ROLE OF WILD TYPE SUPEROXIDE DISMUTASE-1 AND THE EFFECT OF MUTATION ON THE PROTEIN STRUCTURE AND FUNCTION

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ABSTRACT

Enzyme can give benefit to living things in this world especially human. Enzyme have their own characteristics or more to function that able them to help process in the living things but when mutation happened to the gene of enzyme, the function of enzyme can change and could cause bad side effect to human and could kill the human. Nowadays, there are many research is done in order to understand the mutation that happened. This research project is about the role of Superoxide Dismutase-1 (SOD1) and the mutation that happened on the protein structure of SOD1. The objective of this research project have three objectives that are function of SOD1 enzyme, is compare the wild type of SOD1 and mutated SOD1 gene and last one is to visualize mutated SOD1

The first objective is to know the ability of SOD1 enzyme. SOD1 enzyme general ability is to break down the superoxide radical in the human body. This superoxide radical that consist of charged oxygen molecular. The SOD1 will bind the copper and zinc ion to remove the superoxide radical. The second objective is about comparison of wild type SOD1 with the mutated SOD1. The reason of this comparison is to know the spot of where the mutation happened in the mutated SOD1 with compare the mutated with the wild type. This will tell the position of where the mutation is happened and the effect on the function. The visualization of SOD1 that consist of mutated and wild type will tell what happened on the protein structure of mutated SOD1 that being caused by the mutation. With the visualization, the effect of mutation on the protein structure of mutated SOD1 can be known.

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CHAPTER 1

INTRODUCTION

1.1 Background studies

Bioinformatics is a field of studies that develops software tool and methods in order to gain more understanding of biological data. The combination field of science, the bioinformatics combines the statistics of computer science, engineering and mathematics in order to analyze and understand the biological data. Nowadays, bioinformatics is becoming a vital part in many areas of biology. The bioinformatics tools can help to show the comparison of genetic and genomic data. Besides, these tools can give more understanding about aspects of evolution of molecular biology and about analyzing the biological pathways.

In the structural biology, the bioinformatics can aids in simulating and modelling of DNA, RNA and protein structures and also with the molecular interactions. For this research, the bioinformatics tools will be used to analysis the mutation of superoxide dismutase 1. By using bioinformatics tool, the structure of superoxide dismutase 1 (SOD1) can be described in order to investigate the mutation of SOD1 and to compare the wild type of SOD1 with the mutation SOD1.

The SOD1 gene have the information to instruct for producing an enzyme called superoxide dismutase. This enzyme have function to bind with molecules of copper and zinc in order to break down dangerous toxic that is the charged oxygen molecules or called superoxide radicals. The superoxide radicals can cause damage the human cells if too many superoxide radicals accumulate in human cells. The superoxide radicals are the byproduct from cell processes the superoxide radical are usually being produce in reaction that produce energy as its product and the superoxide radical need to be broken down regularly (Gisela Nogales-Gadea, 2004).