

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

THE ESTIMATION OF THE TUMOR
GROWTH RATE AND THE EQUATION
SOLUTION OF THE MATHEMATICS MODEL

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ABSTRACT

The aim of this project is to calculate the growth rate of tumor using logistic equation and determining the equilibrium solution of the model. Logistic equation is commonly used in calculating the population growth model. The process to calculate the growth rate of tumor is applied on the experimental data for Ehrlich ascites tumor (EAT) in a mouse taken from Krug & Taubert (1985). By using MATLAB and Microsoft Excel, a logistic test behavior is performed to determine whether the data is reasonably logistic. Next, a graphical test using Microsoft Excel is used to estimate the parameters r and K the equilibrium solution for this problem is obtained by using Maple. Finally, the results obtained through this study are $r = 0.4691$ and $K = 120 \times 10^7$.

1 INTRODUCTION

1.1 Introduction

A tumor is an abnormal mass of tissue which may be solid or fluid filled. Tumor is also known as neoplasm (Noordqvist, 2015). A tumor is not necessarily a cancer. Tumor can be benign (not cancerous) and malignant (cancerous). According to (Cheprasov, n.d.), benign tumors grow locally and do not spread while malignant tumors are tumors that are capable to spread and affect other tissues as shown as Figure 1.1:

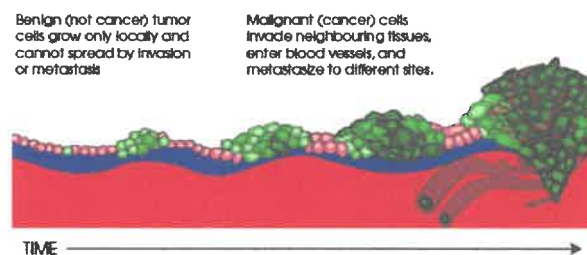


Figure 1.1: Benign tumor and malignant tumor

Benign and malignant tumor are similar in few ways including its size. Both benign and malignant tumor can grow rapidly large. According to Noordqvist (2015), Usually, a tumor can grow at least 20 mm (0.787 inches) in diameter at its widest point, while a nodule is less than 20 mm at its widest point. Benign tumor grows by expanding and it is not attached to surrounding tissue that makes tumor able to move easily. Malignant tumor spreads and destroys surrounding tissue. Both tumors may come back after they are removed. The difference is that malignant tumors may come back in different regions of the body to which they have spread.

There are various types for every classified tumor. National Cancer Institute stated that the classification of types of tumor is based on the cells in the body and the location of the tumor. The most common types of benign tumor are adenomas, fibromas or fibroids, hemangiomas