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Effectiveness of Diagnostic Tools and Management of Lung Cancer

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Abstract

Early detection of lung cancer stages is deeply under consideration of scientists. By day, high rate of mortality might be caused by cancer of lung over the world. Detecting appropriate tools to determine the early stages of lung cancer is urgently needed. Over the years, recent tools such as position emission tomography/computed tomography, Tranbronchial needle aspiration, endobronchial ultrasound, esophageal ultrasound, medical thoracoscopy and Non-invasive biomarkers have been performed and many studies have estimated where they can be effective alternative in lung cancer diagnostic and staging algorithms. By accurate detection, lung cancer can be managed and treated efficiently. Surgery is considered as the only treatment for lung cancer. Consequently, finding out alternative treatment and reliable management are required.

Keywords: Lung cancer; Radiography; Endobronchial ultrasound; Biomarkers

Abbreviations: Lung Cancer (LC); Computed Tomography (CT); Sputum Cytology Screening (SCS); Bronchoalveolar Lavage (BAL)

Introduction

Tobacco consumption is considered the major cause of Lung cancer (LC, and approximately 85% of all cases in both genders infected by lung cancer worldwide have tobacco consumption history [1]. Detecting around 50 % patients with early stages and localised lung cancer is considered better than diagnosis in advanced stages [2]. However, about 61% of cases are determined in later stages (III and IV), whenever the treatment availabilities are limited and the prognosis is usually poor, with a 5-year survival of only 5-15% [3]. Even though finding out new effective diagnostic tools such biomarkers and radiography options has vital roles in treatment and following up the infected individuals, the main challenge with lung cancer is to improve initial evaluating of the patients, because according to various projections, the number of lung cancer cases is expected to increase in the future [4].

Chest radiography as a diagnostic tool

The detection of lung cancer at early stages is therefore of great clinical value. The screening for lung cancer with chest radiography and overall low-dose Computed Tomography (CT) has resulted in an increased proportion of invasive procedures. Bronchoscopic examination, the principal diagnostic tool for patients with suspected carcinoma, has led to a strategy of using multiple simultaneous tests from the same bronchoscopic procedure (e.g., bronchial brushing, bronchoalveolar lavage-BAL, and endobronchial ultrasound-guided biopsy) to enhance the probability of obtaining a diagnosis. Despite this, the diagnostic accuracy of bronchoscopic examinations is sub-optimal, with the sensitivity ranging from 34-88% depending on the size of the primary tumor and the number of parallel tests performed per bronchoscopy [5].

Sputum cytology screening

To determine initial levels of lung cancer, Sputum Cytology Screening (SCS) and chest radiography (and later on low-dose spiral CT) have been approved in many medical foundation [6]. Epidemiologists, cytopathologists, molecular biologists, radiologists and surgical oncologists have been involved in the process to identify and treat those with early lung cancer. Cases with suspicious sputum cytology (severe atypia or malignant cells) have been subjected to FB and further radiological staging [7]. Sputum cytology mainly detects SCC in the central airway. Treatments offered have been both surgical and bronchoscopic, e.g. photodynamic therapy [8].

Non-invasive biomarkers as a diagnostic tool

MiRNAs The higher sensitivity and robustness against degradation by Rnase could promote their role as noninvasive markers for managing lung cancer. Several studies have declared that miRNAs are dysregulated in lung growth, recurrence and metastasis [9]. These RNA molecules were literally tested particularly in the Bronchoalveolar Lavage (BAL), sputum and tissue samples [10].

Proteomics involves the separation, identification and quantification of proteins. It also obtains the analysis of proteoforms that arise as a consequence of post-translational modifications and sequence variants such as mutants and alternatively spliced isoforms. New progress in mass-spectrometry in combination with a range of separation methods have assisted scientists to reach satisfactory results on the different protein expressions between normal and neoplastic lung tissue, thus offering beneficial data for molecular interactions, signal pathways and biomarker identification (both diagnostic and predictive) [11]. BAL fluids and tissue samples are used to be included

in different potential studies to estimate the proteome status of lung cancer.

Metabolomics

Metabolomics is a new technology developed to determine small molecule intermediates and products of metabolism in organisms. Scientists have made different research studies on metabolomics application in cancer research, which approved that novel metabolites can play pivotal role as an effective biomarker to detect early stages of lung cancer. By advanced studies, the development of a next-generation metabolomic technique affirmed the sensitivity and accuracy of the method.

Microbiome

The number of bacteria in the body is estimated to be of the same order as the number of human cells and the combined genetic material of the microorganisms is defined as the microbiome [12]. The link between the microbiome and cancer has been performed by different research studies, particularly in gastrointestinal malignancies [13]. Much evidence has confirmed that microbiome profile has efficient role in detecting the progress of lung cancer. As a result, by tissue or cytological samples, microbiome can be accurately used for early detection.

Chemotherapy

Chemotherapy is the use of chemical complexes as drugs to kill or stop rapidly growing cancer cells. Chemotherapy may be given by injection directly into a vein or given through a catheter, which is a thin tube placed into a large vein and kept there until it is no longer required. Some types of chemotherapy drugs are taken orally in pill form.

Management of lung cancer

Treatment and management of lung cancer infected cases represent a serious public-health problem often with difficult-to-control health costs especially after the introduction of molecular target therapy and immunotherapy for cancer [14]. When diagnosed at an early operable stage, the 5-year survival rate from lung cancer climbs to above 50%. The greatest elimination in morbidity and mortality from lung cancer is probably to be done through improved prevention. Smoking is by far the most important cause of lung disease and interventions to assist smoker to stop smoking are needed.

Discussion and Conclusion

Detecting recent reliable diagnostic tools whatever biomarkers or radiography techniques are required urgently. Thereafter, scientist should be promoted to find out new efficient predictive tools for early stages of lung cancer. On the other side, discovering effective safe drugs whatever chemical or herbal as a treatment is inevitably needed. Diagnosis and treatment for lung cant should be planned accurately. Caring patients and curing infected cases in isolated environment are very important in a plan of treatment. Following up by effective diagnostic tools should programme regularly. Consequently, detecting early stages of lung cancer and treating them at these initial levels is better than programming a plan of treatment at advanced stages. Moreover, Programmes should obtain awareness-rising contents to help all different class of individual whoever patients, family and community members to be enlighten about risk factors of cancer and the need for taking protective and preventive measures to whatever eliminate or avoid progress cancer. On the other hand, intervention of governments to outlaw the smoking and enforce individuals to stop smoking wherever at public or private places by making random scanning and implementing taxes on smokers. Finally, further research studies for detecting recent appropriate diagnostic tool and drugs are urgently needed.

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