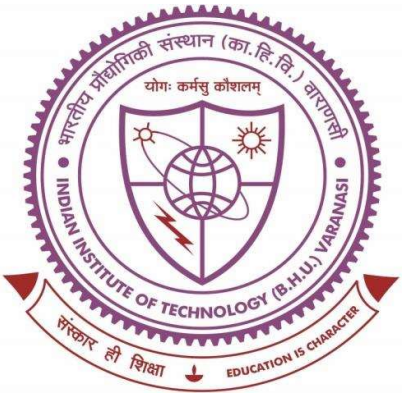
Computational Systems Biology based analysis of Tumour Regression



Thesis submitted in partial fulfilment

for the Award of Degree

Doctor of Philosophy

by

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It is certified that the work contained in the thesis titled **"Computational Systems Biology based analysis of Tumour Regression"** by **"Bindu Kumari"** has been carried out under my supervision and this work has not been submitted elsewhere for a degree.

It is further certified that the student has fulfilled all the requirements of Comprehensive Examination, Candidacy and SOTA for the award of Ph.D. Degree.

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DECLARATION BY THE CANDIDATE

I, Bindu Kumari, certified that the work embodied in this Ph.D. thesis is my own bonafide work and carried out by me under the supervision of Prof. Prasun Kumar Roy and Prof. Neeraj Sharma from **27th December 2017 to 25th July 2023** at the School of Biomedical Engineering, Indian Institute of Technology (BHU), Varanasi. The matter embodied in this thesis has not been submitted for the award of any other degree/diploma.

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Bindu Kumari

(Bindu Kumari)

Date: 25/07/2023

Place: Varanasi

Dedicated

To

My Beloved Parents,

My Loving Husband and my In-laws

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LIST OF ABBREVIATIONS

WHO	World Health Organization
NK cell	Natural Killer cell
DNA	Deoxyribonucleic acid
MAPK	Mitogen-activated protein kinase
PI3K	phosphoinositide 3-kinase
RAF	Rapidly Accelerated Fibrosarcoma
BRAF	Murine sarcoma viral oncogene homolog B
RAS	Rat sarcoma virus
NRAS	Neuroblastoma RAS viral oncogene homolog
KRAS	Kirsten rat sarcoma virus
HRAS	Harvey Rat sarcoma virus
ARAF	Serine/threonine-protein kinase A-Raf
CRAF	RAF proto-oncogene serine/threonine-protein kinase
ERK	Extracellular signal-regulated kinase
AKT3	AKT Serine/Threonine Kinase 3
PTEN	Phosphatase and tensin homolog deleted on chromosome ten
BAD	BCL2 associated agonist of cell death
BCL-2	B-cell leukemia/lymphoma 2 protein
MDM2	murine double minute 2
IL-2/15	Interleukin-2/ Interleukin-15
PIP2	Phosphatidylinositol 4,5-bisphosphate
PIP3	Phosphatidylinositol 3,4,5-triphosphate
CCND1	Cyclin D1
CDC2	Cell division control protein 2 homolog
CHEK2	Checkpoint kinase 2
IL2RG	Interleukin (IL)-2 receptor common gamma chain gene
TRGV5	T Cell Receptor Gamma Variable 5
CD28	Cluster of Differentiation 28
CASP7	Caspase 7
GZMB	Granzyme B

TOP2A	topoisomerase IIalpha gene
DEGs	Differentially Expressed Genes
FC	Fold Change
FDR	False Discovery Rate
IPA	Ingenuity Pathway Analysis
GO	Gene Ontology
NCBI	National Center for Biotechnology Information
CC	Cellular Component
BP	Biological Process
MF	Molecular Function
DAVID	Database for Annotation, Visualization, and Integrated Discovery
PDB	Protein Data Bank
Å	Angstrom
MD	Molecular dynamics
RMSD	Root Mean Square Deviation
RMSF	Root Mean Square Fluctuation
ANOVA	Analysis of variance
3D	3 Dimensional
SB	Salt Bridges