

# Therapeutic Strategy for the Treatment of Silicosis with Nasal Protective Film and Respiratory Filter Wrapping Metabolism

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**Abstract:** Background Silicosis, also known as silicosis, is the most common type of pneumoconiosis. Silicosis is a common and serious respiratory disease in China. The prevention and treatment of pneumoconiosis is a arduous task. The existing prevention methods are only mechanical dust prevention. self-prevention and other industrial approaches. Based on the contradictory status quo between the common and irreversible disease characteristics of silicosis and the lack of reasonable and effective prevention or treatment methods, combined with existing knowledge and reality, a reasonable idea for the prevention and treatment of silicosis is made, which provides new ideas for the future prevention and treatment of the disease. ideas. A reasonable assumption is put forward that the current situation can be improved from three aspects: nasal cavity protection, respiratory tract protection and ventilation improvement.

**Keywords:** Silicosis; Improve ventilation.

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## 1. Introduction

Silicosis is currently a serious occupational disease with poor prognosis in China. According to January 2021, based on the occupational disease data reported by the Guangzhou Occupational Disease and Occupational Health Information Monitoring System in Guangzhou, the researchers adopted a descriptive epidemiological research method. system Research. And made a detailed study on the characteristics, regularity and types of the disease, and finally analyzed the results of the research on pneumoconiosis and silicosis, and listed them as key occupational diseases in Guangzhou for supervision and management [1]. At present, due to the single prevention method of silicosis, the damage to lung tissue is irreversible, so traditional clinical treatment strategies still cannot achieve good results. Conservative treatment will bring great pain to the patient, the patient's own breathing ability will drop sharply, and the quality of life will be seriously affected. Lung transplantation during surgery will also have many problems, such as pulmonary tension and strong postoperative rejection. Therefore, for silicosis patients, it is particularly important to choose safer and more effective preventive measures. In this article, a therapeutic strategy for the treatment of silicosis with nasal protective film and respiratory filter wrapping metabolism will be proposed and its feasibility will be discussed.

## 2. Pathogenesis

According to research, particles below  $5\mu\text{m}$  can enter the deep respiratory tract and mainly settle in the bronchi at all levels; most particles with a particle size less than  $1\mu\text{m}$  can enter the alveoli and deposit in the terminal bronchial wall and alveolar wall [2]. Silica fume, and the accumulation of small particles of silica in the bronchi and alveoli cause an irreversible and progressive pulmonary fibrosis disease.

## 3. Nasal Protective Mask

### 3.1. Protection Mechanism

Since the cause of silicosis is the deposition of dust in the lungs due to a large amount of inhalation of dust, and inhalation through the nasal cavity is the only way for dust to enter the respiratory tract, blocking dust inhalation at this stage will effectively prevent the generation of silicosis. In the body's own defense, the nasal mucosa and nasal hair play a similar role in blocking the invasion of foreign objects. Therefore, special chemical substances with adsorption function, such as the human body's own mucous membrane analogues, can be used as protective agents to make it adhere to the nasal cavity, and act as "artificial nose hair" to adsorb small particles of dust such as silicon dioxide. Impurities are excreted along with nasal secretions during subsequent metabolism.

### 3.2. Material Selection and Usage

According to relevant literature, the high secretion of mucin is related to interleukin 13 to a certain extent, so drug development can be based on this research, and the drug can be used as an aerosol similar to rhinitis spray, which can be inhaled into the nasal cavity [2]. In order to form a dense adsorption film in the nose to absorb impurities. A moderate amount of inhalation before work, can be discharged together with nasal secretions after exertion

## 4. Respiratory Filter Wraps Metabolism

### 4.1. Protection Mechanism

Similar to the nasal protective film [3], the drug transports the active ingredients to the respiratory tract through the circulatory system in the body, where the active ingredients pass through the capillary wall to form a thin filter membrane on the cross-section of the respiratory tract as a special "sieve". On the respiratory tract, the air particles inhaled into the lungs

are filtered for a second time, and the large dust particles are left on the screen, and the clean air passes through the screen, which in turn purifies the air entering the lungs.

## 4.2. Filtration of Impurities for Metabolic Processing

After the air filtration is realized, the filtration membrane forms a structure similar to "vesicles", and the impurities are wrapped in it for degradation [4]. The relevant in vivo metabolism experiments have proved that the introduction of disulfide bonds can promote the metabolism of silica in the body, so it can be The special silica microspheres with the introduction of disulfide bonds are degraded as the contents of "vesicles" as encapsulations [5], and then the metabolites are transported to the circulatory system again by osmotic absorption. It is excreted along with other wastes from the body during metabolism.

## 5. Strategies for the Treatment of Mild Silicosis

### 5.1. Theoretical Basis

The reduction of pulmonary ventilation due to the accumulation of silica dust is the main reason for poor breathing in most silicosis patients [6]. Therefore, dilating the bronchial tubes to increase their diameter and increase the air flow can relieve the symptoms of dyspnea to a certain extent. Because in the process of autonomic regulation of the nervous system, when the human body is in an explosive fighting state, the acetylcholine released by the parasympathetic nerve binds to the  $\beta_2$  receptor on the bronchi to relax it. This can be used as a basis for research on related drugs [7].

### 5.2. Principles of the Drug

It can be used as a selective  $\beta_2$  receptor agonist through special synthesis of chemical substances similar in structure to acetylcholine, which can specifically bind to specific receptors on the bronchi, increase the degree of bronchial relaxation, prolong the relaxation time, increase tidal volume, and improve dyspnea [8]. Symptoms do not affect the normal working or resting state of other tissues or organs in the body that contain  $\beta_2$  receptors [9]. However, this method is only suitable for mild patients who still have the ability to contract

and dilate the lungs and bronchi. Severe patients still need to be treated with lung transplantation.

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