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Molecular understanding of lung cancers-A review

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PEER REVIEW

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Comments

This is the excellent review given by the author. This may help to understand the global problem lung cancer and to know the importance of chemotherapy; sofar 45 different mangrove plants have the anti-cancer potential but not studied thoroughly. This study clearly indicates the much more bottomless study need to find out the remedy for this problem and mangrove may be very good source. Also UGC, Government of India supported this brilliant study.
Details on Page S39

ABSTRACT

Lung cancer is considered to be the most common cancer in the world. The purpose of this paper is to review scientific evidence, particularly epidemiologic evidence of overall lung cancer burden in the world. And molecular understanding of lung cancer at various levels by dominant and suppressor oncogenes.

KEYWORDS

Lung cancer, p53 mutation, Mangroves, Anti-cancer drugs.

1. Introduction

Lung cancer is considered as the most common cancer in the word[1]. Until today, several biological events have been identified in lung adenocarcinoma, including epidermal growth factor receptor mutations and anaplastic lymphoma kinase translocations, offering new hopes to patients with metastatic disease. Lung cancer remains a major global health problem accounting for more than a million (1.8 million) annual deaths worldwide[3,4], especially it kills more people than from colon, breast, and prostate cancers[5]. Lung cancer responsible for 17.8% of all cancer death[6]. In India, around 555 000 people died of cancer in 2010[7], according to estimates published in The Lancet today.

2. Carcinogens of lung cancer

2.1. Smoking and lung cancer

Lung cancer rates are largely determined by smoking patterns, medical, occupational and environmental radiation exposures have also been shown to increase risks of lung cancer[8]. The disease of lung cancer was not recognized as a disease until 1761[9], the first link between lung cancer and smoking was reported in 1929 by physician

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Fritz Lickint from Germany. It is believed that smoking is the primary etiologic agent in more than 80% of lung cancer patients[10]. Cigarette smoking is also an important cause of esophageal, oral, oropharyngeal, hypopharyngeal and laryngeal cancers as well as pancreatic cancer, bladder cancer, and cancer of the renal pelvis including vascular diseases[11]. The mainstream smoke emerging from the mouth-piece of a cigarette is an aerosol containing about 1 010 particles/mL and 4 800 compounds include poly aromatic hydrocarbons[12]. It is experimentally proved that, cigarette contains PAH like aza-arenes, tobacco-specific nitrosamines, *e.g.* 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK), 1,3-butadiene, ethyl carbamate, ethylene oxide, nickel, chromium, cadmium, polonium-210, arsenic, and hydrazine convincingly induce lung tumors[12]. Among the poly aromatic hydrocarbons, benzo[a]pyrene (BaP) is the most extensively studied compound against lung cancer through administration or inhalation[13]. Studies of non-smokers exposed to second hand smoke in their workplace show an increased risk of lung cancer[14].

2.2. Radiation and lung cancer

Lung cancer rates are also strongly associated with radiation, with an estimated excess relative risk per Gy of 0.81 and excess absolute risk of 7.5 per 10 000 person-year Gy[15].

2.3. Pollution and lung cancer

Pollution from transport also associated with the development of cancer, particularly lung cancer[16]. A recent report published in Europe related to relationship between lung cancer and vehicle-related pollution[17]. Exposure to NO_2 from heavy traffic roads increases the risk of lung cancer[18,19]. Reasons for believing that air pollution might be an important factor in the development of lung cancer were first, the presence in polluted air of known human carcinogens[20]. Benzopyrene in air is one of the important risk factor of lung cancer[21,22]. Use of unprocessed solid fuel for cooking most found in India causes indoor air pollution which may have the wide-range of chemicals is the important risk factor of lung cancer[23, 24].

2.4. Chemicals and lung cancer

Exposure to chemicals, whether naturally occurring or industrially produced, is a constant and inescapable fact of life. Natural chemicals such as arsenic, asbestos, chromium, nickel and vinyl chloride and to the natural radioactive gas radon increased the risk of lung cancer[25]. Genetic predisposition: especially polymorphisms of the tumor suppressor genes and the allelic variants of the genes involved in detoxification are implicated into the susceptibility to the disease. Chemical carcinogens has specific effect on metabolic pathways by interfering with the genetic integrity[26].

2.5. Radon and lung cancer

Radon is an invisible, odorless, and tasteless radioactive gas that occurs naturally in soil and rocks. Radon-222 is a naturally occurring gas that originates from the decay product of uranium-238, and in turn decays into short-lived radioactive alpha and beta emitting particles[27]. Exposure to radon (in mines or even houses) can cause damage to the lungs that may lead to lung cancer[28]. In 1988, radon was classified as a Class 1 human carcinogen and it is established that high levels of inhalation exposure can cause lung cancer[29]. Since radon is an inert gas, when it is inhaled, the gas is mostly exhaled except radon will decay to other radioactive decay products, such as polonium, bismuth and lead. These are solid fine radioactive particles that can be inhaled and subsequently reside in the lung. The link between radon and lung cancer dates back to early reports of underground miners in the 16th century who were anecdotally observed to have greater risk of respiratory related mortality, later determined to be lung cancer[30].

2.6. Asbestos and lung cancer

Asbestos (actinolite, amosite, anthophyllite, chrysotile and tremolite) is the name of a group of minerals that occur naturally as fibers and are used in certain industries. Asbestos is one of the most important occupational carcinogens causing about half of the deaths from occupational cancer. When the particles are inhaled, they can lodge in the lungs, damaging cells and increasing the risk for lung cancer[31].

2.7. Lung diseases and lung cancer

Certain lung diseases, such as tuberculosis, increase the risk of developing lung cancer. Lung cancer tends to develop in areas of the lung that are scarred from tuberculosis[32].

3. Symptoms of lung cancer

Lung cancer symptoms are not often felt until the disease has developed into an advanced stage. Constant chest pain, chronic cough, coughing up blood (hemoptysis), dyspnea (difficulty breathing), fatigue, lung infection (pneumonia, bronchitis), shortness of breath, swollen lymph nodes, loss of appetite and weight loss, and wheezing, bone pain and tenderness, breast development in men, weakness, chills, speech difficulties or changes (*i.e.*, hoarseness), droopy eyelids, swelling of the face and neck, fever, joint pain and swelling, muscle weakness, pale or bluish skin *etc*[33,34].

4. Apoptosis

Apoptosis is a genetically programmed process