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## Smoker's cough-nothing but a Pre-COPD

Smoker's cough is defined as persistent cough in smokers as a result of the irritation and damage of the lining of lungs from smoking cigarettes. In practice, smokers cough represents a spectrum of lung disease from mild irritation to advanced Chronic Obstructive Pulmonary Disease(COPD). It is hard to separate pure smokers cough from beginning of more advanced lung diseases. Smoker's cough can be seen as the first step towards development of COPD.

Cigarette smoke is made up of many different particles and gases. When you inhale this mixture inside your lungs, your lungs try to protect themselves using several lines of defenses. Tightly packed cells called the epithelial cells of the air pipes guard the inner lining of your lung. They are the first line of defense against external irritants. They produce liquid mucous to help clean the inside of the lungs and clear the debris. They also have small hair like projection called cilia that literally sweep the mucus along with the dirty particles. The inner lining of the lungs also have immune cells that help to capture and kill invading organisms. Your immune system has the ability to recruit additional immune cells and inflammatory mediators to your lungs when needed to fight any invasion.

When the particles and gases in the cigarette smoke reach the inner linings of lungs, the epithelial cells sense those irritants and produce more mucous. They try to clear the debris by sweeping with the cilia. They also initiate the cough response and help expel the dirt out of your lungs. When a person start smoking, initial cough is part of the defense mechanism and eventually this defense mechanism gets weaker. The epithelial cells start to lose their cilia and become less effective in clearing the particles. They produce more mucous but their ability to clear the mucous and irritants decrease. At this stage, the irritation and surface damage leads to persistent cough as your lungs try to free themselves of the irritants. Dry cough for at least three months, it could be smokers cough from the beginning stage of lung damage.

When a smoker continue to smoke cigarettes, he have further and more extensive damage in lungs. The production of mucus keeps going up. Normally mucus is only produced in relatively bigger airways so that they can be cleared easily. When the irritation and damage of the epithelial cells continue, even smaller airways start forming cells capable of producing more mucus. When the amount of mucus in small airways reaches a certain level, it starts to get trapped. With mucus trapping, cough gets worse and begin to transition from dry cough to wet productive cough. Due to decreased debris clearance and accumulation of mucus, you may be susceptible to more frequent upper respiratory infections. Your immune system gets activated to build up a better defense system because of the increased susceptibility to infection. In the short term, this may be helpful to fight infection. However, the over-activation of immune system

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can cause long-term lung damage.

When a smoker have daily cough with copious amount of sputum production for at least 3 months, you meet the criteria to be formally diagnosed with chronic bronchitis. Other than significantly increased mucus production, there is significant inflammation from over-activation of the immune system when you have chronic bronchitis. The inflammatory immune cells infiltrate the epithelium. The inflammation results in enlargement of the mucous producing glands. The toxic gas and particles present in cigarette smoke continue to damage the surface of the air tubes repeatedly. The cells of the air tubes try to repair themselves back to normal. However, the surfaces of the air pipes lose their original structure because of the repeated damage and repair. This is called remodeling. It can lead to narrower airways.

When the narrowing of airways becomes widespread, it can cause significant slowing down of the airflow inside your lungs. The airflow obstruction gets particularly worse when the airways narrowing involves small branches of the airways. At this stage, smoker's have chronic productive cough associated with wheezing. When the airway obstruction is permanent and associated with some degree of respiratory compromise, you have chronic obstructive pulmonary disease. It is the ultimate end game of smokers cough in most smokers. It is said that anyone who keeps smoking will get COPD at some point in his/her life if he/she lives long enough. It is a question of "when", not "if". However, there is a significant variation in the amount of cigarette smoking required to get COPD. Some people may get COPD with just 15 years of smoking while it may take 30 or even 40 years for others. It is true even if they smoked the exact same numbers of cigarette a day. Some people are born with a gene that makes them highly susceptible to getting COPD even from relatively small amount of cigarette exposure. When you have COPD, you will have some degree of shortness of breath along with smokers cough and wheezing.

At first, the shortness of breath may only be apparent with exertion rather than smoker's feeling of low energy or being tired. Although airway obstruction is one of the main problems in COPD, it is not the only one. Smoking can also damage air sacs in addition to airways. In some people, airways damage predominates while air sac damage predominates in others. In addition to that, smoking can also reduce the overall elasticity of your lungs and make them somewhat stiff.

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