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Research Article

ESTIMATING THE SURVIVAL TIME OF CANCER PATIENTS

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ABSTRACT

This article motivated by the women's health. It has been widely recognized that the amount of people infected patients with advanced or metastatic HER2-negative breast cancer has been increasing in recent years. Especially in developing countries. The threshold level of HER2-negative infected cells is been calculated through statistical model of the infected person. Many standard of medical care are based on the demonstrated effects of various treatment strategies or process.

INTRODUCTION

As an illustration we apply the design to data from an ongoing study of human breast cancer. It may happen that successive shocks become increasingly effective in causing damage, even though they are independent. One is interested in an item for which there is a significant individual variation in ability to withstand shocks. When the HER2 negative infected cells is affected in human body, shock with different infected variable is the one to look. When the immune system does not accumulated the increase in shock which is the inter-arrival time, the expected life time of the human system will reach the threshold. The total cumulative damage found with shock model approach using renewal process. The expected life time is been derived through modified weibull distribution. The original data in the model derived for the Expected time. The observed data are from the thanjavur medical college.

Model Discriptions

The Cumulative distribution function (CDF) of the modified Weibull Distribution $(x: \tau, \varphi, \omega)$

$$F(x: \tau, \varphi, \omega) = 1 - e^{-\tau x - \varphi x^{\omega}}, \quad x > 0$$

$$\bar{H}(x) = 1 - F(x) = e^{-(\llbracket \tau x - \varphi x) \rrbracket^{\omega}}, \ \omega = 1$$

Y: Continuous random variable denoting the threshold level of modified weibull distribution.

$$P(Xi < Y) = \int_0^{\infty} g_k^*(x) e^{-(\tau x - \varphi x)} dx = [g*(\tau + \varphi)]^k \quad (1)$$

$S(t)$: The survivor function i.e. $P(T > t)$

$$P(T > t) = \sum_{k=0}^{\infty} v_k(t) P(Xi < Y) = \sum_{k=0}^{\infty} \llbracket [F] \rrbracket_k(t) - F_{k+1}(t)][g^*(\tau + \varphi)]^k$$

$$= 1 - [1 - g^*(\tau + \varphi)] \sum_{k=1}^{\infty} F_k(t) [g^*(\tau + \varphi)]^{k-1} \quad (2)$$

$F_k(t)$, probability that there are exactly 'k' policies decisions in $(0, t]$

Taking Laplace transform of $L(t) = 1 - S(t)$, we get

$$L(t) = [1 - g^*(\tau + \varphi)] \sum_{k=1}^{\infty} F_k(t) [g^*(\tau + \varphi)]^{k-1} \quad (3)$$

Let a continuous random variable U denoting inter arrival time between decision epochs which follows exponential distribution.

Now,

$f^*(s) = \left(\frac{c}{c+s}\right)$, substituting in the below equation (4) we get,

$$L^*(s) = L(t) = \frac{[1 - g^*(\tau + \varphi)] f^*(s)}{[1 - g^*(\tau + \varphi) f^*(s)]} \quad (4)$$

$$= \frac{[1 - g^*(\tau + \varphi)] \left(\frac{c}{c+s}\right)}{[1 - g^*(\tau + \varphi) \left(\frac{c}{c+s}\right)} \quad (5)$$

On simplifications we get,

$$= \frac{c\,[1 - g^*(\tau + \varphi)]}{[c + s - g^*(\tau + \varphi) c\,]} \quad (6)$$

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$E(T) = -\frac{d}{ds}$ L*(s) given s = 0

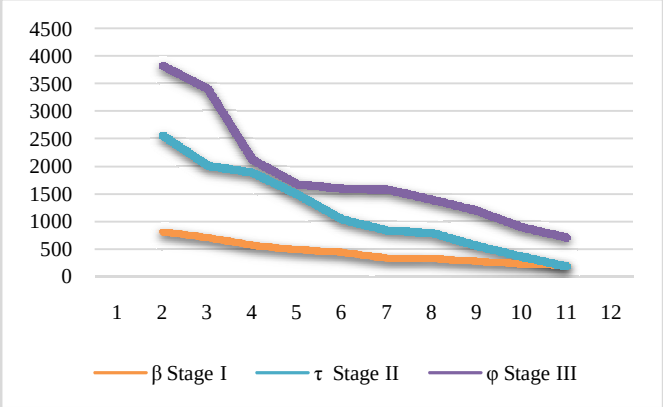
$g^*(.) \sim \text{Exp}(\beta)$, $g^*(\lambda) \sim \exp\left(\frac{\beta}{\beta+(\tau+\varphi)}\right)$

$E(T) = \frac{\beta+(\tau+\varphi)}{c\,(\tau+\varphi)}$ (7)

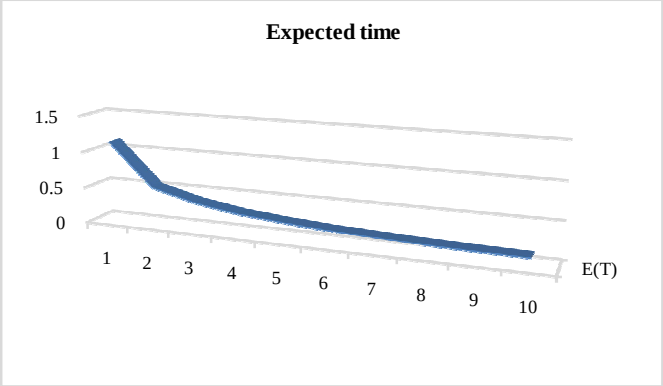
Where:
β - Stage I
τ - Stage II
φ – Stage III
c – Time Interval

Table Data Observed of the Smoking HER2 Cell infected person Expected Time

C	β	τ	φ	E(T)
1	809	2560	3824	1.12672
2	703	2009	3411	0.53485
3	564	1890	2122	0.38019
4	486	1489	1680	0.28834
5	433	1035	1601	0.23285
6	326	840	1586	0.18906
7	320	789	1398	0.16376
8	272	561	1196	0.14435
9	231	369	899	0.13135
10	198	187	712	0.12202



Graph The chart for HER2 infected person's stage wise



The Chart for HER2 infected person's Expected time

CONCLUSION

The person infected with human breast cancer HER-2 cell infected is more quickly to cross the threshold level. Once the person is infected the HER-2 Cells gets damaged and he/she is likely to affect, when infected with human breast cells. The time interval is the smoking of the infected person. The expected life time decreases quickly to the threshold level. The model shows that once the person is infected the breakdown of the immune system starts which is observed in the above table and figures.

We observe that once the person gets affected by HER-2 negative breast cancer his/her immune system capacity gets decreased. By Proper medical doctor advice and through regular treatment his/her life span can be extended.

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