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Lung Cancer Successful Treatment For Chemotherapy And Radiotherapy Decission Making Usingfuzzy Logic

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Abstract: The present study deals with the application of chemotherapy and radiation therapy uses special equipment. Chemotherapy simply means treatment with chemicals. Those used to treat cancer are called cytotoxic drugs because they poison cells in the body. Chemotherapy drugs are carried by the bloodstream throughout the body. The drugs affect both normal healthy cells and cancerous ones. However, healthy cells are able to repair themselves. Most types of chemotherapy for lung cancer are given directly into vein through a drip (intravenously). However, there are some types of chemotherapy which are given as a tablet. If the small cell lung cancer (SCLC), chemotherapy is usually the first type of treatment. The other method is internal radiation therapy. This method is also called brachytherapy. Internal radiation therapy involves placing a radioactive object for lung cancer; internal radiation can shrink a blocking. Radiation is given through a plastic tube that is inserted into the removed after the treatment session

Keywords: SCLC, Oncology, EBRT, Cancer stem cells.

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I. INTRODUCTION

Lung cancer, also referred to as bronchogenic carcinomas, is a major contributor of lung cancer. The development of lung cancer occurs on the lining glands, which contains damage cells that are located in our lungs and bronchial known as the tracheobronchial system. This part of human being is important because this system is susceptible to being contaminated by inhaled, which is a major cause of lung cancer. Scientists believe that the major cause of lung cancer is due to cancer-causing agents known as carcinogens, such as asbestos and radon. However, research and statistics show that the major agent of lung cancer is tobacco smoke, which contains over 60 carcinogens

Today, cigarette smoke is responsible for a great proportion of deaths within tobacco smoke. Each year in the approximately 400,000 people die from cigarette smoke, which accounts for one in every five deaths in the nation. The likelihood that a smoker will develop lung cancer from cigarette smoke depends on many aspects, such as the age at which smoking began, how long the person has smoked, the number of cigarettes smoked per day, and how deeply the smoker inhales. The relationship between cigarette smokes with respect to lung cancer has been established in 85-90 percent of all lung cancer cases (146,000 case/year). Furthermore, an estimated 3,000 non-smoker per die from lung cancer due to second-hand smoke (also known as environmental tobacco smoke). The number of deaths of non-smokers may be lower than active smokers, but according to the nation. Environmental protection agency, it is quite larger when compared to those associated with other indoor and outdoor environmental pollutants. This data has had a great impact on public policies that protect people from second-smoke. Based on the relationship between lung cancer and cigarette smoke, we want to show the reduction of contact between non-smokers and smokers, and how to decrease the rate in which nonsmokers and smokers progress towards lung cancer. The arrangement of seven different classes will assist us to define the total population we want to analyze.

However, the best way to detail the transition of each class is to use a mixture of parameters, probabilities, and rates. Based on the behavior of each class, the Poisson distribution is created. One of the main purposes of the distribution is to obtain the sample points. Is used to find the basic reproductive number, which represents the rate that people get infected. Though simulations, the model is analyzed to obtain different situations that produce interesting results among the specific classes. Using real life data, the model is believed to show how the increase of the educated class can lower the probability of being diagnosed with lung cancer.

Chemotherapy:-

There are several reasons why you may be receiving chemotherapy as a treatment for lung cancer. These include:

- Cure early stage inoperable lung cancer in combination with radiotherapy (chemotherapy).
- Extend length of life when a cure is not possible (palliative).
- Remove any cancer cells which may still exist after surgery for lung cancer (adjuvant).
- Reduce symptoms, such as breathlessness (palliative).

Chemotherapyell lung cancer:-

The small cell lung cancer (SCLC), chemotherapy is usually the first type of treatment receive. SCLC cells can often grow and spread quickly (metastasis). Chemotherapy travels in the bloodstream, and throughout most of the body. This usually leads to relief of symptoms and longer survival. Radiotherapy may be given after chemotherapy to try to stop the cancer coming back.

There are a variety of different types of chemotherapy drugs. The most common combination of chemotherapy drugs for people with SCLC contains platinum (cisplatin or carboplatin) and topside.

Other drug combinations that may be used as further treatment after initial chemotherapy include. Cyclophamide, doxorubicin, vincristine and topotecan. If your lung cancer gets smaller after your first Corse of chemotherapy and are coping well with few side-effects, cancer doctor may offer to continue your treatment with more chemotherapy. This is called maintenance therapy. Maintenance is only suitable for some people with certain types of lung cancer. It may help to continue to slow down the growth of your lung cancer and keep the symptoms of your disease under control for longer. Most chemotherapy day units are open Monday to Friday.

The patient can usually make an appointment time to suit both the patient chemotherapy department. Patients are receiving the chemotherapy at a day unit it will normally be given directly into a vein through a drip (intravenously). A chemotherapy will care for you while are receiving the chemotherapy. There are several reasons why having chemotherapy sometimes requires a hospital stay for a night or two. Some chemotherapy drugs have to be given very slowly, often with fluids given directly into a vein, through a drip, before and after receiving the drug. This can take up to 12 hours and you have to be closely monitored by chemotherapy during this time. The chemotherapy treatment your cancer doctor recommends will depend on several factors.

These include:

- The type (pathology) of lung cancer you have.
- The size, position and spread of your lung cancer (stage).
- The general health and how will cope with treatment.

There will be offered the best standard treatment available that current research shows is likely to work best for the patient. This is why may meet other people with the same cancer as you who are having different chemotherapy treatments. The patient may be asked to take part in a chemotherapy clinical trial. This unusual involves comparing treatments to help find out which works best.

Radiation therapy:-

Radiation therapy is cancer treatment that uses high-energy rays. The rays damage DNA. This either kills the cancer cells or stop new cancer cells from being made. Radiation can also harm normal cells. As a result, new methods keep being made that target the tumor more precisely. The current standard of radiation therapy is described next. Radiation can be used to treat or control lung cancer. A board-certified radiation oncologist who treats lung cancer often should be on your treatment team if you may have radiation therapy.

External radiation:-

Most often, EBRT (external beam radiation therapy) is the method used to treat lung cancer. This method delivers radiation from outside your body using a large machine. The radiation passes through your skin and other tissue to reach the tumor.

Simulation:-

Treatment planning with a simulation session is needed. During simulation, pictures of the tumor will be taken with an imaging test. Pictures are taken after the body is moved into position needed for treatment. The CT scans within 4 weeks of treatment are advised. If your breathing causes large movements, motion control methods during the scans may b**e** used.

Internal radiation:-

The other method is internal radiation therapy. This method is also called **brachytherapy**. Internal radiation therapy involves placing a radioactive object in or near the tumor. For lung cancer, internal radiation can shrink a tumor blocking an airway. The tube is removed after the treatment session. Most **brachytherapy** is put in place through a catheter, which is a small, stretchy tube.

Sometimes, **brachytherapy** is put in place through a larger device called an applicator. The patient will place the catheter or applicator into your body before you begin treatment.

Once the catheter or applicator is in place, the radiation source will be placed inside. The radiation source may be kept in place for a few minutes, for many days, or for the rest of your life. How long the radiation source remains in place depends on the type of branchy therapy you have, the type of cancer, where the cancer is in your body, your health, and other cancer treatments have had.

Low-dose rate (LDR) implants:-

In this type of brachytherapy, the radiation source stays in place for one to five days. You are likely to be in the during this time. Once the treatment is finished, the doctor will remove the radiation source and the catheter or applicator. As with LDR implants, the patent will remove the catheter or applicator once yo have finished treatment.

Mathematical modeling:-

Here we shall deal with a stochastic process in continuous time and with discrete state space. If x is a random variable which can assume any one of the values $x_1,x_2,\ldots\ldots x_n$with respective probabilities $p_1,p_2,\ldots\ldots,p_n$ Then the mathematical expectation of x, usually called the expected value of x and denoted by
$E(x) = p_1x_1+p_2x_2+\ldots\ldots\ldots\ldots\ldots+p_nx_n$ Where more precisely.

If x is random variable with probability distribution $\{x\ p(x)\}$ then

$$E(x) = \sum x \times p(x)$$

Summation being taken over different values of x.
Physical interpretation of E(x). Let us consider the following frequency distribution of the random variable x.

X: $x_1, x_2,x_3,\ldots\ldots\ldots x_i \ldots\ldots\ldots\ldots x_n$
F: $f_1,f_2, f_3,\ldots\ldots\ldots\ldots f_i \ldots\ldots\ldots\ldots f_n$
Then the mean of the distribution is given by
It is a patient observation of chemotherapy and Radiation therapy

$$\bar{x} = \frac{f1x1 + f2x2 + \ldots\ldots\ldots\ldots + fnxn}{N}$$

We observe that, out of total of N cases fi cases are favorable to xi

$$p(X = xi) = \frac{fi}{N} = (say)(i = 1,2,\ldots\ldots\ldots\ldots n)$$

$$f_1 \frac{f_1}{N} = p_1 \frac{f_2}{N} = p_2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \frac{fn}{N}$$

Substituting in we get

$\bar{x} = p_1x_1+p_2x_2+p_3x_3+p_4x_4+\ldots\ldots\ldots\ldots\ldots\ldots + p_nx_n \Longrightarrow E(x)$

$$\sum_{N=0}^{\infty} pn(t) = 1$$

Thus $\{pn(t)\}$ represents the probability distribution of the random variable N (t) for every value of t.

The family of random variable $\{N(t), t \geq 0\}$ is a stochastic process.

Here the time t is continuous. The state space N (t) is discrete and integral valued and process is integral valued.

The probability distribution $\{pn(t)\}$ of N (t) is given by

$$Pn(t) = \frac{e-\lambda t\,(\lambda t)^n}{n!}, \qquad n = 0, 1, 2, 3\ldots\ldots\ldots\ldots..$$

And mean = $E\{N(t)\} = \lambda\, t \qquad and$

$$\bar{x} = A+\left(\frac{\sum d}{N}\right)$$

$$\sigma = \frac{\epsilon f x^2}{N}$$

Kendall's table

(Correlation Coefficient for 2-pair of significance 1.00 at Fuzzy value)

		X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
X1	Correlation Coefficient	1.000	-.044	.301	.357	.438	.207	.319	.213	-.440	-.093	-.140	-.228
	Sig. (2-tailed)		.870	.297	.184	.092	.425	.243	.415	.082	.733	.611	.378
	N		12	12	12	12	12	12	12	12	12	12	12
X2	Correlation Coefficient		1.000	.620	.500	-.262	-.334	.163	.038	.233	-.271	-.167	-.130
	Sig. (2-tailed)		.	.026	.054	.298	.182	.535	.880	.340	.302	.529	.603
	N			12	12	12	12	12	12	12	12	12	12
X3	Correlation Coefficient			1.000	.577	.206	.025	.056	.340	.148	-.344	.172	.102
	Sig. (2-tailed)				.040	.449	.925	.844	.211	.575	.227	.549	.705
	N				12	12	12	12	12	12	12	12	12
X4	Correlation Coefficient				1.000	.172	.227	.229	.078	-.238	-.149	-.064	.114
	Sig. (2-tailed)					.499	.369	.389	.760	.335	.575	.812	.652
	N					12	12	12	12	12	12	12	12
X5	Correlation Coefficient					1.000	.478	-.058	.400	-.274	-.040	.239	.053
	Sig. (2-tailed)						.051	.820	.105	.253	.877	.357	.828

	N						12	12	12	12	12	12	1
X6	Correlation Coefficient						1.000	-.039	.270	-.509	.237	.336	.15
	Sig. (2-tailed)							.880	.271	.033	.355	.194	.51
	N							12	12	12	12	12	1
X7	Correlation Coefficient							1.000	-.159	-.168	.022	-.457	-.05
	Sig. (2-tailed)								.538	.502	.936	.093	.82
	N								12	12	12	12	1
X8	Correlation Coefficient								1.000	.000	-.426	.020	-.25
	Sig. (2-tailed)									1.000	.096	.938	.30
	N									12	12	12	1
X9	Correlation Coefficient									1.000	-.305	.267	-.06
	Sig. (2-tailed)								1.000	.	.222	.289	.77
	N									12	12	12	1
X10	Correlation Coefficient										1.000	.200	.15
	Sig. (2-tailed)											.462	.53
	N											12	1
X11	Correlation Coefficient											1.000	.23
	Sig. (2-tailed)												.35
	N												1
X12	Correlation Coefficient												1.00
	Sig. (2-tailed)												.38
	N												1

RADIOTHERAPY IMPROVEMENT 5TH WEEK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	89	1	6.7	6.7	6.7
	90	1	6.7	6.7	13.3
	92	2	13.3	13.3	26.7
	93	2	13.3	13.3	40.0
	94	3	20.0	20.0	60.0
	95	5	33.3	33.3	93.3
	96	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

II. CONCLUSION

In this model the use of mean, standard deviation equation was crucial to study the dynamics of lung cancer at the population level caused by smoking and second-hand smoke.Lung cancer is one of the most common and deadly diseases in the world. Detection of lung cancer in its early stage is the key of its cure. In general, measures for early stage lung cancer diagnosis mainly includes those utilizing X-ray chest films, CT, MRI, isotope, bronchoscope, etc., among which a very important measure is these-called pathological diagnosis that analyzes the specimens of needle biopsies obtained from the bodies of the subjects to be diagnosed. At present, the specimens of needle biopsies are usually analyzed by experienced pathologists. Since senior pathologists are rare, reliable pathological diagnosis is not always available.

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