

Foundations of Cancer

2-28-2013

Dr. Wouter Hoff

Lung Cancer Treatment

Abstract

Cancer is, always has been, and always will be a huge problem in the world that we all live in. All types of cancer are potentially deadly with the right set of circumstances. However, one of the most formidable forms of this horrendous disease comes in the form of lung cancer. Lung cancer is the third most common type of cancer in America led only by skin and breast cancer respectively. Over two hundred thousand American people were diagnosed with a new case of lung cancer in the year 2022 alone. As long as we have known about cancer we have tried to find the causes and the different kinds that exist. However, the one thing we have done with more purpose is try to find the treatments or cures to these diseases. Diagnostic predictions have changed from the diagnosis meaning almost certain death to the individual having hope that they can survive with the right medical care. Lung cancer has a long history of how it was clinically treated. Over time we have become more effective in our treatments and hope to carry this upward trend into the future.

Lung cancer is the leading cause of cancer related deaths worldwide, with almost 1.6 million deaths, and the five year survival rate is still below 20%. However, there are multiple different ways that our medical professionals and scientists are trying to combat these statistics. The first step that is taken is just a general monitoring of normal patients. If patients have their normal checkups and testing the chances of catching the lung cancer early enough to prevent mortality go up. However, nearly forty percent of the newly diagnosed cases of non-small cell lung cancer are already in stage IV of the disease. However, there is still hope for these patients looking for answers.

The list of treatment options for non-small cell lung cancer is extensive and dependent on the progression and stage of the disease. However, the first stop for a majority of patients with non-small cell lung cancer is imaging. The imaging will show if the cancer is in an operable location. This can also be determined through endoscopy of the patient. The next step in the treatment of these patients is a surgical route. This surgical route can follow one of two paths. The first path consist of a full on removal of the mass if it is in a lower risk area and is operable. The second path that can be followed on the surgical route is a biopsy that can then be sent to test if the mass I benign or if it should be fully removed or further treated. Many of these

people that are surgically treated lead to an adjuvant treatment method. This method consists of radiation, chemotherapy, and targeted therapy to target and kill remaining cancer cells to help people live longer. However, these chemical methods are often used as the first line treatment due to the stages of cancer that the person is in. One of the main front line treatments for advanced stage cancer is the chemotherapy route. Chemotherapy has been known to help people survive and enter remission from their lung cancer. However, the median overall survival rate for the patients was roughly 8-10 months depending on how advanced the cancer is when treatment starts. However, chemotherapy is not the only treatment offered.

Chemotherapy may be one of the most well known front line treatments for non-small cell lung cancer. However, radiotherapy has also been shown to be an efficient and effective route of treatment for non-small cell lung cancer. Radiotherapy uses high energy beams to destroy the DNA in the cancer cells. This DNA destruction makes it to where the cancerous cells cannot replicate, thus destroying them. This route of treatment has been shown to be effective in patients that have non-small cell lung cancer concentrated to a certain area. However, this is seen as a secondary treatment for all patients that surgical resection does not end up being an option for. Some patients with a single small cancerous area are often candidates for a treatment method known as stereotactic body radiation therapy. This technique uses a tracking coordinate system to accurately locate the area and deliver a high focused treatment of radiation to the area. Patients treated with the stereotactic body radiation therapy method during stage II non small cell lung cancer had a 70% had high levels of local control of the growth area. The stereotactic body radiation therapy method also showed a 55.8% survival rate after three years when used on patients with stage III non small cell lung cancer. However, some other preventative measures have also been found to be extremely effective in the prevention of cancer morbidity.

Biomarker testing has been shown to increase the survival rates of the patients that they are used to treat. There are multiple different types of biomarker testing and treatments available. Biomarker testing helps by creating a personalized treatment used in targeting specific genetic markers. Epidermal growth factor receptor gene is one of the main genes associated with non small cell lung cancer. Epidermal growth factor receptor is a surface-cell kinase receptor that is responsible for cell growth. This gene is activated in 10-15% of all lung cancers. This makes it a great target for a preventative testing and a treatment route. KRAS is a common mutated oncogene associated with non small cell lung cancer. This is due to the mutations that cause amino acid substitutions at 12, 13, and 61. Some studies have shown that it is possible to directly target a KRAS mutational subset with small-molecule inhibitors directed at the G12C lung cancer mutation. This is a common mutation in the argument for nonsmokers vs smokers. The next gene that is commonly activated in Non small cell lung cancer patients in the Anaplastic lymphoma kinase gene. Around 3-7% of all lung tumor patients are positive for the Anaplastic lymphoma kinase gene. This gene is also well know for being present in the younger lung cancer patients. The average age of Anaplastic lymphoma kinase positive patients was 49 years old. Whereas the average age for Anaplastic lymphoma kinase negative patients was around 62 years old.

Cancer is and will continue to be one of the worst diseases to plague the world that we live in. However, the treatments that have been developing and advancing over the last few decades is promising. These advancements are showing that we are learning how to better treat this disease while we attempt to learn how to cure or treat it at a much higher rate than we currently are able.