimum sanctum* was evaluated against histamine and acetylcholine-induced pre-convulsive dyspnea (PCD) in guinea pigs. The extract of fresh leaves, volatile oil extracted from fresh leaves and fixed oil from the seeds significantly protected the guinea pigs against histamine- and acetylcholine-induced PCD (P Prakash *et al.*, 2005).

Onions (*Allium cepa*): Nine different compounds isolated from this common folk remedy inhibit leukotriene synthesis *in vitro*. Crude onion extracts reduce experimentally induced bronchoconstriction in guinea pigs. Onions are extremely safe and well tolerated in normal diets. Hypersensitivity is rare. Additional research is needed to determine the best dose and frequency of onion supplements for asthmatic children (Dorsch W *et al.*, 1984).

***Piper longum* Linn:** The fruits of *Piper longum* contain 1% volatile oil, resin, alkaloids piperine and piperlonguminine, a waxy alkaloid N-isobutyldeca-trans-2-trans-4-dienamide and a terpenoid substance. Dried ripe fruits; the fruit

effectively reduce passive cutaneous anaphylaxis in rats and protect guinea pigs against antigen-induced bronchospasm; a 30% protection of mast cells was observed in an *in vitro* study (Chatterjee, 1999; Dahanukar *et al.*, 1984). Aller-7, a combination from seven medicinal plants including Long pepper is used for allergic rhinitis, as antihistaminic and as antispasmodic (Amit *et al.*, 2003; P. Manoj, 2004). In a study involving 240 children of different age groups suffering from frequent asthma attacks, long-term administration of long pepper fruits significantly, reduced the frequency and severity of attacks. In another study 20 pediatric patients with asthma received long pepper in dosages ranging from 935-1575 gm, daily for several weeks as a result of this treatment all patients showed clinical improvement. *Piper longum* has been shown to reduce the passive cutaneous anaphylaxis in rats and protect guinea pigs against antigen-induced bronchospasm (Dahanukar SA *et al.*, 1984; Nisha Ojha *et al.*, 2011).

Ryokan-kyomi-shinge-nin-to (RKS): It is a traditional oriental herbal (Kampo) medicine which has been used for the treatment of allergic asthma and rhinitis, were investigated. These results suggest that RKS has antiallergic activity in animals, by significantly inhibited an increase in vascular permeability induced by histamine and serotonin. In addition, RKS prevented histamine hypersensitivity in actively sensitized mice. Because RKS did not affect sleeping time induced by pentobarbital in mice and did not inhibit gastric emptying in rats, the drug appears to be useful for treating allergic patients suffering from classical antihistamines side effects such as stomach discomfort or relative drowsiness (Masaru Sakaguchi *et al.* 2002).

SHATI (*Hedychium spicatum*): The powdered rhizome given in divided doses of 10gm to 25 patients with recurrent paroxysmal attacks of dyspnoea for 4 weeks (Bronchial asthma), completely relieved dyspnoea, cough and restlessness in all patients. The bronchi completely disappeared in 36% of the patients. The mean R/R was reduced by 25% and the vital capacity increased by 20%. The mean absolute count also decreased by 55.6% (Chaturvedi GN *et al.*, 1974; Nisha Ojha *et al.*, 2011).

Shinpi-to and saiboku-to: Clinical trials indicate some steroid-sparing effects of the ancient Chinese herbal combination remedy, saiboku-to, reducing the need for anti-inflammatory medications in adult asthmatics taking it over several months. Saiboku-to contains five herbs that slow steroid breakdown, possibly increasing the risk of side effects (or decreasing dosage requirements) in patients dependent on oral steroids. Like the new asthma drug zileuton, saiboku-to and shinpi-to, another Chinese herbal asthma remedy, inhibit 5-lipoxygenase and thus the synthesis of the pro-inflammatory leukotrienes (Hamasaki Y *et al.*, 1997). The ethanolic extract (50%) of fresh leaves, volatile oils (from fresh leaves) and fixed oil (from seeds) has shown anti asthmatic activity and significantly protected guinea pigs against histamine and acetylcholine induced preconvulsive dyspnoea Kathi J Kemper *et al.*, 1999; Nisha Ojha *et al.*, 2011).

***Solanum xanthocarpum*, *Tylophora asthmatica*, and *Curcuma caesia*.** Histamine induced bronchoconstriction is the traditional immunological model of antigen induced airway obstruction. In Pritesh Paliwal1 *et al.*, 2011 study find that Methanolic extracts of *Adhatoda vasica*,

Solanum xanthocarpum, *Tylophora asthmatica*, and *Curcuma caesia* significantly prolonged the latent period of convulsions followed by exposure to histamine aerosol at the dose of 500 mg/kg, 100 mg/kg, 100 mg/kg and 500 mg/kg respectively. The results of the study confirmed the bronchodilator properties of the plants, justifying their traditional claims in the treatment of asthma. *Adhatoda vasica* mainly consists of pyrroquinazoline alkaloids viz. vasicine, vasicol, vasicinone, peganine along with other minor constituents. Vasicine is a major bioactive pyrroquinazoline alkaloid of *vasaka* present in the concentration of 1.3%. Minor alkaloids include adhatonine, vasicinol and vasicinolone (Pritesh Paliwal *et al.*, 2011; Sayeed Ahmad *et al.*, 2009).

Xincang Decoction was composed of Flos Magnoliae (Xinyi) and Fructus Xanthii (Cang'erzi), the traditional Chinese herbs for expelling wind. In three months treatment, Xincang Decoction showed that the levels of EOS and IL-5 were obviously decreased after the treatment, and the levels of EOS and IL-5 of the patients in the treatment group were lower than those in the control group. Meanwhile the forced expiratory volume in one second (FEV1) was improved after the treatment, and the FEV1 of the patients in the treatment group was higher than that of the patients in the control group. Hence Xincang Decoction can decrease the levels of EOS and IL-5 and improve the pulmonary function in treating chronic airway inflammation in children with bronchial asthma in remission stage (Yu Jian-Er 2005).

NUTRITIONAL THERAPY

Antioxidant vitamins are commonly suggested complementary therapies for asthma. Pyridoxine supplements of 200 mg per day reduced the

number of asthma attacks, the severity of symptoms, and the need for medications in a double-blind study of 76 asthmatic children (Collipp PJ *et al.* 1975). Side effects are rare with these doses. In some children, 500 mg of oral vitamin C has a protective effect against exercise-induced asthma (Cohen HA *et al.* 1997). Oral magnesium supplementation (400 mg daily) in adults, there was a statistically significant improvement in asthma symptoms and a small reduction in bronchodilator requirements, but no significant change in pulmonary function tests during the three weeks of treatment (Hill J *et al.*, 1997). Omega-3 fatty acids limit leukotriene synthesis by blocking arachidonic acid metabolism. Eating fresh oily fish (cod, mullet, orange roughy, salmon, tuna, mackerel and rainbow trout) is associated with a significantly reduced risk of asthma and improved pulmonary function in large epidemiologic studies in both adults and children (Hodge L *et al.* 1996).

LIFESTYLE THERAPY

Although many people with asthma rely on medications to prevent and relieve symptoms, you can do several things on your own to maintain your health and lessen the possibility of asthma attacks.

- Use air conditioner, it reduces the amount of airborne pollen from trees, grasses and weeds that finds its way indoors and Keep indoor air clean
- Maintain optimal humidity
- Reduce pet dander
- If your asthma is worsened by cold, dry air, wearing a face mask can help.
- Taking care of yourself and treating other conditions linked to asthma will help keep your

symptoms under control. A few things you can do include:

- Regular exercise can strengthen your heart and lungs, which helps relieve asthma symptoms. Keep in mind that exercising in cold weather may trigger asthma symptoms.
- Eating plenty of fruits and vegetables may increase lung function and reduce asthma symptoms. These foods are rich in protective nutrients (antioxidants) that boost the immune system.
- Control heartburn and gastroesophageal reflux disease (GERD) may damage lung airways and worsen asthma symptoms.

Alternative Medicine: There's some evidence that certain alternative treatments may help with asthma symptoms. However, keep in mind that these treatments are not a replacement for medical treatment especially if you have severe asthma. Alternative asthma treatments include:

- **Breathing techniques:** The Papworth method and yoga breathing (pranayama) may reduce the amount of medication you need to keep your asthma symptoms under control. Yoga classes increase fitness and reduce stress, which may help with asthma as well (Nagarathna R *et al.* 1985).
- **Acupuncture.** This technique involves placing very thin needles at strategic points on your body. It's safe and generally painless (Jobst K A, 1995).

Bronchial thermoplasty is a novel therapy that uses radiofrequency energy to heat the airways in order to reduce excess smooth muscle mass in the airways. Patients with chronic asthma have more airway smooth muscle than non-asthmatics (Bergeron C *et al.*, 2006; Carroll N *et al.*, 1993).

Beta-agonist therapy temporarily reduces bronchoconstriction, but bronchial thermoplasty is the first therapeutic attempt to achieve a long-term reduction in airway smooth muscle mass and potentially reduce asthma severity. The thermal energy is hypothesized to disrupt the interaction between actin and myosin and to denature muscle proteins (Dyrda P *et al.* 2001).

Working: During the procedure, a small, flexible catheter is guided into the lung using a bronchoscope accessed through the nose or mouth. No incision is required. The tip of the catheter is expanded to touch the walls of the airway. The catheter delivers controlled radiofrequency energy along the length of the airway walls in 10 second bursts. The heat reduces the amount of excess airway smooth muscle and limits its ability to constrict, making it less sensitive to irritants in the air. Traditionally, living with asthma has meant patients have to avoid “triggers,” use medications religiously to prevent flare-ups and have an inhaler handy at all times. This kind of treatment goes right to the source of the problem, hopefully offering a way of life less dependent on having to avoid triggers to reduce the occurrence of asthma attacks (www.texashealth.org).

Bronchial thermoplasty uses radio frequency energy to relieve asthma symptoms. Because the procedure requires only light anesthesia, it can be performed on an outpatient basis. A small, flexible tube called a bronchoscope is inserted through the nose or mouth and guided into the lungs. Once the bronchoscope is situated in the desired airway; a catheter is inserted through the bronchoscope. The tip of the catheter is inflated until it touches the sides of the airway wall. Radio frequency energy is then sent through the catheter,

heating the smooth muscle walls of the airway to approximately 149° F. This temperature is sufficient to thin the smooth airway wall muscles without scarring or damaging them (www.tree.com).

The Alair®Bronchial Thermoplasty System is indicated for the treatment of severe persistent asthma in patients 18 years and older whose asthma is not well controlled with inhaled corticosteroids and long acting beta agonists.

Contraindications

Patients with the following conditions should not be treated:

- Presence of a pacemaker, internal defibrillator, or other implantable electronic devices.

- Known sensitivity to medications required to perform bronchoscopy, including lidocaine, atropine, and benzodiazepines.

- Patients previously treated with the Alair System should not be retreated in the same area(s). No clinical data are available studying the safety and/or effectiveness of repeat treatments.

- Patients should not be treated while the following conditions are present:

 - Active respiratory infection

 - Asthma exacerbation or changing dose of systemic corticosteroids for asthma (up or down) in the past 14 days

 - Known coagulopathy

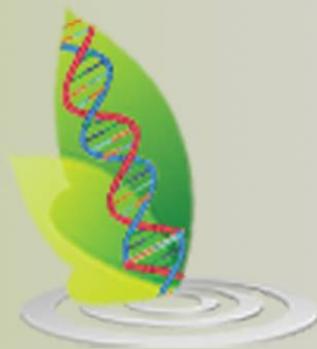
 - As with other bronchoscopic procedures, patients should stop taking anticoagulants, antiplatelet agents, aspirin and NSAIDs before the procedure with physician guidance.

REFERENCES

1. Amit A, Saxena V S, Pratibha N, D'Souza P, Banchi M, Bagchi D and Stohs S J (2003), "Mast cell stabilization, lipoxygenase inhibition, Lyaluronidase inhibition, anti-histaminic and anti-spasmodic activities of Aller-7, a novel botanical formulation for allergic rhinitis", *Drugs Exp Clin Res*; Vol. 29, No. 3, pp. 107-115.
2. Bauer K (1993), "Pharmacodynamic effects of inhaled dry powder formulations of fenoterol and colforsin in asthma" *Clin Pharmacol Ther*, Vol. 53, No. 1, pp. 76
3. Bergeron C and Boulet L P (2006), "Structural changes in airway diseases: characteristics, mechanisms, consequences, and pharmacologic modulation", *Chest*, Vol. 129, pp. 4, pp. 1068-1087.
4. Carroll N, Elliot J, Morton A and James A (1993), "The structure of large and small airways in nonfatal and fatal asthma", *The American review of respiratory disease*, Vol. 147, No. 2, pp. 405-410.
5. Chatterjee S (1999), "Bronchodilatory and anti-allergic effect of Pulmoflex-A proprietary herbal formulation", *Indian J Physiol Pharmacol*, Vol. 43, No. 3, pp. 486-490.
6. Chaturvedi G N and Sharma B D (1975), "Clinical studies on Hedychium spicatum (Shati) : An antiasthmatic drug", *J. Red. Indian Med*, Vol. 10, No. 2, pp.6.
7. Cohen HA, Neuman I and Nahum H (1997), "Blocking effect of vitamin C in exercise-induced asthma", *Arch Pediatr Adolesc Med*, Vol. 151, pp. 367.
8. Collipp P J, Goldzier S, Weiss N *et al.*, (1975), "Pyridoxine treatment of childhood bronchial asthma", *Ann Allergy*, Vol. 35, pp. 93.
9. D Anil kumar and P Ramu (2002), "Effect of methanolic extract of Benincasa Hispida against histamine and acetylcholine induced bronchospasm in guinea pigs", *Indian journal of pharmacology*, Vol. 34, pp. 365-366.
10. Dahanukar S A, Karandikar S M and Desai M (1984), "Efficacy of Piper longum in childhood asthma", *Indian Drugs*, Vol.21, No. 9, pp. 384-388.
11. Dahanukar S A and Karandikar S N (1984), "Evaluation of anti allergic activity in piper longum. Indian Drugs", Vol. 21, pp. 377-83.
12. Dorsch W and Weber J (1984), "Prevention of allergen-induced bronchial obstruction in sensitized guinea pigs by crude alcoholic onion extract", *Agents Actions*, Vol. 14, pp. 626.
13. Dyrda P, Tazzeo T, DoHarris L, *et al.*, (2011), "Acute response of airway muscle to extreme temperature includes disruption of actin-myosin interaction". *Am. J. Respir. Cell Mol. Biol*, Vol. 44, No. 2, pp. 213-221.
14. Ezike A C, Akah P A and Okoli C O (2008), "Bronchospasmolytic activity of the extract and fractions of Asystasia gangetica leaves", *International Journal of Applied Research in Natural Products*, Vol. 1, No. 3, pp. 8-12.
15. Guang Zhao L I, Ok Hee CHAI, Moo Sam LEE, Eui-Hyeog HAN, Hyung Tae KIM, and Chang Ho SONG (2005), "Inhibitory Effects of Houttuynia cordata Water Extracts on Anaphylactic Reaction and Mast Cell Activation", *Biol. Pharm. Bull*, Vol. 28, No. 10, pp. 1864-1868.

16. Guinot P, Brambilla C, Duchier J, *et al.*, (1987), "Effect of BN-52063, a specific PAF-acether antagonist, on bronchial provocation test to allergens in asthmatic patients: A preliminary study", *Prostaglandins*, Vol. 34, No. 5, pp. 723.
17. Gupta S (1979), "Tylophora indica in bronchial asthma: A double-blind study", *Indian J Med Res*, Vol. 69, pp. 981.
18. Hamasaki Y, Kobayashi I, Hayasaki R, *et al.*, (1997), "The Chinese herbal medicine, shinpi-to, inhibits EgE-mediated leukotriene synthesis in rat basophilic leukemia-2H3 cells", *J Ethnopharmacol*, Vol. 56, pp.123.
19. Hill J, Micklewright A, Lewis S, *et al.*, (1997), "Investigation of the effect of short-term change in dietary magnesium intake in asthma", *Eur Respir J*, Vol. 10, pp. 2225.
20. Hodge L, Salome C M, Peat J K, *et al.*, (1996), "Consumption of oily fish and childhood asthma risk", *Med J Aust*, Vol. 164, pp. 137.
21. <http://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/DeviceApprovalsandClearances/PMAA>
22. [pprovals/ucm213621.htm](http://www.fda.gov/oc/ohrt/ucm213621.htm) DATED: 21-11-2011.
23. <http://www.sciencedaily.com/articles/a/asthma.htm>. Accessed on Jan 13 2009.
24. <http://www.texashealth.org/body.cfm>, accessed on Oct 2011.
25. <http://www.tree.com/health/asthma-bronchial-thermoplasty.aspx>, Accessed on Oct 2011.
26. J P Kowalak A S and Hughes *et al.*, (2001), "Professional Guide to Diseases" (7th ed.) Springhouse.
27. Jin-Ah LEE, Mee-Young LEE, Chang-Seob S E O, Da Young JUNG, Nam-Hun LEE, Jung-Hun KIM, Hyekyung HA, and Hyeun Kyoo SHIN (2010), "Anti-Asthmatic Eüects of an Amomum compactum Extract on an Ovalbumin (OVA)-Induced Murine Asthma Model", *Biosci. Biotechnol. Biochem*, Vol. 74, No. 9, pp.1814-1818.
28. Jing Li, Li Luo, Xiaoyun Wang, Bin Liao and Guoping Li ((2009)), "Inhibition of NF-OB expression and Allergen-induced Airway Inflammation in a Mouse Allergic Asthma Model by Andrographolide", *Cellular & Molecular Immunology*, Vol. 6, pp. 5.
29. Jobst K A (1995), "A critical analysis of acupuncture in pulmonary disease: Efficacy and safety of the acupuncture needle", *J Altern Complement Med*, Vol. 1, pp. 57.
30. Kathi J Kemper M D, MPH, and Mitchell R. Lester M D (1999), "Alternative asthma therapies: An evidence-based review", *CONTEMPORARY PEDIATRICS*, Vol. 16, No. 3, pp. 162-195.
31. Li G Z, Chai O H, Lee M S, Han E H, Kim H T and Song C H (2005), "Inhibitory effects of Houttuynia cordata water extracts on anaphylactic reaction and mast cell activation", *Biol Pharm Bull*, Vol. 28, No. 10, pp.1864-1868.
32. Litonjua A A *et al.*, (2010), "Risk factors for asthma. <http://www.uptodate.com/home/index.html>.
33. Masaru SAKAGUCHI, Yoshiki IKEDA, Toshitaka KIDO, Mitsutoshi YUZURIHARA, Yoshio KASE, Masahiro YAMAMOTO, Atsushi ISHIGE, and Hiroshi SASAKI (2002), "Pharmacological Characteristics of Ryokan-kyomi-shinge-nin-to, an Antiallergic Kampo Medicine", *Biol. Pharm. Bull*, Vol. 25, No. 12, pp. 1562-1565.

34. Nagarathna R and Nagendra H R (1985), "Yoga for bronchial asthma: A controlled study", *BMJ*, Vol. 291, pp. 1077
35. Nisha Ojha (2011), "Management of respiratory allergic disorders (rads) in children: some clinical and experimental evidences from ayurveda", *Journal of Herbal Medicine and Toxicology*, Vol. 5, No. 1, pp. 103-109.
36. P. Manoj, E V Soniya, N S Banerjee and P Ravichandran (2004), "Recent studies on well-known spice, Piper longum Linn", *Natural Product Radiance*, Vol. 3, No. 4.
37. P. Prakash and neelu gupta (2005), "Therapeutic uses of Ocimum Sanctum Linn (tulsi) with a note on Eugenol and its Pharmacological actions: a short review", *Indian J Physiol Pharmacol* Vol. 49, No. 2, pp. 125–131.
38. Pritesh Paliwal, S S Pancholi and Rakesh K Patel (2011), "Comparative Evaluation of Some Plant Extracts on Bronchoconstriction in Experimental Animals", *Asian Journal of Pharmacy and Life Science*, Vol. 1, No. 1.
39. Ram A, Das M and Ghosh B (2003), "Curcumin attenuates allergen- induced airway hyper responsiveness in sensitized guinea pigs", *Biol and Pharm Bulletin*, Vol. 26, No. 7, pp. 1021-1024.
40. Sayeed Ahmad, Madhukar Garg, Maksood Ali, Mhaveer Singh, Md Tanwir Athar and Shahid Husain Ansari (2009), "A phyto-pharmacological overview on Adhatoda zeylanica Medic. syn. A. vasica (Linn.) Nees", *Natural Product Radiance*, Vol. 8, No. 5, pp. 549-554.
41. Schwarz J (1992), "Caffeine intake and asthma symptoms", *Ann Epidemiol.*, Vol. 2, pp. 627.
42. Shabana Channa, Ahsana Dar, Shakeel Ahmed and Atta-ur-Rahman (2005), "Evaluation of Alstonia scholaris leaves for broncho-vasodilatory activity" *Journal of Ethnopharmacology*, Vol. 97, No. 3, pp. 469-476.
43. Shimada T, Kondoh M, Motonaga C, Kitamura Y, Cheng L, Shi H, Enomoto T, Tsuruta D, Ishii M, and Kobayashi H (2010), "Enhancement of anti-allergic effects mediated by the Kampo medicine Shoseiryuto
44. (Xiao-Qing-Long-Tang in Chinese) with lysed Enterococcus faecalis FK-23 in mice", *Asian Pac J Allergy Immunol*, Vol. 28, No. 1, pp. 59-66.
45. Su-ping FANG, Takeshi TANAKA, Fumitosi TAGO, Takuya OKAMOTO, and Shuji KOJIMA (2005), "Immunomodulatory Effects of Gyokuheifusan on INF-g /IL-4 (Th1/Th2) Balance in Ovalbumin (OVA)-Induced Asthma Model Mice", *Biol. Pharm. Bull*, Vol. 28, No. 5, pp. 829-833.
46. Tadahiro Nishimura, Li-Yan Wang, Kouji Kusano, and Susumu Kitanaka (2005), "Flavonoids That Mimic Human Ligands from the Whole Plants of Euphorbia lunulata", *Chem. Pharm. Bull*, Vol. 53, No. 3, pp. 305-308.
47. Yu Jian-Er (2005), "Therapeutic effect of Xincang Decoction on chronic airway inflammation in children with bronchial asthma in remission stage", "Journal of Chinese Integrative Medicine", Vol. 3, No. 1.



International Journal Life Sciences Biotechnology and Pharma Research
Hyderabad, INDIA. Ph: +91-09441351700, 09059645577
E-mail: editorijlbpr@gmail.com or editor@ijlbpr.com
Website: www.ijlbpr.com

