

# Asthma Treatment

## Conventional and Chinese Medicine Approaches

by **Attilio D'Alberto** BSc (Hons) TCM MATCM



*Pollen grains*

**Between 100 and 150 million people around the globe, roughly the equivalent of the population of the Russian Federation, suffer from asthma and this number is rising.**

### Introduction

Between 100 and 150 million people around the globe, roughly the equivalent of the population of the Russian Federation, suffer from asthma and this number is rising. Worldwide, deaths from this condition have reached over 180,000 annually.<sup>1</sup> The Office for National Statistics<sup>2</sup> in the UK recorded the largest number of asthma sufferers below the age of 15 in both males and females. The next highest recording was in the 75-84 age groups in males and 65-74 age groups in females. Overall, there were more female asthmatics than males. The treatment of asthma in orthodox medicine

involves managing the symptoms using a variety of medications, such as corticosteroid drugs; budesonide or immediate bronchodilators; ventolin. Chinese medicine aims to treat the causes of asthma rather than managing the symptoms by using a wide variety of herbal decoctions that are consumed via the digestive system.

### Aetiology and Pathology of Asthma Orthodox Medicine

Asthma is a complex disorder involving biochemical, autonomic, immunologic, infectious, endocrine and psychological factors to varying

degrees between individuals. Asthma is described as an inflammatory disease characterized by airway hyper-responsiveness and episodic periods of bronchospasm.<sup>3</sup> There are two types of asthma: extrinsic (immunologic) and intrinsic (autonomic).

Extrinsic asthma is caused by the release of inflammatory mediators from sensitized mast cells. Intrinsic asthma, however, is not characterized by such clearly defined precipitating factors. Attacks usually occur in people more than 35 years-old, and are triggered by factors such as infection, weather changes, exercise, inhaled allergens,

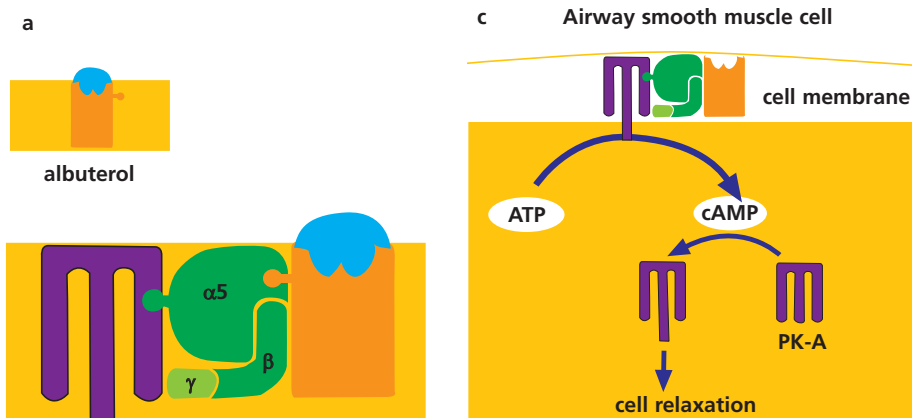


Figure 1. Action of B2 adrenoceptor agonists on airway smooth muscle.<sup>7</sup>

emotions and allergic reactions to drugs such as aspirin.

The signs and symptoms of asthmatics are predominantly constant between each sufferer. Asthma is initiated by a type I, IgE immune response. The mast cells of the bronchial tissues release chemical mediators, histamine, slow-reacting substance of anaphylaxis, eosinophilic chemotactic factors, platelet-activating factors and prostaglandins. These produce bronchial smooth muscle spasm, vascular congestion, increased vascular permeability, oedema, production of thick tenacious mucus and an impaired mucociliary function. When combined with the epithelial cell damage caused by eosinophilic infiltration, it results in airway hyper-responsiveness. A combination of bronchospasm, mucosal swelling and excessive production of mucus obstructs the airways and increases the airflow resistance, especially on inhalation. As Mera<sup>4</sup> states, the symptoms of asthma include a persistent cough, recurrent episodes of dyspnoea, wheezing, tightness of the chest, a shortness of breath and a loss of energy due to excessive exertion on inhalation.

When a doctor administers a synthetic drug, such as salbutamol, which is found in ventolin, an exact dosage is based upon a patient's body weight and age. Therefore, blood levels of the drug can be monitored easily for maximum therapeutic vs toxic effect.

#### Chinese Medicine

In Chinese medicine, asthma is known as *Xiao Chuan* and is the result of Phlegm. Phlegm is a by-product of a weak Lung, Spleen or Kidney, the three main organs that control water

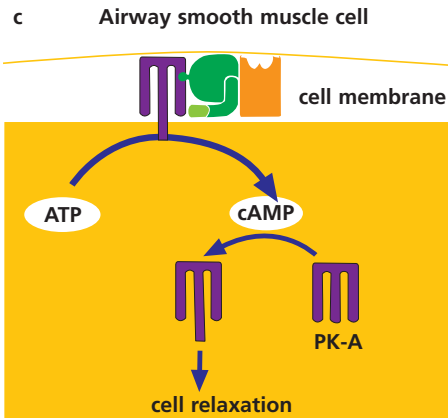


Figure 2. The factors leading to the formation of Phlegm and asthma

metabolism in the body. If any of these are unbalanced, water becomes stagnate and turns into Phlegm. No matter where Phlegm is formed in the body, it is stored in the Lung. This impedes the Lung, causing shallow breathing, wheezing, chest oppression, sweating, coughing that is sometimes productive, susceptible to colds and flu, slight fever, etc. In some cases, Phlegm housed in the Lung becomes irritated and hot. A productive, sputum cough can then change to a dry, hacking, non-productive cough. Asthmatics of this kind will tend to desire cold drinks and cold air, which temporary relieves the condition.

Asthma is further broken down into five different patterns of disharmony; Lung Cold, Lung Heat, Lung Qi deficiency, Spleen Qi deficiency and Kidney Qi deficiency<sup>5</sup> (Qi being vital energy). Ma Huang is used to treat Lung Cold type asthma. Ma Huang facilitates Lung Qi to flow more easily, thereby allowing the Lung to breathe properly and deeply, stop coughing, reducing respiratory difficulty and aiding the function of the Kidney in grasping Lung Qi.<sup>6</sup> In Chinese medicine,

if Lung Qi fails to descend, Kidney Qi cannot grasp it and pull the air deep into the abdomen, giving rise to shallow breathing.

There are a number of causes of asthma within Chinese medicine, all of which affect the Lung and lead to the formation of Phlegm:

- Sudden changes in weather;
- Inhalation of pollens, smoke dust and other irritations;
- Improper diet: excessive intake of greasy food, dairy, sweets, sea food, red meat, nuts, etc;
- Emotions: sudden, drastic changes in emotional states;
- Stress and overwork;
- Frequent and repetitive cases of cold or flu;
- Excessive intake of cold and raw food;
- Long-term illnesses.

#### Pharmacology of Salbutamol and Ma Huang

##### Salbutamol

The most widely prescribed drug used in the treatment of acute asthma is salbutamol (albuterol). It is a sympathomimetic bronchodilator that relaxes the smooth muscle surrounding the bronchioles. There are various ways of administering a dose of salbutamol: slow-releasing preparations, subcutaneous, intravenous or the preferred effective means of delivery, inhalation. A typical inhaled metered dose would include 100µg/puff, usually one to two doses up to six times a day. Otherwise, 2.5-5mg of salbutamol can be administered via a nebuliser in a sterile saline given over a 5-15 minute period or as a dry powder. After inhalation, it will have an effect within 5 to 15 minutes. This effect may last up to six hours.

Salbutamol is a  $\beta$ -adrenoreceptor antagonist that binds to  $\beta$ -adrenoreceptors. By doing so, it prevents molecules from binding with the  $\beta$ -adrenoreceptors, hence the name  $\beta$ -blockers. Page, Curtis, Sutter, Walker and Hoffman<sup>7</sup> state that salbutamol acts upon the  $\beta_2$  subtype of  $\beta$ -adrenoreceptors to cause bronchodilation. It is worth mentioning that salbutamol can work alongside other drugs such as antimuscarinic agents and methylxanthines to achieve bronchodilation. Referring to Figure 1 (a, b) we can see the  $\beta_2$  adrenoreceptor agonists relaxes the smooth muscle of the airways by activating the G protein-coupled receptors. (c) This consequently leads to the activation of adenylyl cyclase and the generation of cyclic adenosine monophosphate (cAMP). Theophylline may relax the smooth muscle of the airways by inhibiting cAMP phosphodiesterase in the cell, thus increasing the intracellular concentrations of the protein kinase A (PK-A).<sup>7</sup>

When salbutamol is given to an asthmatic patient, the ratio of unchanged drug to metabolite in the urine after an oral dose is 1:2.8 Ritter *et al.*<sup>8</sup> explain the pharmacokinetics of salbutamol: "It undergoes pronounced presystemic metabolism in the intestinal mucosa and hepatic conjugation to form an inactive metabolite that is then excreted in the urine. Up to 80% of the aerosol-administered drug is actually swallowed; whilst the remaining 10-20% remains as a free drug within the airways. The plasma elimination half-life is between 2-4 hours".

Henry<sup>9</sup> explains how particular areas of the population need to vary their dosage: Infants and children should take a reduced dose along with patients over the age of 60. It can be passed by breastfeeding to an infant but does not pose any risk. Pregnant women have no adverse reaction. For the general population, its overdose danger rating and dependency is low. It has little stimulant effect upon the heart rate and blood pressure, thus making it safe for patients with heart problems or high blood pressure.

The adverse reactions to salbutamol include:



Figure 2. Processed Ma Huang (*Ephedra Sinica*).

- Fine skeletal muscle tremors;
- Hypertension;
- Vasodilation of blood vessels to skeletal muscle;
- Palpitations;
- Excitability;
- Hypocalcaemia;
- Tachycardia.

These adverse reactions are caused by salbutamol attaching to  $\beta$ -adrenoreceptors located in the heart, lungs and muscles. This is also the receptor site for epinephrine, thus any antagonist action by salbutamol will inhibit epinephrine action. This will lead to a decrease in cardiac output and metabolic rate.

### Ma Huang

Ma Huang (*Ephedra Sinica*) is the Chinese herbal equivalent of salbutamol. It can only be administered orally, within a mixed herbal formula, either in an herbal tea or in tablet form and usually accompanies other herbs such as Gui Zhi (*Ramulus Cinnamomi Cassiae*), Xing Ren (*Semen Pruni Armeniacae*), Shi Gao (*Gypsum*), Huang Qin (*Radix Scutellariae Baicalensis*), etc. The species of Ma Huang, *Ephedra sinica* spp. are native to China, but other species exist in a number of Asian countries. The usual adult dose of Ma Huang is three to ten g/day. As Tang and Eisenbrand<sup>10</sup> state, the structural elements of Ma Huang vary depending upon its origin. Bensky *et al.*<sup>6</sup> list the main ingredients as ephedrine, pseudoephedrine, 1-N-

methylephedrine, ephedrine, 1-norephedrine, d-N-pseudo-methylephedrine, d-dimethylpseudoephedrine, benzyl-methylamine and 1-alpha-d-terpineol. Ephedrine is the main bronchodilatory agent in Ma Huang. From the native species of China, about one percent total alkaloid containing 63%-80% ephedrine and 20%-34% pseudoephedrine can be found.

Keys<sup>11</sup> states that ephedrine dilates the bronchi, stimulates the respiratory centre and acts to prevent bronchial asthma. Its vasoconstrictive action shrinks congested mucous membranes. Structurally, ephedrine is very similar to epinephrine; it triggers the release of endogenous catecholamines from the post-ganglionic sympathetic fibres. It is well-absorbed and highly lipophilic. It crosses the blood-brain barrier, but its persistence is longer than that of epinephrine.<sup>12</sup> Precautions should be taken for patients with prostatic hypertrophy, cardiac insufficiency and diabetes.

Tang *et al.*<sup>10</sup> reported an excretion rate of a typical oral dose of (-)-ephedrine at 88% in the first 24 hours and 97% within 48 hours; 53-74% of the drug was excreted unchanged, with N-demethylation to norephedrine occurring variably (8-20%).

Bruneton<sup>12</sup> mentions excessive ephedrine use (as little as 15ml of one percent solution) can induce spontaneous recovery from the common cold. However, possible side-effects include dryness of the mouth, insomnia, sweating and anxiety. More seriously, it can cause psychic and cardiac alterations. Other adverse affects include:

- Palpitations;
- Hypertension;
- Increased blood pressure;
- Stimulated cerebral cortex resulting in nervous excitability;<sup>11</sup>
- Insomnia;
- Diuresis.

At high dose rates and in sensitive subjects, ephedrine, the most active compound in Ma Huang, can cause adverse effects, especially palpitations, hypertension and excitability. This is why only qualified practitioners of Chinese

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herbal medicine should be licensed to prescribe and administer Ma Huang. Salbutamol, even at standard dose rates can cause similar adverse effects, but for a shorter time, because ephedrine persists longer in body fluids than epinephrine.

#### Case File

**Male, 42.**

**Main complaint:** Wheezing and coughing.

#### History

Difficult breathing with wheezing for three years. This was accompanied with a productive cough that yielded thick, white sputum. The patient also complained of a choking sensation in chest and hypochondria, grey complexion, no thirst for drink or prefers hot drinks, predisposed by cold, aversion to cold, cold limbs, headache and slight fever. The tongue coating was white and moist, whilst the pulse was tight and floating.

#### Pattern of disease

Accumulated Cold-Phlegm is activated by exogenous evils such as Wind-Cold (common cold). This obstructs the flow of Lung Qi and Chest Yang.

#### Treatment principle

Coughing is often accompanied with asthma. This can actually initiate an asthma attack. In Chinese medicine, it is important to stop the coughing first for several reasons: this reduces the asthma problem immediately and allows the patient to sleep easier at night. As a person coughs, the pores of their skin open and sweat leaks out. This not only leaves the person vulnerable to attack from Wind and Cold (catch another cold) but also depletes Yin as Yin is fluid. In dry-hacking cough patients, this depletion of sweat and Yin makes the dry, excessive Yang cough even worse. In addition, the act of coughing saps energy from the body, making the asthmatic weak and tired, which can worsen the Qi imbalance.

The treatment principles in this case are:

- Stop the cough;
- Stop wheezing;
- Warm the Lung and dispel Cold;
- Resolve Phlegm.

#### Formula

She Gan Ma Huang Tang (*Belamcanda and Ephedra Decoction*), which contains She Gan (*Rhizoma Belamcandae Chinensis*) 9 grams, Ma Huang (*Herba Ephedrae*) 12g, Zi Wan (*Radix Asteris Tatarici*) 9 grams, Kuan Dong Hua (*Flos Tussilaginis Farfarae*) 9 grams, Fa Ban Xia (*Processed Rhizoma Pinelliae Ternatae*) 9 grams, Xi Xin (*Herba cum Radice Asari*) 9 grams, Wu Wei Zi (*Fructus Schisandrae Chinensis*) 3 grams, Sheng Jiang (*Rhizoma Zingiberis Officinalis*) 12g and Da Zao (*Fructus Zizyphi Jujubae*) 3 pieces. This formula stops coughing, warms the Lung, transforms Cold and congested fluids lingering in the chest and redirects rebellious Qi downwards.<sup>13</sup>

#### Lifestyle advice

The patient was advised to change his diet, cut out greasy foods, dairy, stop drinking alcohol and stay out of smoky environments. Tips on what to wear during the different seasons was given so as to protect him from harmful weather conditions, such as the wind and cold. Also, breathing exercises and ways to deal with stress and anxiety were given along with bathing instructions and advice on appropriate bed linen.

#### Follow up

During the first month the patient was treated once week. The symptoms improved with less wheezing, coughing and the production of sputum. This allowed the patient to sleep better and regain strength. The patient remained well for the following three months, and only occasionally suffered some shortness of breath and a stifling sensation after catching a cold. He was treated and his symptoms disappeared. The patient was

advised to start some moderate exercise. He was followed for a further three months, during which he was not taking any orthodox medication and was asthma free.

#### Conclusion

The levels of active compounds in herbs vary widely. Variations in the levels of active compounds in *Ephedra* plants from different regions in Asia, harvested at different times and prepared in different ways, ultimately impact on their therapeutic vs toxic effects. It is important to note that Ma Huang has many different compounds. Therefore, it can be difficult to distinguish and isolate all of the physiologically therapeutic compounds. Since Ma Huang and salbutamol both act as antagonists on epinephrine receptors, their dual administration to a patient will induce a synergistic response or a higher rate of adverse reactions. These would probably include palpitations, hypertension or even cardiac failure. Also, possible down-regulation would occur as one or both drugs are withdrawn from treatment.

Unfortunately, this paper cannot address all the possible adverse or therapeutic effects of simultaneous use of Ma Huang and Salbutamol because there has been no critical research into these possible scenarios. It is extremely important to understand the inter-relationships that might occur, in an effort to balance a patient's therapeutic vs toxic effects, as an increasing number of patients are now using Chinese medicine in conjunction with orthodox medicine.

It is important to note that only qualified practitioners of herbal medicine should be licensed to prescribe and administer Ma Huang. Herbal medicine regulation should be in place within the next few years. Practitioners should not encourage patient withdrawal of orthodox medication, but instead allow the patient to make the autonomous decision themselves, after consulting their GP.

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#### About the Author

Attilio D'Alberto BSC (Hons) TCM MATCM suffered from asthma since the age of three and was taking a number of medicines, including salbutamol. For the last 13 years, he has been asthma free. This came about with a positive mental attitude, lifestyle and diet changes along with the taking of Chinese medicine. He now successfully treats other chronic asthma sufferers. D'Alberto graduated with a BSc. (Hons) in TCM (Middlesex University) and a Bachelor of Medicine (Beijing University of TCM). He practises in busy clinics in London. He may be contacted via [www.attiliodalberto.com/contact.htm](http://www.attiliodalberto.com/contact.htm)

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