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Priscilla Omai Prof. B. Amole MCB 2010L 26th March 2012 ABSTRACT During the course of a lifetime, the average person will take some 600 million breaths. Most people can keep their lungs healthy by simply avoiding tobacco smoke, other noxious fumes and maintaining a good diet. Even when emphysema causes damage, early diagnosis and treatment can slow the process, ward off complications and improve quality of life. New therapies are on the way, but simple prevention is the best treatment of all. After all, what is more important than preserving the breath of life? (Chronic Obstructive Pulmonary Disease: It Takes Your Breath way 1-4). Emphysema is increasing in the United States, Canada and other developed countries primarily because of cigarette smoking. It is almost entirely a disease of adults. Here are some demographics on the disease. About 12 million adults in the United States have been diagnosed with the disease as of 2009; however, many doctors believe emphysema is under diagnosed. Between 4-6% of male adults and 1-3% of female adults in North America are estimated to have emphysema. The number of women diagnosed with the disease is rising rapidly; the year 2000 was the first year that more women than men were identified as having emphysema. In 2005, almost 66, 000 females died compared to 61, 000 males (Deanna et al). According to the American Lung Association(ALA), the cost to the U. S for COPD each year is approximately \$42. 6 billion including \$26. 7 billion in direct health care expenditures, \$8billion in indirect morbidity costs and \$7. 9 billion in indirect mortality costs. Rates of emphysema are rising worldwide as more people in the developing countries take up cigarette smoking. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) estimates that 9-10% of adults

around the world have either chronic bronchitis or emphysema (Deanna et al). What is Emphysema? Emphysema is a lung disease, a kind of Chronic Obstructive Pulmonary Disease (COPD) in which a person's ability to breathe easily and deeply is steadily weakened over time by the destruction of lung tissue. The human lung consists of tissue containing millions of tiny air sacs called alveoli, which are arranged like bunches of grapes around very small air tubes called bronchioles. There are about 300 million alveoli in each lung. When breathing occurs, the air travels from the nose and mouth through the windpipe and then into the right and left bronchi which are the main air passages into each of the two lungs. To perform their functions effectively, the tissue in the lungs that separates the alveoli from one another needs to be as elastic as possible. What happens in emphysema is that tobacco smoke or other irritants causes the alveoli to become inflamed and lose their elasticity. The bronchioles start to collapse which traps air inside the alveoli and overstretches them. In time, the alveoli rupture leading to the formation of fewer but larger air sacs in the lungs. The smaller areas of alveoli destruction are known as blebs and the larger ones are called bullae. The bullae are less efficient in forcing air out of the lungs when exhalation takes place. As a result, the person has to breathe more frequently or harder in order to get enough oxygen and get rid of carbon dioxide. In addition, more mucous is secreted than usual causing a clogging that further makes breathing more difficult(Deanna et al) What Causes Emphysema? Smoking is responsible for about 85% of cases; heavy smokers are at highest risk. Airborne toxins account for COPD in many non- smokers. Second hand smoke is another likely contributor. In others, an inherited deficiency of a

protein called alpha1-antitrypsin that keeps the lung is to blame. But in some cases, no cause is apparent (COPD: It takes Your Breath Away¹⁻⁴).

Symptoms Emphysema starts gradually and progresses slowly; the reason for the increase in cases years after many smokers quit. Initially, there are no symptoms, but little by little, problems appear usually in the late 40s to early 50s. A morning smoker's cough is often the first complaint. The cough gradually gets worse and occurs throughout the day. Next, shortness of breath develops and then breathing becomes a chore even at rest. Most patients become weak and tired and morning headaches may be prominent. Their cough is dry and scanty, they stay pink and do not accumulate fluid, but weight loss is visible. Muscles tend to waste away and they develop large barrel shaped chests (COPD; It Takes Your Breath Away 1-4). How is Emphysema Diagnosed? A physician will ask about smoking history, possible exposures to second hand smoke, fumes and dust particles and also family history of COPD and symptoms earlier described. Chest exam is of most importance, a chest x-ray will show enlarged lungs filled with an excessive amount of air, scarring and large filled cavities (blebs and bullae) may also be evident. The most important test of all is a lung function test called 'Forced Expiratory Volume in one second' (FEV₁). This test measures the amount of air you can breathe out with a maximal effort in one second. A spirometer can be used for the test. This instrument collects the air and measures the amount you have exhaled in the first second. By repeating lung function tests, a physician can tell if a COPD is getting worse (COPD; It Takes Your Breath Away 1-4). Treatment Only about half of people with emphysema survive for 10 years or more after the diagnosis is made. The

goals of COPD treatment are not only to prolong life but also to help maintain independence and alleviate discomfort. Achieving these goals require a combination of lifestyle modifications, medications, mucous clearance devices, vaccinations, oxygen therapy and sometimes surgical procedures (COPD: Lung Disorders 21-37).

Lifestyle Modifications The two interventions associated with improved survival in people with emphysema are smoking cessation and supplemental oxygen. It is important to avoid exposure to other airborne toxins including second hand smoke, exercise as much as possible and follow an adequate diet. Adding a liquid protein supplement to the daily diet can improve overall nutrition and help prevent weight loss (COPD; Lung Disorders 1-4). One study of data from more than 51, 000 men found that those who consumed a rich diet in fruits and vegetables, whole grains and fish had a 50% lower risk of developing COPD than men who ate a rich diet in refined grains, cured and red meat, desserts and French fries. A separate study of data from more than 72, 000 women found similar results (American Journal of Clinical Nutrition).

Bronchodilator Medicines This class of medication works by relaxing the muscles around the airways. They are typically indicated for the relief of bronchospasm in patients with reversible obstructive airway disease. Some of them include; Albuterol, terbutaline, ipratropium, bromide and theophylline. Inhaled medicines which go directly into the lungs and have less exposure to other parts of the body are often tried first because they usually begin working in less than five minutes with a lower incidence of side effects (Lewis).

Anti-Inflammatory Devices Physicians may prescribe a corticosteroid to soothe and ultimately heal the delicate lining layer of the air passage ways making them more resistant to

obstruction. They do not carry an FDA approved indication for COPD but are used off label by many clinicians. Long term use of oral corticosteroids is commonly associated with a variety of dose dependent side effects such as osteoporosis in men and women, weight gain, and fat redistribution, hypertension and high blood sugar. The commonly used one is the oral preparation prednisone (Lewis). Oxygen Therapy Supplemental oxygen can benefit the patient whose lung function is severely impaired and cannot absorb enough oxygen from the air. This therapy reduces the excess red blood cells which helps improve mental functioning and heart failure. It may also improve shortness of breath during exercise (Lewis). Lung Reduction Surgery This is a minimally invasive procedure which often eliminates the need for oxygen and significantly enhances breathing function. Two or three small incisions are made in the chest and a tiny camera inserted through one of the incisions to view the lung, a special stapling device is inserted through another incision to cut portions of the lung so that the healthy lung tissue has more room to expand. This procedure requires prior testing for prospective patients (Lewis). Transplant Surgery This is a highly invasive, complex procedure that carries substantial risk. Because of known complications of any organ transplant surgery, this option is only viable in a very small select group of patients (Lewis). Mucous Clearance Devices This is a small hand held object shaped like a pipe. Blowing into it creates vibrations in the chest that loosens mucus and help medication penetrate the lungs more easily. Some studies suggest that using a mucus clearance device before an inhaled bronchodilator can improve both lung function and exercise capacity while reducing shortness of breath (COPD; Lung Disorders

21-37). Vaccinations People with Emphysema should have annual flu shots as well as a pneumonia vaccination about once every six years. These steps minimize the risk of infections that can lead to episodes of temporary but severely worsened symptoms (COPD; Lung Disorders 21-37). Inherited Emphysema This rare inherited form of emphysema is called alpha1-antitrypsin deficiency (A1AD). People with this disease lack a protective protein called alpha1- antitrypsin(AAT) or alpha 1- proteinase inhibitor. Without AAT, a natural enzyme called neutrophil elastase that initially fights bacteria and cleans up dead lung tissue can run rampant and eventually damage lung tissue. The missing or defective protein can be replaced or augmented. The treatment raises the level of AAT in the blood and may protect the lung tissue from the destructive enzyme. The therapy is called Prolastin and is derived from human plasma that has been screened and tested for viruses. It is usually taken in weekly intravenous infusions. The prognosis for emphysema associated with A1AT deficiency is poor. Long term studies of the efficacy of the augmentation therapy have not been carried out as of 2009 although it has been for about 20years and is considered safe. Most patients with this form of emphysema suffer some degree of disability and shortened life expectancy (Lewis). Conclusion A simple and inexpensive blood test designed to uncover early signs of emphysema may one day find its place among the standard work up that most Americans undergo during their yearly physical. Although the novel screening method has shown considerable promise in preliminary investigations sponsored by the U. S National Institutes of Health, the researchers caution that more studies are needed before the test could

become available. Studies have shown that smokers who learn from objective evidence that their health is in danger are much more likely to quit according to Dr Ronald G. Crystal, professor of genetic medicine and internal medicine at the Weill Cornell Medical College and the study's lead author. The ALA recommends that physicians make strong efforts at smoking cessation for all their smoking patients, it is an effective way to get people to make a serious attempt to quit. Dr Schuchter, a professor of pulmonary medicine at Mount Sinai Medical Center, New York added that early detection can make all the difference in managing emphysema (New Test for Emphysema on the Horizon). Works Cited American Journal of Clinical Nutrition. Vol. 86, P. 488 August 2007. " Chronic Obstructive Pulmonary Disease: " It Takes Your Breath Away...(cover story)." Harvard Men's Health Watch 14. 7 (2010): 1-4 Health Source-Consumer Edition. web. 23 Mar. 2012. " Chronic Obstructive Pulmonary Disease (COPD)." Lung Disorders (2008): 21-37. Health Source-Consumer Edition web. 23 Mar. 2012. Deanna M. Swartout-Corbeil, RN., Patricia Skinner; and Rebecca J. Frey, PhD. " Emphysema." The Gale Encyclopedia of medicine. Ed. Laurie J. Fundukian. 4th ed. Detroit: Gale, 2011. 6 vols. Lewis, Carol. " Every Breath You take." FDA Consumer 33. 2 (1999): 9. Health Source- Consumer Edition. web. 23 Mar. 2012. " New Test for Emphysema on the Horizon" www. businessweek. com/lifestyle/content/healthday/650728. Mar 11, 2011. web. 23 Mar. 2012