

**UNIVERSITI TEKNOLOGI MARA**

**VACCINE CANDIDATE ANALYSIS OF THE  
HELMINTH *ONCHOCERCA VOLVULUS*: A  
COMPUTATIONAL APPROACH**

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## Abstract

Filarial nematode *Onchocerca volvulus* had been identified as the causative agent for river blindness, or onchocerciasis. A disease characterized by chronic skin and eye lesions. It is the world's second leading infectious cause of blindness. It is a major health problem in several tropical countries, mostly in Africa, south of the Sahara. More than 18 million persons are infected with this nematode. Discovery of primary FAR1\_ONCV0 gene in *Onchocerca volvulus* may provide us a deeper insight into vaccine development for river blindness. In this study, the identification of FAR1\_ONCV0 gene in *Onchocerca volvulus* was reported using *in silico* prediction approaches. FAR1\_ONCV0 gene of *Onchocerca volvulus* consists of 178 amino acids length. The predicted value of both pI and Mw of FAR1\_ONCV0 protein is 8.58 and 20580.81 Da, respectively. Prediction of secondary structure of *Onchocerca volvulus* FAR1\_ONCV0 protein revealed that it consists of 80.34%  $\alpha$ -helix, 1.12%  $\beta$ -strand and 18.54% loop. Grand average of hydropathicity (GRAVY) is -0.516. Hence, *Onchocerca volvulus* FAR1\_ONCV0 protein is hydrophilic in nature. From the analyzed result, most of the protein sequences of *Onchocerca volvulus* FAR1\_ONCV0 are located in extracellular cell. The region of "LRNFVKAKI" and "VIMANVVPF" which is at position 86 and 12 of FAR1\_ONCV0 protein sequences was predicted to have high potential candidate as promiscuous binders. In conclusion, the information obtained from *in silico* analysis of FAR1\_ONCV0 gene would then provide preliminary information for vaccine study.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Introduction

River blindness, or onchocerciasis, is a major health problem in several tropical countries, mostly in Africa, south of the Sahara. More than 18 million persons are infected with the filarial nematode *Onchocerca volvulus*, the causative agent of this debilitating disease (WHO, 2000). The nematode develops in subcutaneous nodules within the skin and produces large numbers of microfilariae, i.e. larvae which migrate in the skin and eyes of the patients. Inflammations induced by the microfilariae lead to skin diseases and to eye lesions, which may result in blindness. Programs for the control of the *Simulium* vector and ivermectin therapy have well suppressed the parasite in many formerly endemic areas, and reduced the prevalence and intensity of infections in many other regions. However, river blindness outbreaks might recur unless vector-controlling measures and chemotherapy campaigns are maintained continuously. Since these efforts require relatively costly and sophisticated logistics, an effective vaccine against *O. volvulus* is highly desired, to complement available tools for onchocerciasis control on the long run.