

Dedicated to my Maa, Baba and Dipul

## **DECLARATION BY THE CANDIDATE**

I hereby declare that the thesis entitled “**Studies on the anti-cancer potential of crude and a purified protein from *Naja kaouthia* venom of North East India origin**” submitted to School of Sciences, Tezpur University, in part fulfilment for the award of the degree of **Doctor of Philosophy** in the Department of Molecular Biology and Biotechnology, is a record of original research work carried out by me. Further, I declare that no part of this thesis has been reproduced elsewhere for award of any other degree.

**Date:** 08/04/25

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All help received by her from various sources have been duly acknowledged. No part of this thesis has been submitted elsewhere for award of any other degree.

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All help received by her from various sources have been duly acknowledged. No part of this thesis has been submitted elsewhere for award of any other degree.

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## **List of Symbols and Abbreviations**

%	Percentage
<	Lesser Than
≤	Lesser Than Equal To
>	Greater Than
≥	Greater Than Equal To
=	Equals to
Å	Angstrom
°C	Degree Celsius
®	Registered
™	Trademark
μ	Micron
μg	Microgram
μl	Microlitre
μM	Micromolar
ml	Millilitre
3FTx	Three-Finger Protein
AChE	Acetylcholine Esterase
ADME	Absorption, Distribution, Metabolism and Excretion
AI	Artificial Intelligence
AMPK	Adenosine Monophosphate Protein Kinase
ANOVA	Analysis of Variance
AO	Acridine Orange
AP-1	Activator Protein-1
APTT	Activated Partial Thromboplastin Time
Apaf-1	Apoptosis Protease Activating Factor-1
APS	Ammonium Per Sulfate
ATCC	American Type Culture Collection
ATP	Adenosine Triphosphate
BC	Before Christ
Bcl-2	B-cell Lymphoma 2
Bid	BH3 Interacting-Domain
BLAST	Basic Local Alignment Search Tool
BSA	Bovine Serum Albumin
CADD	Computer Aided Drug Design

CASTp	Computed Atlas of Surface Topography of Proteins
c-IAP	Cellular Inhibitor of Apoptosis Protein
CIN	Chromosomal Instability
CN	Contorstatin
CRiSP	Cysteine-Rich Secretory Protein
CTC	Circulating Tumor Cells
CTL	C-type Lectins
CTX	Cardiotoxin
CVF	Cobra Venom Factor
CYPD	Cyclophilin D
DLF	Direct Lytic Factor
DMEM	Dulbecco's Modified Eagle Medium
DMSO	Dimethyl Sulfoxide
DNA	Deoxyribonucleic Acid
DNM-1	Dynamin-1
DR	Death Receptor
DTC	Disseminative Tumor Cells
EAC	Ehrlich Ascites Carcinoma
ECL	Enhanced Chemiluminescence
ECM	Extracellular Matrix
EGFR	Epidermal Growth Factor Receptor
EMT	Epithelial-Mesenchymal Transition
ESI	Electrospray Ionization
EtBr	Ethidium Bromide
FADD	Fas-Associated Death Domain
FACS	Fluorescence-Activated Cell Sorting
FBS	Fetal Bovine Serum
FPLC	Fast-Protein Liquid Chromatography
GLOBOCAN	Global Cancer Observatory
GLUT1	Glucose Transporter 1
GMQE	Global Model Quality Estimate
GNP	Gold Nanoparticle
HPLC	High-Performance Liquid Chromatography
HSP	Heat-Shock Protein

HtrA2	High Temperature Requirement A2
<i>i.p</i>	Intraperitoneal
IUCN	International Union for Conservation of Nature
JNK	c-Jun N-terminal Kinase
kDa	kilo Dalton
KSPI	Kunitz-type Serine Protease Inhibitor
LAO	L-Amino Acid Oxidase
LC	Least Concern
LC-MS/MS	Liquid Chromatography-tandem Mass Spectrometry
LD <sub>50</sub>	Median Lethal Dose
LTX	Long Neurotoxin
MAPK	Mitogen-Activated Protein Kinase
MDR	Multi-Drug Resistance
MDSC	Myeloid-derived Suppressor Cells
MMP	Matrix Metalloprotease
mRNA	Messenger RNA
miRNA	Micro RNA
MKK	Mitogen-activated protein Kinase Kinase
MLKL	Mixed-Lineage Kinase-domain Like
MPT	Mitochondrial Permeability Transition
MTLP	Muscarinic Toxin-like Protein
MTT	3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide
nAChR	nicotinic Acetylcholine Receptor
NCBI	National Center for Biotechnology Information
NCCS	National Centre for Cell Science
NCT	Normal Clotting Time
NF-κB	Nuclear Factor-κB
NK	Natural Killer
ns	Not Significant
NSA	Non-Swiss Albino
O.D	Optical Density
OVACAR	Ovarian Carcinoma
PARP	Poly (ADP-ribose) Polymerase
PaTu	Pancreatic Tumor
PBS	Phosphate Buffer Saline
PDB	Protein Data Bank

PDE	Phosphodiesterase
PI	Propidium Iodide
PI3K	Phosphoinositide 3-Kinase
PLA <sub>2</sub>	Phospholipase A <sub>2</sub>
PP2A	Protein Phosphatase 2A
PPP	Platelet-Poor Plasma
PT	Prothrombin Time
PTPC	Permeability Transition Pore Complex
PVDF	Polyvinylidene fluoride
RB	Retinoblastoma
RBC	Red Blood Cells
RCD	Regulated Cell Death
RIP	Receptor Interacting Protein
RNA	Ribonucleic Acid
ROS	Reactive Oxygen Species
RP-HPLC	Reverse Phase-High Performance Liquid Chromatography
RT	Recalcification Time
TFA	Trifluoroacetic Acid
TNF	Tumor Necrosis Factor
TNFR	Tumor Necrosis Factor Receptor
TRADD	TNF-Associated Death Domain
USA	United States America
VEGF	Vascular Endothelial Growth Factor
VEGFR-1-3	Vascular Endothelial Growth Factor Receptor-1-3
VNGF	Vascular Nerve Growth Factor
SDS-PAGE	Sodium-Dodecyl Sulfate-Polyacrylamide Gel Electrophoresis
SEM	Scanning Electron Microscope
SNTX	Short Neurotoxins
STAT3	Signal Transducer and Activator of Transcription 3
SVMP	Snake Venom Metalloprotease
SVSP	Snake Venom Serine Protease
TEMED	N,N,N'N'-Tetramethylethylenediamine

TGF- $\beta$	Tumor Growth Factor- $\beta$
TP53	Tumor protein 53
TSG	Tumor Suppressor Gene
TSP-1	Thrombospondin-1
US FDA	United States Food and Drug Administration
WBC	White Blood Corpuscles
WHO	World Health Organization
WTX	Weak Toxin
XIAP	X-linked Inhibitor of Apoptosis Protein