Prediction and Mapping of IgE Epitopes in the Allergenic Egg Proteins using Computational Approaches

A Major Project dissertation submitted in partial fulfilment of the requirement for the degree of

Master of Technology in Bioinformatics

Submitted by

Nitish Sharma (2K11/BIO/13)

Delhi Technological University, Delhi, India

Under the supervision of

Dr. Yasha Hasija



Department of Biotechnology
Delhi Technological University
(Formerly Delhi College of Engineering)
Shahbad Daulatpur, Main Bawana Road,
Delhi-110042, INDIA



CERTIFICATE

This is to certify that the M. Tech. dissertation entitled "Prediction and Mapping of IgE Epitopes in the Allergenic Egg Proteins using Computational Approaches", submitted by Nitish Sharma (2K11/BIO/13) in partial fulfilment of the requirement for the award of the degree of Master of Technology, Delhi Technological University (Formerly Delhi College of Engineering, University of Delhi), is an authentic record of the candidate's own work carried out by her under my guidance.

The information and data enclosed in this dissertation is original and has not been submitted elsewhere for honouring of any other degree.

Date:

Dr. Yasha Hasija

(Project Mentor)
Assistant Professor,
Department of Biotechnology,
Delhi Technological University,
(Formerly Delhi College of Engineering, University of Delhi).

ACKNOWLEDGEMENT

Successful completion of my work would be incomplete unless I mention the name of persons who made this possible. Guidance and encouragement served as a beacon of light and crowned my efforts into success.

I would like to take this opportunity to express my deep sense of gratitude to my respected Vice Chancellor Prof. P.B. Sharma for constantly motivating me for exploring new ventures. I thank Dr. Yasha Hasija, Assistant Professor, Department of Biotechnology, DTU, for her involvement, skillful assistance and guidance during the tenure of this project. I owe my profound gratitude to thank Dr. N. Latha, Associate Professor, Sri Venkateswara College, DU, for letting me into their prestigious establishment to complete my dissertation.

My report would be incomplete without thanking Mrs. Nidhi Batra, Ms. Tanimashree, and Mr. Shri Ram for constantly helping me, clarifying my doubts and taking me to the right direction. I want to thank all my lab mates for constantly supporting me.

I also thank all those who have directly or indirectly helped me in completing my project and in writing and critically assessing this report.

Nitish Sharma 2K11/BIO/13

CONTENTS

LI	ST OF FIGURES	i- ii
LI	ST OF TABLES	iii-iv
LI	ST OF ABBREVIATIONS	ν
1.	ABSTRACT	1
	INTRODUCTION	
3.	REVIEW OF LITERATURE	3
	3.1 FOOD ALLERGY	3-9
	3.2 MOLECULAR PROPETIES OF FOOD ALLERGENS	9-11
	3.3 EGG ALLERGY AND EGG PROTEOME	11-16
	3.4 ALLERGEN DATABASES	16-23
	3.5 ALLERGENICITY PREDICTION	23-28
	3.6 EPITOPE	28-29
	3.7 IgE EPITOPE PREDICTION AND MAPPING	29-38
4.	METHODOLOGY	39
	4.1 RETRIEVAL OF EGG PROTEOME	39-41
	4.2 PREDICTION OF ALLERGENICITY	42-43
	4.3 PROTEIN STRUCTURE PREDICTION OF POTENTIA	L
	ALLERGENS	43-44
	4.4 EPITOPE PREDICTION AND MAPPING	45-52
	4.5 EPITOPE ANALYSIS	52
5.	RESULTS.	53
	5.1 EGG PROTEOME	53-55
	5.2 ALLERGENICITY PREDICTION	55-57
	5.3 PROTEIN STRUCTURE PREDICTION	57-58
	5.4 EPITOPE PREDICTION AND MAPPING	58-89
6.	DISCUSSION	90
7.	CONCLUSION AND FUTURE PERSPECTIVE	91
8.	REFERENCES	
9.	APPENDIX	100-102