The Use of Lobelia in the Treatment of Asthma and Respiratory Illness

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ABSTRACT

Lobelia is a genus of flowering plants that includes approximately 400 species and was popular in traditional Native American medicine as an emetic, expectorant and respiratory stimulant. *Lobelia* is currently used as an adjunctive for the treatment of asthma and other respiratory disorders. The active constituent of *Lobelia* is the alkaloid lobeline, which is known for its beneficial effects on the function of the respiratory tract including stimulating breathing, supporting the cough reflex and improving vascular tone. *Lobelia* is important as an alternative treatment for patients with asthma to reduce or eliminate the need for pharmaceuticals commonly associated with adverse effects. However, because of its properties as a respiratory stimulant and expectorant, *Lobelia* should be used at the correct dose and together with herbs that are soothing to the throat and lungs, and it is often used in a synergistic herbal formula that includes *Lobelia* herb and seed, *Zingiber officinale* (ginger), and *Hyssopus officinalis* (hyssop). *Lobelia* should not be used as a substitute for drug therapy during an asthma attack and its use is contraindicated during pregnancy. *Lobelia* has no known adverse drug interactions and it is therefore a promising complementary therapy for the management of respiratory disorders, in particular in light of the recent increase in the prevalence of allergic respiratory diseases.

AARM REFERENCE REVIEWS:

These are AARM reference reviews in which clinicians can obtain a quick overview of understanding with respect to how herbs, nutrients, and hormones can be used effectively in clinical practice. The dosages recommended are based on therapeutic results. Side effects that have not been seen in clinical experience or found in clinical studies but only been theorized have been identified and depicted as Unsubstantiated Theoretical Concerns.

Since many nutrients and herbs on the market have not gone through double-blind studies but have been used extensively in clinical settings for hundreds, and for some thousands of years, these reference reviews have attempted to give a unified opinion on how to use these herbs effectively. The opinions expressed are from different professors and experts in the field of nutritional and botanical medicine. Some information is based on personal opinions and can not be quantified as fact. However, if clinicians only restricted themselves to what is fully proven by double-blind studies, the art of healing and restoring health with nutrients and herbs would be lost.

CLINICAL IMPLICATIONS

Severe asthma is on the rise and is often managed with corticosteroids and other pharmaceuticals known to be immunosuppressives. Such pharmaceutical management typically must be continued long-term, if not for life, and is often associated with side effects. Complementary Alternative Medicine (CAM) therapies, including herbs, may reduce allergic phenomena and airway reactivity such that drug therapies can be reduced or possibly eliminated altogether. *Lobelia inflata* is a mainstay of botanical therapy for asthma among practitioners of the previous century up to the present time. The active constituents of *Lobelia* are alkaloids, including lobeline. The highest amount of *Lobelia* alkaloids are found in the seeds and flowers, but not in the leaf. Therefore, for most effective results it is important to administer *Lobelia* that has been picked in seed and/or at the flowering stage.

PRIMARY INDICATIONS:

Asthma, Respiratory Congestion, Bronchospasm, Pulmonary Hypertension

ADJUNCTIVE OR STAND-ALONE TREATMENT:

Adjunctive

DOSE OF BIOACTIVE CONSTITUENTS:

Lobelia 975 mg twice per day; containing 180 µg of lobeline (minimum)

Synergistic Herbal Formula: Lobelia Herb and Seed, Ginger, Hyssop, tincture dose 1:2, .25-1 ml (5-20 gtt.) three times per day

LAB TEST TO ASSESS EFFICACY:

None known

TIME TO CLINICAL EFFICACY:

In high doses, effects can be seen within a week

DRUG INTERACTIONS AND CAUTIONS:

Since asthma attacks are potentially fatal, herbal treatment can not be a replacement for drug therapy during an attack. The primary side effect that is experienced when taking high doses (twice the recommended dose) of *Lobelia* is nausea. However, *Lobelia* induced nausea can be mitigated with the concurrent use of herbs such as peppermint, hyssop and ginger and it is recommended that *Lobelia* be taken with food. Other reported side effects include: vomiting, diarrhea, coughing, dizziness, tremors, and throat irritation. If nausea does occur, lower the dosage and or take with food or a cup of peppermint or chamomile tea. *Lobelia* is contraindicated in individuals with infectious or inflammatory GI conditions. Lobelia should not be taken during pregnancy. Dose dependent cardio-activity has been observed. There are no reported adverse drug interactions, thus *Lobelia* can be used concomitant with pharmaceutical respiratory drugs.

UNSUBSTANTIATED THEORETICAL CONCERNS:

Unsubstantiated claims of Lobelia toxicity date to the early 18th century from Samuel Thomson's use of Lobelia in emetic doses with *Capsicum*.

COMMENTS:

For mild asthma cases, the capsule dose of *Lobelia* herb and seed should start at 975 mg (per dose) twice per day. Typically, patients can take this dose indefinitely. It is notable that some CAM clinicians have found a subgroup of patients can wean off the herb and experience a resolution of asthma symptoms for several months following, especially when other contributing diet and lifestyle factors are addressed as well.

For a patient using *Lobelia* along with 500 mg rosmarinic acid per day (and avoidance of all food and environmental allergens), this may be a powerful enough therapy to gradually eliminate the need for an inhaler. Other therapeutic options include *Grindelia* (Gumweed), *Tanacetum* (Feverfew), *Petasites*(Butterbur) *Curcuma* (Turmeric), *Foeniculum* (Fennel) and *Ammi visnaga* (Khella), and essential fatty acids and anti-oxidant nutrients.

Cayenne preparations may potentiate the expectorating effects of *Lobelia.* Avoiding all food allergens that have tested positive for IgE, IgA, and IgG should be practiced. Restoring bowel health

with alterative herbs, dietary changes, and probiotic and prebiotic supplementation may also benefit some asthma patients. Avoidance of all environmental and household chemicals, solvents, and synthetic compounds possible may also complement these above-described CAM therapies.

DISCUSSION

The *Lobelia* genus, belonging to the *Campanulaceae* family contains nearly 400 species. The name *Lobelia* was derived from a Belgian botanist, Matthias de Lobel—Flemish botanist and physician to King James I. *Lobelia inflata* is commonly known as "Indian Tobacco" and sometimes referred to as "Pukeweed" due to the powerful emetic effect of the fresh herbs. *Lobelia* has a longstanding history as an expectorant and respiratory stimulant, and is used in the treatment of asthma and other respiratory conditions.

THE USE OF LOBELIA IN NATIVE AMERICAN TRADITIONAL AND MUSLIM MEDICINE:

In the United States, *Lobelia* has always held a strong place in North American herbal history. Indigenous peoples of North America used *Lobelia* for wheezing, respiratory problems, and to relax muscle spasms. Commonly referred to as "Indian Tobacco" it was used in smoking mixtures in traditional medicine. The dried leaves were also sprinkled over burning coals to inhale the vapors in cases of acute wheezing. *Lobelia* was used in teas and tinctures for asthma, cough, bronchoconstriction—as well as for nervous tension and muscle spasm. *Lobelia* was also used to prepare lung plasters and compresses placed directly over the chest and lungs. In "A Modern Herbal" published in the 1930s, Maude Grieve described a poultice formula for respiratory problems using *Lobelia* and *Ulmus* bark powders combined with a weak lye solution. Historical medical journals from the 1800s and early 1900s describe the use of *Lobelia* for treatment of diphtheria and angina. Herbalists still commonly use *Lobelia* for respiratory problems.

LOBELIA CONSTITUENTS:

The physiologically most potent constituents of *Lobelia* are the piperidine alkaloids, including lobeline, lobelanine, and lobelanidine. New *Lobelia* alkaloids continue to be identified. *Lobelia inflata* also contains beta-amyrin palmitate, lobelic acid, gums, resin fixed oils and mineral salts including calcium, potassium and ferric oxide.

The highest amount of lobeline is found in the seeds. *Lobeline* is a lipophilic molecule which has been reported to act as both an agonist and antagonist to beta nicotinic receptors. Animal studies have suggested that piperidine alkaloids, such as lobeline, are able to cross the blood-brain barrier, and (similar to nicotine) promote the release of the neurotransmitters dopamine and norepinephrine. On the other hand, in animal studies, beta-amyrin palmitate has been shown to reduce the effects of amphetamines and exert a mildly sedative effect.

LOBELIA'S EFFECT ON THE LUNGS:

Lobeline is a respiratory stimulant that excites pulmonary afferent nerves, and veterinary medicine has been exploring the use of lobeline for chronic obstructive pulmonary disease in horses. At high doses, lobeline is known to be an emetic where nausea and pronounced salivation usually precede vomiting. This effect can promote hyperventilation and hyperpnoea on occasion. At moderate dosages, it promotes expectoration, can help to free secretions, and can aid respiration.

Lobeline is also reported to inhibit the release of catecholamines from adrenal glands. Specifically, it inhibits the flow of calcium ions into chromaffin cells of rat adrenal glands but does not affect the calcium ion release from the cytoplasmic calcium store. Due to blockage of adrenalin-like responses, *Lobelia* may be an appropriate additive to herbal formulas for those who experience wheezing and respiratory symptoms due to psychological stress and nervous tension.

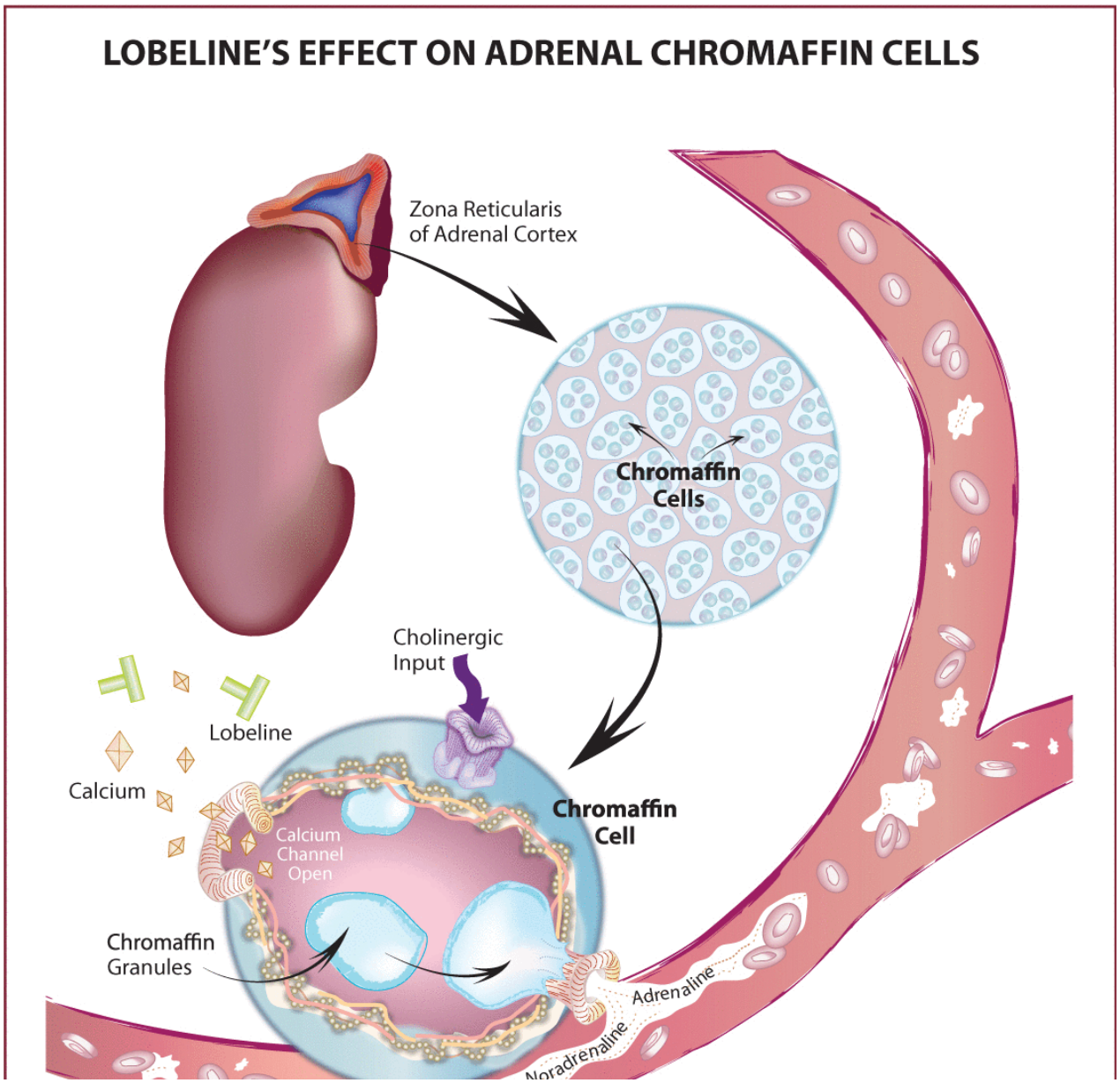
LOBELIA, THE COUGH REFLEX, AND J RECEPTORS:

Even though *Lobelia* is a classic herb for cough and lung symptoms, *Lobelia* itself is known to induce a cough and pressure sensations in the chest if injected intravenously or administered orally, especially in large doses. The sensation of fumes or pressure in the throat and upper chest may occur within seconds of oral dosing with *Lobelia* extracts; if dosing is continued, choking sensations and emesis may follow. With smaller, physiologically appropriate dosages, *Lobelia* is a rapid-acting expectorant.

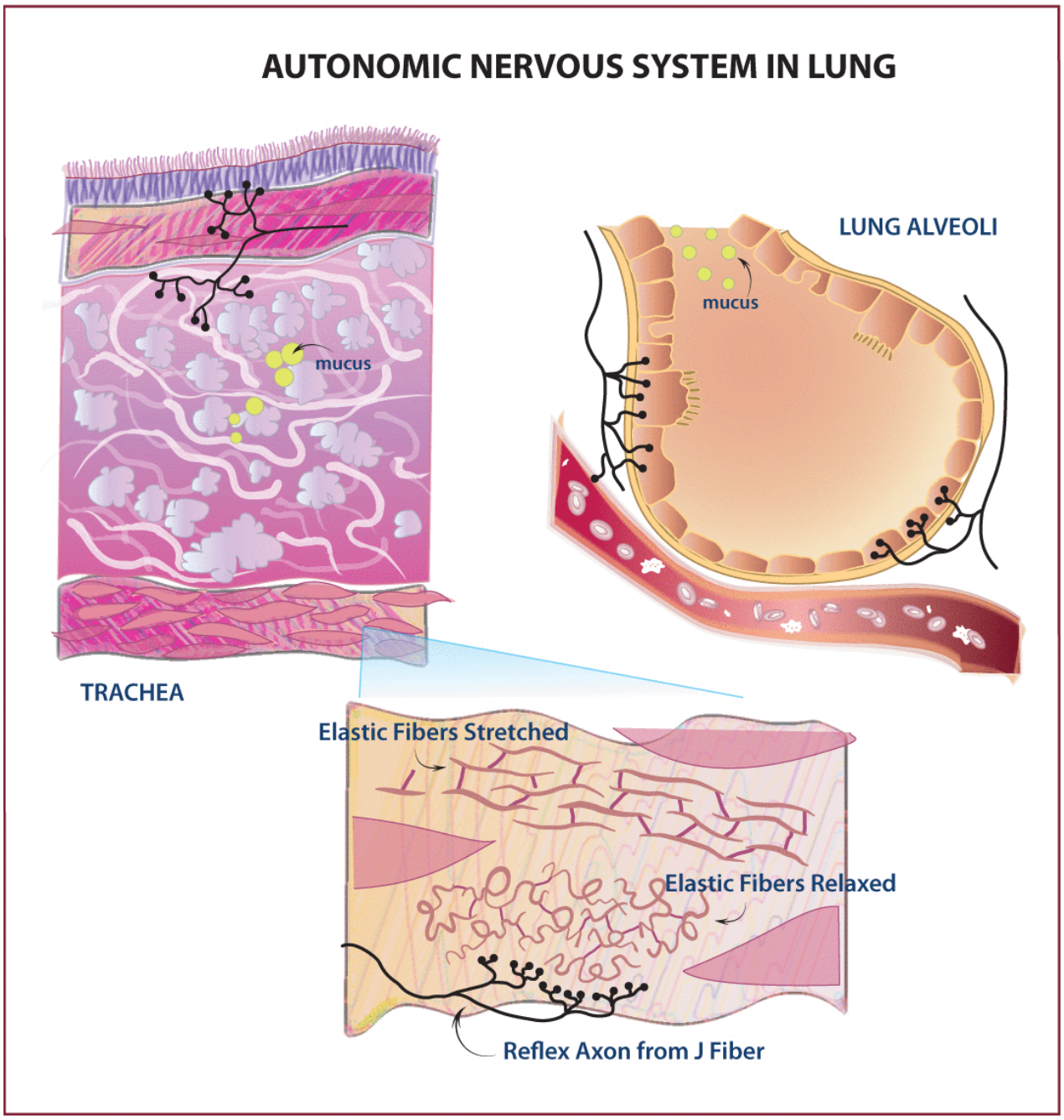
Lobelia supports the cough reflex by a variety of mechanisms including acting on juxtapulmonary capillary receptors (J-receptors). The smooth muscles of the upper airways receive input from peripheral chemoreceptors and pressure receptors including J-receptors. Lobeline's stimulation of breathing has been shown in animal studies to be abolished by carotid sinus denervation, suggesting

that lobeline may act on pressure receptors in the carotids and other blood vessels. Lobeline stimulates carotid body chemoreceptors via an adrenergic mechanism and promotes neural firing of the phrenic nerve. Lobeline may effect the cough reflex, expectoration, vascular tone, and bronchial smooth muscle tone via effects on lung cells and innervation.

The larynx and trachea are the most common locations of eliciting the cough reflex where nerve fibres associated with "rapidly adapting receptors", and laryngeal J-receptors can be stimulated and trigger a cough. J-receptors are known to be activated by capsaicin, lobeline, bradykinin, sulphur gases, and mechanical manipulation. Research has demonstrated that the throat and chest symptoms produced by *Lobelia* occur due to binding and activation of the J-receptors by lobeline, which in turn may trigger brief pulmonary congestion. J-receptors are bound and activated by lobeline. Lobeline may trigger brief pulmonary congestion due to effects on J-receptors.



Lobeline's Effect on Adrenal Chromaffin Cells



Autonomic Nervous System in Lung

Lobeline can reduce adrenergic signals via blocking calcium channels.

Theoretically, in patients suffering from excessive secretions in the bronchial passages, *Lobelia* may act like an internal "counter-irritant", but this has not been proven. If true, *Lobelia* may alleviate

pressure and congestion in the lungs which are triggering a cough reflex. Therapeutically, *Lobelia* should be formulated with herbs that are soothing to the throat and lungs and have an antispasmodic effect to complement the stimulating effects of *Lobelia.*

LOBELINE AND LUNG PROSTACYCLIN:

Prostacyclin is produced by vascular endothelial cells. The production of prostacyclin by the lungs may help protect the coronary and cerebral arteries against thrombosis and atherosclerosis. In the lungs, it decreases vascular toneand may be beneficial against respiratory diseases. Prostacyclin levels are decreased in patients with pulmonary hypertension, and prostaglandin analogues are now widely used in the treatment of pulmonary hypertension.

Prostacyclin production in the lungs is promoted by angiotensin II, bradykinin, and the presence of arachidonic acid (its metabolic precursor). Prostacyclin production is also stimulated by abnormally high oxygen levels associated with pulmonary air emboli and hyperventilation. Interestingly, lobeline has also been shown to stimulate the release of prostacyclin from the lungs, suggesting that *Lobelia* may constitute a new manner of treating pulmonary vascular inflammation as well as wheezing and other asthma-related symptoms.

SUMMARY

In summary, *Lobelia* is indicated for asthma and other respiratory ailments. It influences several mechanisms involved in proper functioning of the respiratory tract including stimulating breathing, supporting the cough reflex, promoting expectoration, and improving vascular tone. Therapeutically, *Lobelia* should be formulated with herbs that are soothing to the throat and lungs and have antispasmodic effect to complement the stimulating effects of *Lobelia*.

DISCLOSURE OF INTERESTS

Dr. Saunders reports personal fees related to employment or seeing patients from CCNM, the Dundas Naturopathic Centre, and from Beaumont Health Systems, Troy Hospital, MI, outside the submitted work. Dr. Stansbury and Dr. Zampieron have nothing to disclose.

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