Lung Cancer: Brief Account of Advanced and Traditional Treatments and Diagnosis

Jumma Shaikh[1], Pankaj Bangal[2], Rituja Pandhre[3] and Vishesh Saini[4]

[1]Department of Microbiology, Abasaheb Garware College, Savitribai Phule Pune University, Pune, India

[2]Department of Bioinformatics, Savitribai Phule Pune University, Pune, India

[3]Department of Biotechnology, Modern College Savitribai Phule Pune University, Pune, India

[4]Department of Biotechnology, Graphic Era University, Dehradun, India

Corresponding author: Jumma Shaikh, Department of Microbiology, Abasaheb Garware College, Savitribai Phule Pune University, Shivajinagar, Pune, India, Tel: 9096099942; E-mail: shaikh.sahil70@gmail.com

Abstract

Lung cancer is an uncontrolled growth of lung cells that's lead to form a tumour. More than 20% of total cancer death is due to lung cancer. There are mainly two types of effective treatments available viz. traditional and advance. Each treatment has their pros and cons, but the advance and latest treatment has upper hand as well as effective results compared to the traditional one. Both Traditional chemotherapy and radiotherapy have restricted impact on advance stage of cancer. This review provides comparative account of traditional and advances in lung cancer treatment.

Keywords: Lung cancer; Traditional and advance treatment; Chemotherapy; Radiotherapy

Introduction

Lung cancer is an uncontrolled growth of lung cells that's lead to form a tumour. More than 20% of total cancer death is due to the lung cancer. The mortality rate of lung cancer is very high and almost 1 in 5 cancer patients [1,2]. There are 2,24,210 new cases and 1,59,260 deaths are reported in the year 2014 [3]. Basically there are two major types of lung cancer viz. small cell lung cancer and non-small cell lung cancer [2]. Various treatments are being used on the basis of cancer progress. Major chances of lung cancer being diagnosed are between the age of 65 and 74 [2]. The major cause behind lung cancer is smoking. 90% of lung cancer cases are found to be associated with continuous exposure of carcinogen strongly found in the cigarette [3]. The survival of lung cancer is very poor but early detection and diagnosis can helps to complete resection in very early stage. overall outcome can be improved in cancer patients by using screening techniques [4-8].

Advance Treatment

Chest X-ray, sputum cytology

Till now for lung cancer screening there are many techniques are available, Chest X-ray, sputum cytology and computed tomography (CT), chest X-ray and sputum cytology is mainly being used to evaluate the smoker population [9]. The sensitivity and accuracy of chest X-ray technique ranges from 54% to 84% whereas for sputum cytology is from 27% to 66%. As per the study carried out earlier, it has been found that both the X-ray and sputum cytology cannot improve mortality, even though these techniques can detect lung cancer at an earlier stage [10-17].

Genomics, genetics and proteomics techniques

Proteomics, genetics and genomics research techniques are high dimensional and are being widely used in the treatment and research of cancer over the two decades. In these two decades different genetic, genomics and proteomics markers have been invented and discovered for the prediction as well as prognosis of the diseases [11-19]. This can allow us to understand the deep knowledge of molecular heterogeneity and target therapy. Now day's medical imaging techniques has gained the considerable attention for early screening of cancer [20].

Blood-Based biomarker

The utilization of metabolomics to the revelation of blood-based biomarker in disease has significant potential clinical pertinence. As of late, it has been recognized the polyamine deciding item N1, N12-diacetylspermine (DAS) as a novel pre-indicative serum biomarker for non-little cell lung growth [21].

PCR-based mutation testing kits and Sanger sequencing

PCR-based change testing units and Sanger sequencing have gotten to be as brilliant standard strategies for demonstrative purposes. Next generation sequencing (NGS) techniques are quick, sparing, delicate and multipliable, and they are gradually supplanting the conventional strategies [22-27]. However, before execution of NGS in indicative settings, it is critical to altogether test and contrast results with those with standard routine demonstrative techniques. Some past studies have demonstrated the Ion Torrent PGM framework to be precise in change investigation by utilizing Ion AmpliSeq Colon and Lung Disease Panel and/or the Ion AmpliSeq Colon and Lung Cancer Research Panel V2 contrasted and Sanger sequencing [28-31].

New and emerging drugs for squamous cell lung cancer

Agents focusing on the epidermal growth factor receptor (EGFR) have been utilized successfully as a part of both squamous and non-squamous NSCLC regardless of a low frequency of activating EGFR transformations in SQCLC [32]. This may be to some extent because of higher EGFR protein expression or expanded quality duplicate number/intensification seen with squamous histology. Past trials with Erlotinib exhibited its unassuming advantage as second-line versus placebo treatment or as support treatment. In any case, different Phase III studies including TAILOR (Tarceva Italian Lung Optimization Trial) and DELTA (Docetaxel and Erlotinib Lung Cancer) showed the prevalence of second line docetaxel over erlotinib in both PFS and OS in the number of inhabitants in EGFR-WT patients (which incorporates most SQCLC patients), blocking far reaching appropriation of second line Erlotinib for SQCLC [33-35].

Recently, Necitumumab was approved by the FDA in November 2015 as first line treatment in combination with chemotherapy for SQCLC. The Phase III Study (SQUIRE) showed significantly improved OS (HR=0.84, p=0.012) and PFS (HR=0.85, p=0.020) with the addition of Necitumumab to Gemcitabine/Cisplatin [36-41].

VEGF targeted therapy

In 2014, Ramucirumab, a human IgG1 antiboy focusing on the extracellular area of the vascular endothelial development element receptor 2 (VEGFR-2) was endorsed for use in the second line in conjunction with docetaxel [42-48]. The Phase III REVEL Trial demonstrated a 1.4-months OS advantage (HR 0.86, p=0.023) and 1.5 month PFS advantage (HR 0.76, p<0.0001) with utilization of Ramucirumab/docetaxel versus Docetaxel alone as second line treatment in Stage IV NSCLC. The study incorporated all histologies of NSCLC, yet in light of impromptu subgroup examinations squamous and non-squamous histologies demonstrated comparative advantage [49].

Immunotherapy

Nivolumab is a human IgG4 PD-1 antibody which was approved for the second line treatment of metastatic SQCLC in April 2015. The Phase II CheckMate 063 trial of 117 patients with advanced, refractory SQCLC showed objective response in 14.5% of patients with median duration of response not reached and stable disease in 26% of patients with median duration of 6 months [50,51]. Subsequently a Phase III study of nivolumab vs docetaxel as second line therapy for Stage IIIB or IV SQCLC who have failed platinum based chemotherapy also reported positive results [13]. The median OS was 9.2 months with nivolumab vs 6 months with docetaxel (HR for death 0.59, p<0.001). Response rate was 20% with nivolumab vs 9% with docetaxel (p=0.008) and reassuringly grade 3-4 adverse events were reported in only 7% of the nivolumab group versus 55% of the docetaxel patients. Interestingly, expression of PD-L1 was neither prognostic nor predictive of benefit [52]. Trials are ongoing to evaluate the use of nivolumab in the front line for metastatic NSCLC (NCT02041533), as neoadjuvant therapy in resectable NSCLC (NCT02259621) and as frontline for Stage IIIB/IV NSCLC in conjunction with nab-paclitaxel (NCT 02309177) [53-58].

Of all the late advances in treatment of SQCLC, the most encouraging have been in immunotherapy, especially in agents targeting immune check points. Programed death 1 (PD-1) is included in restricting the movement of T cells permitting tumor cells to sidestep the resistant reaction. SQCLC indicates expanded expression of ligands for PD-1 known as PD-L1. Blocking either the receptor or ligand could defeat invulnerable resistance prompting tumor relapse [59-63]. Nivolumab is a human IgG4 PD-1 antibody agent which was affirmed for second line treatment of metastatic SQCLC in April 2015. In October 2015, pembrolizumab turned into the second immunotherapy agent affirmed in NSCLC. Pembrolizumab is a humanised IgG4 antibody agent affirmed for use in patients with cutting edge NSCLC with archived PD-L1 expression after movement on chemotherapy and focused on agent. Extra accomplishment with immunotherapy has been observed with Ipilimumab and Tremelimumab, antibodies to cytotoxic Tlymphocyte-related protein 4 (CTLA-4) [64]. These therapeutics evolves the resistant reaction by hindering down regulation of the immunity systems brought about by CTLA-4 [65-68].

Notwithstanding these promising results, immune system is ruined by our failure to choose for patients who will appropriate and react. Further research is expected to recognize and approve prescient biomarkers for determination and checking of treatment.

Traditional Medicine

Herbal medicine

Compound derived from plants have been a vital source of several clinically useful activity against cancer. These incorporate vinblastine, vincristine, the camptothecin

subsidiaries, topotecan and irinotecan, etoposide, got from epipodophyllotoxin, and paclitaxel (taxol®) [69-77]. Various promising new drugs are in clinical improvement in view of specific movement against cancer-related molecular targets, including flavopiridol and combretastin A4 phosphate, while a few drugs which fizzled in before clinical studies are fortifying restored interest [78-82].

Acupuncture

This study is the first to show that needle therapy might be a viable methodology for minimising side effects specifically, agony and prosperity in a lung cancer disease populace [83-89]. Needle therapy is a safe and insignificantly obtrusive methodology, and it might have an especially helpful part in patients experiencing anticancer treatment, for example, the people who constituted the more significant degree of the patients in the present study [90,91].

A huge scale randomized controlled trial is expected to affirm the valuable impacts of acupuncture therapy in this populace and to accumulate more exact data about the recurrence and duration of acupuncture therapy medications required to accomplish ideal side effect control [92-96]. Patients and specialists need answers to critical questions about the symptoms that are very amiable to help through acupuncture therapy and the point in the patient's treatment direction when it is best to utilize acupuncture therapy [97,98].

Conclusion

Late advances in lung cancer disease administration have to a great extent profited patients with the adenocarcinoma histologic subtype. In spite of SQCLC representing up to 25% of all lung cancer cases, treatment customarily comprises of established chemotherapy with long haul sickness control and survival staying subtle. Late leaps forward in genomic typing of SQCLC have uncovered different actionable mutations and pathways. As successful molecular targeted agents are distinguished, the battle will stay to discover prescient biomarkers for these treatments. Further trust exists as SQCLC has all the earmarks of being receptive to safe interceded treatments. Better comprehension of tumour science and revelation of prescient biomarkers will encourage enhancing clinical advantages and endeavours at customized treatments.

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