

LIST OF TABLES

Table No.	Table Captions	Page No.
CHAPTER-I		
1.1	Taxonomic classification of the Indian Spectacled Cobra.	8
1.2	Approved drugs, originating from snake venoms, for treating various thromboembolic disorders.	36
CHAPTER-II		
2.1	List of anticoagulant proteins isolated from cobra venom.	78
2.2	List of cytotoxic and myotoxic PLA ₂ s reported from cobra venom.	85
CHAPTER-III		
3.1	Composition of stacking and resolving SDS-polyacrylamide gels.	112
CHAPTER-IV		
4.1	Summary of purification of an anticoagulant PLA ₂ enzyme (NnPLA ₂ -I) from <i>N. naja</i> venom.	160
4.2	Alignment of tryptic, semi-tryptic, and non-tryptic (<i>de novo</i>) peptide sequences of NnPLA ₂ -I with reported sequences of <i>Naja sp.</i> venom PLA ₂ enzymes.	163
4.3	Substrate specificity of the acidic phospholipase A ₂ (NnPLA ₂ -I) enzyme from <i>N. naja</i> venom against different substrates.	165
4.4	Kinetics of thrombin inhibition by NnPLA ₂ -I.	173
4.5	Hemolytic, antibacterial, and <i>in vitro</i> cytotoxicity of NnPLA ₂ -I.	178
4.6	Effect of chemical inhibitors, chelating agent, and heparin on catalytic and anticoagulant activities of NnPLA ₂ -I.	180
4.7	Fibrinogen clotting assay in the presence and absence of heparin.	180
4.8	A comparison of neutralization potency of catalytic and anticoagulant activities of NnPLA ₂ -I by commercial polyvalent and monovalent antivenoms.	182
4.9	Behavioral changes, if any, in Wistar rats after 72 h of intravenous injection of 4.0 mg/kg NnPLA ₂ -I.	189
4.10	Effect of NnPLA ₂ -I on the serum parameters of Wistar strain rats.	190
4.11	Effect of NnPLA ₂ -I on the blood parameters of treated Wistar rats.	190
4.12	Comparison of <i>in vivo</i> anticoagulant activity of NnPLA ₂ -I, argatroban, and heparin in Wistar strain rats.	192
CHAPTER-V		
5.1A	List of identified peptides and its corresponding protein present in spot R1 of reduced 2D SDS-PAGE of <i>N. naja</i> venom by LC-MS/MS analysis.	211
5.1B	List of identified peptides and its corresponding proteins present in spots R2 and R3 of non-reduced 2D SDS-PAGE of <i>N. naja</i> venom by LC-MS/MS analysis.	212
5.2	List of identified proteins and their corresponding peptides by LC-MS/MS analysis of Nn(N)CM2 fraction of eastern India <i>N. naja</i> venom.	214
5.3	List of proteins identified by LC-MS/MS analysis of protein spots in Nn(N)CM2 and 2D SDS-PAGE of <i>N. naja</i> venom under reduced (R1) and non-reduced (R2, R3) conditions.	215

Table No.	Table Captions	Page No.
5.4	LC-MS/MS analysis identified proteins and their corresponding peptides present in RP-HPLC fractions [Nn(N)CM2RP1-3] of Nn(N)CM2.	217
5.5	Release of creatine kinase (CK) and lactate dehydrogenase (LDH) enzymes in the culture media of L6 cells (myoblasts) treated with NnPLA ₂ -I (10.0 µg/ml or 0.70 µM), NnPLA ₂ -I cognate complex [Nn(N)CM2] (12.5 µg/ml containing 0.35 µM of NnPLA ₂ -I), and crude <i>N. naja</i> venom (45.0 µg/ml containing 0.35 µM of NnPLA ₂ -I).	222
5.6	A comparison of the cytotoxicity exhibited by the individual components of the complex, and neutralization or inhibition of PLA ₂ activity and cytotoxicity of NnPLA ₂ -I cognate complex by commercial polyvalent antivenom (PAV), anti-NnPLA ₂ -I antibodies and <i>p</i> -bromophenacyl bromide (<i>p</i> -BPB) towards L6 myogenic cells.	224
5.7	Sequence alignment of LC-MS/MS identified tryptic peptides of affinity purified NnPLA ₂ -I bound L6MP (blue), ~55 kDa L6MP band (red), ~48 kDa L6MP band (green), and vimentin P31000 from <i>Rattus norvegicus</i> (black).	236
5.8	A comparison of the global energy of binding of NnPLA ₂ -I to different regions of rod structure of vimentin.	241
5.9	A comparison of the global energy of binding of the components of NnPLA ₂ -I cognate complex to two regions of the rod structure of vimentin. 3s4rB (rod region; 99 – 189) and 3trtA (rod region; 261 – 335).	247
5.10	A comparison of the interactions between the components of NnPLA ₂ -I – 3FTx – NGF cognate complex and 3s4rB (99 – 189) region of vimentin.	250
5.11	A comparison of the interactions between the components of NnPLA ₂ -I – 3FTx – NGF cognate complex and 3trtA (261 – 335) region of vimentin.	251
CHAPTER-VI		
6.1	List of synthetic peptides designed from the thrombin binding region of NnPLA ₂ -I and their physico-chemical properties.	267
6.2	Re-calcification time (Unit) of mammalian platelet poor plasma (PPP) in presence of different concentrations (0.25 – 1.0 µM) of peptides (ACR1 to 12), NnPLA ₂ -I (0.25 – 1.0 µM), argatroban (0.25 – 1.0 µM), and heparin (0.25 – 1.0 µM).	268
6.3	Kinetics of inhibition of thrombin by ACR9.	274
6.4	Kinetics of inhibition of factor Xa by ACR9.	278
6.5	Assessment of dose-dependent (0.5 – 5.0 µM) hemolytic activity of ACR9.	284
6.6A	Behavioral changes, if any, in Wistar rats (n = 3 per group) after 72 h of intravenous injection of ACR9 (4.0 mg/kg dose).	287
6.6B	Effect of ACR9 (4.0 mg/kg) on the serum parameters of Wistar strain rats after 72 h of administration (<i>i.v.</i>).	288
6.6C	Effect of ACR9 (4.0 mg/kg) on the blood parameters of treated Wistar rats after 72 h of administration (<i>i.v.</i>).	288

Table No.	Table Captions	Page No.
6.7	Comparison of <i>in vivo</i> anticoagulant activity of ACR9, argatroban, and heparin post 60 min of administration (<i>i.v.</i>) in Wistar strain rats.	292
6.8	Effect of 0.4 mg/kg ACR9 on defibrinogenation activity after 60 min of administration (<i>i.v.</i>).	293

LIST OF FIGURES

Figure No.	Figure Captions	Page No.
CHAPTER-I		
1.1	Epidemiology of snakebite mortality across the world. Annual estimates of snakebite-induced deaths for 138 countries were obtained from the data published by Kasturiratne et al. (2008) and Harrison et al. (2009).	5
1.2	Estimated deaths and standardized death rates in states with high prevalence of snakebite deaths, 2005, as published by Mohapatra et al (2011).	6
1.3	An Indian Spectacled Cobra (<i>Naja naja</i>) with its spreading hood.	7
1.4	Geographic range of distribution of the Indian cobra (<i>Naja naja</i>).	9
1.5	Diagrammatic left lateral views of the skull of elapids.	10
1.6	A comprehensive representation of the coagulation cascade.	16
1.7	Reaction showing the hydrolysis of phosphatidylcholine by phospholipase A ₂ .	18
1.8	Three-dimensional structures of snake venom PLA ₂ s.	21
1.9	The three-dimensional structure of active site of PLA ₂ .	22
1.10	Schematic representation of theoretical scenarios in which synergism between toxins occur in snake venom.	30
1.11A	Ribbon model of β -bungarotoxin (β -BuTx) (PDB ID: 1BUN) showing the disulphide linkage between chain A and chain B.	31
1.11B	Schematic representation of β -bungarotoxin, a covalent snake venom PLA ₂ complex.	31
1.12	Schematic representation of different types of non-covalent snake venom PLA ₂ complexes.	32
1.13	A schematic representation of targets of antiplatelet drugs.	34
1.14	A schematic representation of targets of anticoagulant drugs.	34
CHAPTER-II		
2.1	Effect of snake venom anticoagulant PLA ₂ enzymes in different stages of the extrinsic pathway of blood coagulation.	76
2.2	Hypothetical sequence of cellular degenerative events in skeletal muscle cells as a consequence of the action of venom myotoxic PLA ₂ s.	89
CHAPTER-IV		
4.1A	Elution profile of cation-exchange chromatography of crude <i>N. naja</i> venom.	158
4.1B	Elution profile of gel filtration chromatography of NnCM1.	159
4.2	Elution profile of reversed phase-high performance liquid chromatography of NnCM1GF5 (NnPLA ₂ -I).	161

Figure No.	Figure Captions	Page No.
4.3	SDS-PAGE analysis of NnPLA ₂ -I.	162
4.4	MALDI-ToF-MS analysis to determine the molecular mass of NnPLA ₂ -I.	162
4.5	Circular dichroism spectra of NnPLA ₂ -I demonstrating its secondary structure.	164
4.6	Dose-dependent phospholipid hydrolytic activity of NnPLA ₂ -I.	164
4.7	Kinetics of phosphatidylcholine (PC) hydrolysis by NnPLA ₂ -I.	166
4.8A	Effect of pH on the PLA ₂ activity of NnPLA ₂ -I.	166
4.8B	Effect of temperature on the PLA ₂ activity of NnPLA ₂ -I.	167
4.9A	Dose-dependent (25 – 1000 nM) effect of NnPLA ₂ -I on re-calcification time of goat PPP.	168
4.9B	Comparison of the dose dependent (0.2 – 1.0 μM) anticoagulant activity of NnPLA ₂ -I (●), heparin/ATIII (○), and warfarin (▼).	168
4.10	Dose-dependent (150 – 600 nM) effect of NnPLA ₂ -I on APTT and PT of goat PPP.	169
4.11A	Dose-dependent (0.15 – 1.5 μM) effect of NnPLA ₂ -I on fibrinogen clotting time of thrombin.	170
4.11B	Time-dependent (0 – 40 min) inhibition of fibrinogen clotting time of thrombin by NnPLA ₂ -I (0.5 μM).	170
4.12A,B	Effect of NnPLA ₂ -I on the amidolytic activity of thrombin and its comparison to heparin/antithrombin complex.	171-172
4.13	Michaelis-Menten plot for studying the kinetics of thrombin inhibition (by amidolytic activity assay) in two different inhibitor concentrations (150 nm and 300 nm) of NnPLA ₂ -I.	173
4.14	Effect of NnPLA ₂ -I on amidolytic and prothrombin activation properties of factor Xa.	174
4.15	Dose-dependent (0.15 – 0.30 μM) effect of NnPLA ₂ -I on different serine proteases.	175
4.16	Platelet modulating activity of NnPLA ₂ -I.	176-177
4.17	Cell cycle analysis using propidium iodide (PI) staining and flow cytometry.	179
4.18	Dose (concentration of heparin) vs response (% residual activity) curve of inhibition of NnPLA ₂ -I induced thrombin inhibition by heparin.	181
4.19	Effect of commercial antivenoms on antiplatelet property of NnPLA ₂ -I.	183
4.20	Best predicted 3D ribbon model structure of NnPLA ₂ -I by <i>in silico</i> analysis using I-TASSER server and the predicted structure was visualized by UCSF Chimera software.	184
4.21	Docking of NnPLA ₂ -I with human thrombin.	184

Figure No.	Figure Captions	Page No.
4.22	Spectrofluorometry interaction of NnPLA ₂ -I with phospholipids.	186
4.23A	Spectrofluorometry interaction of native NnPLA ₂ -I (50 nM) with factor Xa (20 nM).	187
4.23B	Spectrofluorometry interaction of native and histidine-modified NnPLA ₂ -I (100 nM) with thrombin (40 nM).	187
4.24	Histological images of heart, kidney and liver tissues of Wistar strain rats treated with 4.0 mg/kg of NnPLA ₂ -I and control group of rats.	188

CHAPTER-V

5.1A	2D SDS-PAGE (left panel) of <i>N. naja</i> venom (300 µg) under reduced condition, and its corresponding immunoblot (right panel).	207
5.1B	2D SDS-PAGE (left panel) of <i>N. naja</i> venom (300 µg) under non-reduced condition, and their corresponding immunoblot (right panel).	208
5.2A,B	Percent relative abundances (% RA) of LC-MS/MS identified proteins in A. region 2 and B. region 3 of <i>N. naja</i> venom separated by 2D SDS-PAGE under non-reduced conditions.	209
5.2C	Percent relative abundance (%RA) of NnV protein/polypeptides identified by LC-MS/MS analysis of Nn(N)CM2 fraction (cognate complex).	210
5.3	RP-HPLC of Nn(N)CM2 to isolate the individual components of the cognate complex.	216
5.4	12.5% SDS-PAGE analysis of NnPLA ₂ -I and its cognate complex [Nn(N)CM2 fraction] under reduced and non-reduced conditions.	218
5.5A	Gel filtration chromatography of Nn(N)CM2 to determine the molecular mass range of the NnPLA ₂ -I cognate complex.	219
5.5B	Log (base 10) molecular weight of protein molecular markers vs V_e/V_o (V_e = elution volume of marker proteins; V_o = void volume of column) plot to determine the molecular mass of NnPLA ₂ -I cognate complex [Nn(N)CM2].	220
5.6	ELISA to quantitate the NnPLA ₂ -I in Nn(N)CM2 fraction (cognate complex) by anti-NnPLA ₂ -I antibodies.	221
5.7A	Determination of cytotoxicity of NnPLA ₂ -I and its cognate complex [Nn(N)CM2] post 24 h of incubation against different mammalian cells.	222
5.7B	Bright field microscopy (10 X) for determination of cytotoxicity of NnPLA ₂ -I cognate complex and its individual components against partially differentiated rat myoblasts.	226

Figure No.	Figure Captions	Page No.
5.7C	Percent cell viability determined from cell count analysis of the bright field images [Fig 5.7B(ii-x)] of untreated and treated myoblasts.	226
5.7D	Fluorescent microscopic images (10 X) of AO/EB stained partially differentiated L6 myoblasts treated with PBS (control), NnPLA ₂ -I (10.0 µg/ml or 0.70 µM), and NnPLA ₂ -I cognate complex (12.5 µg/ml).	227
5.8	Dose-dependent binding of NnPLA ₂ -I (0.17 – 0.70 µM) and its cognate complex (6.25 – 25.0 µg/ml) to L6 myoblasts.	228
5.9A	Fluorescence microscopic images (40 X) showing time-dependent (30 – 240 min) internalization of NnPLA ₂ -I (10.0 µg/ml or 0.70 µM) in L6 rat myoblasts.	229
5.9B	Confocal microscopic images (63 X magnification) showing time-dependent internalization of FITC-conjugated NnPLA ₂ -I (10.0 µg/ml or 0.70 µM) after 30 – 240 min incubation with L6 myoblasts.	230
5.9C	Z-stack projection analysis to determine the time-dependent internalization of NnPLA ₂ -I in rat myoblasts.	230
5.10	ELISA to determine the binding of NnPLA ₂ -I (10.0 µg/ml or 0.70 µM) and NnPLA ₂ -I in its cognate complex [25.0 µg/ml containing 10.0 µg/ml (0.70 µM) NnPLA ₂ -I] to L6CP, L6MP, and BSA (negative control).	231
5.11A	Immuno-blot analysis to detect binding of NnPLA ₂ -I and its cognate complex to membrane proteins of rat myoblasts (L6MP).	232
5.11B	Densitometry analysis of ~48 kDa and ~55 kDa L6MPs showing interaction with NnPLA ₂ -I/cognate complex.	233
5.12	RP-HPLC fractionation of affinity purified NnPLA ₂ -I (ligand) bound L6MP.	233
5.13	ELISA showing binding of NnPLA ₂ -I (10.0 µg/ml or 0.70 µM) to L6RP1 (100 ng).	234
5.14A	Composition of ~48 kDa L6MP protein band, as determined by LC-MS/MS.	235
5.14B,C	Composition of B. ~55 kDa L6MP protein band and C. affinity purified L6MP as determined by LC-MS/MS.	236
5.15A	Spectrofluorometry analysis to determine dose-dependent (0.17 – 0.70 µM) binding of NnPLA ₂ -I to vimentin (10.0 µg/ml).	238
5.15B	Spectrofluorometry analysis to determine time-dependent (7.5 – 60 min) binding of NnPLA ₂ -I (0.17 µM) to vimentin (10.0 µg/ml).	238

Figure No.	Figure Captions	Page No.
5.16A	Spectrofluorometry analysis to determine dose-dependent (6.25 – 25.0 µg/ml) binding of NnPLA ₂ -I to vimentin (10.0 µg/ml).	239
5.16B	Spectrofluorometry analysis to determine time-dependent (7.5 – 60 min) binding of NnPLA ₂ -I (6.25 µg/ml containing 0.17 µM of NnPLA ₂ -I) to vimentin (10.0 µg/ml).	240
5.17A	Most favorable docking model of interaction of NnPLA ₂ -I (green chain) with 3s4rB chain (blue chain) of vimentin as predicted by ClusPro 2.0 server and refined by Firedock server.	242
5.17B	Most favorable docking model of interaction of NnPLA ₂ -I (green chain) with 3trtA chain (pink chain) of vimentin as predicted by ClusPro 2.0 server and refined by Firedock server.	242
5.17C	Most favorable docking model of interaction of NnPLA ₂ -I (green chain) with 3uf1A chain (teal chain) of vimentin as predicted by ClusPro 2.0 server and refined by Firedock server.	243
5.17D	Most favorable docking model of interaction of NnPLA ₂ -I (green chain) with 1gk4D chain chain (brown chain) of vimentin as predicted by ClusPro 2.0 server and refined by Firedock server.	243
5.18A,B	ClusPro 2.0 and Firedock predicted best docking models of 3s4rB chain of vimentin with A. CTx and B. LNTx.	244
5.18C	ClusPro 2.0 and Firedock predicted best docking models of 3s4rB chain of vimentin with NGF.	245
5.19A	ClusPro 2.0 and Firedock predicted best docking models of 3trtA chain of vimentin with CTx.	245
5.19B,C	ClusPro 2.0 and Firedock predicted best docking models of 3trtA chain of vimentin with B. LNTx and C. NGF.	246
5.20	ClusPro 2.0 and Firedock predicted best models of A. NnPLA ₂ -I – CTx – LNTx and B. NnPLA ₂ -I – CTx – LNTx – NGF interactions.	247
5.21A	Best docking model of NnPLA ₂ -I-3FTx complex with 3s4rB chain of vimentin.	248
5.21B	Best docking model of NnPLA ₂ -I-3FTx complex with 3trtA chain of vimentin.	249
5.22	Best docking model of NnPLA ₂ -I-3FTx-NGF complex with A. 3s4rB and B. 3trtA chains of vimentin.	250
5.23	ELISA showing binding of NnPLA ₂ -I to native and tail-blocked vimentin.	252

Figure No.	Figure Captions	Page No.
CHAPTER-VI		
6.1A	Comparison of the dose-dependent effect of ACR9 (2.5 – 10.0 μ M) and argatroban (2.5 – 10.0 μ M) on whole blood clotting time.	269
6.1B	Comparison of the dose-dependent effect of ACR9 (0.25 – 10.0 μ M) and argatroban (0.25 – 10.0 μ M) on re-calcification time of mammalian PPP.	270
6.2	Dose-dependent (0.5 – 5.0 μ M) effect of ACR9 on prothrombin time (PT), activated partial thromboplastin time (APTT), and thrombin time (TT) of PPP.	270
6.3	Effect of ACR9 on fibrinogen clotting time of thrombin.	271
6.4A	Effect of ACR9 on amidolytic activity of thrombin.	272
6.4B	Dose-dependent (0.5 – 5.0 μ M) inhibition of the amidolytic activity of thrombin by ACR9 and argatroban.	273
6.4C,D	Log [inhibitor] vs response (absorbance at 405 nm) plot to determine the IC ₅₀ of thrombin inhibition by C. ACR9 and D. argatroban, respectively.	273
6.5	Michaelis-Menten plot to determine the kinetics of thrombin inhibition by ACR9 at 1.0 and 2.0 μ M concentrations	274
6.6	Effect of ACR9 on prothrombin activation by factor Xa	275
6.7A	Effect of ACR9 on amidolytic activity of factor Xa.	276
6.7B	Dose-dependent inhibition of the amidolytic activity of thrombin by ACR9 (0.5 – 4.0 μ M).	277
6.7C	Log [ACR9] (peptide concentration) vs response (absorbance at 405 nm) plot to determine the IC ₅₀ of FXa inhibition by ACR9.	277
6.8	Michaelis-Menten plot to determine the kinetics of FXa inhibition by ACR9 (1.0 and 2.0 μ M)	278
6.9	Effect of ACR9 on prothrombin as assayed by amidolytic assay of prothrombin activation by FXa against the chromogenic substrate of thrombin	279
6.10	Best predicted structure for ACR9 by the PEPFOLD-3 Peptide Structure Prediction online web server	279
6.11A	Docking of ACR9 with thrombin. Best docking model of ACR9 with thrombin (PDB ID: 3RM2) as predicted by the ClusPro 2.0 web server; yellow, grey, and blue chains represent ACR9, heavy (H) chain, and light (L) chain of thrombin, respectively.	280
6.11B	Ligplot analysis to show the residue-to-residue interaction of ACR9 with the heavy chains of thrombin as predicted by PDBSum software.	280

Figure No.	Figure Captions	Page No.
6.11C	Contact-map analysis between the residues of ACR9 (vertical axis) and heavy chain of thrombin (horizontal axis) predicted by PDBsum server.	280
6.12A	Docking of ACR9 with factor Xa. Best docking model of ACR9 with FXa (PDB ID: 1C5M) as predicted by the ClusPro 2.0 web server; red, grey, and yellow chains represent ACR9, heavy (D) chain, and light (F) chain of FXa, respectively.	281
6.12B	Ligplot analysis to show the residue-to-residue interaction of ACR9 with the heavy chain of FXa predicted by PDBSum software.	281
6.12C	Contact-map analysis between the residues of ACR9 (vertical axis) and heavy chain of FXa (horizontal axis), as predicted by PDBsum server.	281
6.13	Spectrofluorometry analysis to determine the dose-dependent (0.5 – 10.0 μ M) binding of ACR9 to thrombin (0.3 μ M).	282
6.14	Spectrofluorometry analysis to determine the dose-dependent (0.5 – 10.0 μ M) binding of ACR9 to FXa (0.1 μ M).	283
6.15	Binding sensogram depicting equilibrium binding of ACR9 (2.5 – 15.0 μ M) with thrombin by surface plasmon resonance.	284
6.16	Cytotoxicity exhibited by ACR9 (12.5 and 25.0 μ M) towards mammalian breast cancer cells (MCF-7) and human embryonic kidney cells (HEK-293).	285
6.17	Flow cytometry analysis of cell cycle using propidium iodide (PI) staining.	286
6.18	Histological images of heart, kidney, and liver tissues of Wistar strain rats treated with ACR9 (4.0 mg/kg) and control group of rats.	290
6.19A	Antithrombotic property of ACR9.	291
6.19B	Percent thrombus formation in the tails of Wistar rats (n=4) after 48 h of intravenous administration of 0.9 mg/kg κ -carrageenan in untreated (control), ACR9, and argatroban-treated rats.	291

ABBREVIATIONS

Abbreviation	Full form
1D	One dimensional
2D	Two dimensional
3D	Three dimensional
3FTx	Three-finger toxins
ACE	Angiotensin converting enzyme
ACE	Atomic contact energy
ACN	Acetonitrile
ADP	Adenosine diphosphate
AERD	Aspirin-exacerbated respiratory disease
AIDS	Acquired Immune Deficiency Syndrome
AMP	Adenosine monophosphate
ANP	A-type natriuretic peptide
AO	Acridine Orange
AP	Andhra Pradesh
APTT	Activated partial thromboplastin time
Arg	Arginine
Asn	Asparagine
Asp	Aspartate
ATCC	American Type Cell Culture
AT-III	Anti-thrombin III
AV	Antivenom
BLAST	Basic local alignment search tool
BNP	B-type natriuretic peptide
BPP	Bradykinin potentiating peptides
BR	Bihar
BSA	Bovine serum albumin
BSVL	Bharat Serum and Vaccines Ltd.
CD	Circular dichroism
CG	Chhattisgarh
CID	Collision-induced dissociation
CK	Creatine kinase
CNP	C-type natriuretic peptide
CPK	Creatine phosphokinase
cPLA ₂	Calcium dependent phospholipase A ₂
CRISP	Cysteine-rich secretory protein
CTx	Cytotoxin
CV	Column volumes
CVD	Cardiovascular disease
CVF	Cobra venom factor
DAPI	4',6-diamidino-2-phenylindole
DDA	Data-dependent acquisition

Abbreviation	Full form
DMEM	Dulbecco's Modified Eagle's Medium
DMSO	Dimethyl sulfoxide
DNP	<i>Dendroaspis</i> natriuretic peptide
DTT	Dithiothreitol
EAT	Ehrlich Ascites Tumor
EB	Ethidium bromide
EC	Enzyme commission
EC50	Half minimal effective concentration
ECD	Glutamate-Cysteine-Aspartate
EDTA	Ethylenediaminetetraacetic acid
EI	Eastern India
ELISA	Enzyme-linked immunosorbent assay
E-P	Enzyme-product complex
E-S	Enzyme-substrate complex
ESI	Electrospray ionization
FA	Fatty acid
FBS	Fetal bovine serum
FCA	Freund's complete adjuvant
FDR	False discovery rate
FFA	Free fatty acid
FIA	Freund's incomplete adjuvant
FITC	Fluorescein isothiocyanate
FIX	Factor IX
FIXa	Activated factor IXa
Fmoc	Fluorenylmethyloxycarbonyl
FPLC	Fast Protein Liquid Chromatography
FT	Fourier transform
FX	Factor X
FXa	Activated Factor Xa
FXI	Factor XI
FXIa	Activated factor XI
FXII	Factor XII
FXIIa	Activated factor XII
GBD	Global burden of disease
GE	Global energy
GJ	Gujarat
Gln	Glutamine
Glu	Glutamate
Gly	Glycine
Hb	Hemoglobin
Hct	Hematocrit
HDL	High density lipids
HEPES	4-(2-hydroxyethyl)-1-piperazineethanesulfonic acid

Abbreviation	Full form
His	Histidine
HIT	Heparin-induced thrombocytopenia
HIV	Human immunodeficiency virus
HMWK	High-molecular-weight kininogen
HRP	Horseradish peroxidase
<i>i.v.</i>	Intravenous
IAA	Iodoacetamide
IC ₅₀	Half maximal inhibitory concentration
IgG	Immunoglobulin G
Ile	Isoleucine
INR	International normalized ratio
iPLA ₂	Calcium-independent Phospholipase A ₂
JH	Jharkhand
KA	Karnataka
kDa	Kilodalton
KDR	Kinase insert domain receptor
KGD	Lysine-Glycine-Aspartate
KSPI	Kunitz-type serine protease inhibitor
KTS	Lysine-Threonine-Serine
KTX	Kaouthiotoxin
kV	Kilo volt
L6CP	L6 cytosolic protein
L6MP	L6 membrane protein
LC-MS/MS	Liquid chromatography-tandem mass spectrometry
LD ₅₀	Median lethal dose
LDH	Lactate dehydronase
LDL	Low density lipids
Leu	Leucine
LMWH	Low molecular weight heparin
LNTx	Long chain neurotoxin
Log	Logarithm
Lys	Lysine
m/z	Mass to charge
MALDI-ToF-MS	Matrix-assisted laser desorption/ionization -Time of flight - mass spectrometry
MAV	Monovalent antivenom
MCF	Michigan Cancer Foundation
MCH	Mean corpuscular hemoglobin
MCHC	Mean corpuscular hemoglobin concentration
MCV	Mean corpuscular volume
MDG	Methionine-Aspartate-Glycine
MH	Maharashtra
MLD	Methionine-Leucine-Aspartate

Abbreviation	Full form
MOPS	3-(N-morpholino)propanesulfonic acid
MP	Madhya Pradesh
MPV	Mean platelet volume
MTCC	Microbial Type Cell Culture
MTT	3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide
MVD	Methionine-Valine-Aspartate
MW	Molecular weight
NCBI	National Center for Biotechnology Information
ND	Not detected
NGF	Nerve growth factor
NHS	N-hydroxysuccinimide
NIH	National Institutes of Health
NnV	<i>Naja naja</i> venom
NP	Natriuretic peptide
OECD/OCDE	Organisation for Economic Co-operation and Development/Organisation de coopération et de développement économiques
OR	Orissa
PAF-AH	Platelet-activating factor acetylhydrolase
PAR1	Protease activated receptor 1
PAV	Polyvalent antivenom
<i>p</i> -BPB	<i>p</i> -Bromophenacyl bromide
PBS	Phosphate buffered saline
PBS-T	Phosphate buffered saline containing Tween-20
PC	Phosphatidylcholine
PCt	Platelet crit
PDB	Protein Data Bank
PDW	Platelet distribution width
PE	Phosphatidylethanolamine
PEG	Polyethylene glycol
Phe	Phenylalanine
PI	Propidium iodide
PLA ₂	Phospholipase A ₂
PLA ₂ R	Phospholipase A ₂ receptor
PLB	Phospholipase B
<i>p</i> -NA	<i>p</i> -Nitroaniline
PPP	Platelet poor plasma
PRP	Platelet rich plasma
PS	Phosphatidylserine
PSVPL	Premium Serum and Vaccines Pvt. Ltd.
PT	Prothrombin time
PTH	Prothrombin
PTM	Post translational modification

Abbreviation	Full form
PVDF	Polyvinylidene difluoride
RA	Relative abundance
RBC	Red blood corpuscles
RCSB	Research Collaboratory for Structural Bioinformatics
RDW	Red blood cell distribution width
R _{eq}	Response at equilibrium
RGD	Arginine-Glycine-Aspartate
RJ	Rajasthan
RP-HPLC	Reversed-phase high-performance liquid chromatography
rpm	Revolutions per minute
RU	Response Unit
SD	Standard deviation
SDS-PAGE	Sodium dodecyl sulfate-polyacrylamide gel electrophoresis
SEC	Size-exclusion chromatography
Ser	Serine protease inhibitor
SGOT	Serum glutamic oxaloacetic transaminase
SGPT	Serum glutamic pyruvic transaminase
SPI	Serine protease inhibitor
sPLA ₂	Secretory phospholipase A ₂
SPPS	Solid phase peptide synthesis
SPR	Surface plasmon resonance
SVMP	Snake venom metalloprotease
SVSP	Snake venom serine protease
SVTLE	Snake venom thrombin-like enzymes
TBS	Tris buffered saline
TBS-T	Tris buffered saline containing Tween-20
TEMED	Tetramethylethylenediamine
TF	Tissue factor
TFA	Trifluoroacetic acid
THR	Thrombin
TMB	3,3,5,5'-tetramethylbenzidine
TMB/H ₂ O ₂	3,3,5,5'-tetramethylbenzidine/hydrogen peroxide
TN	Tamil Nadu
t-PA	Tissue plasminogen activator
Trp	Tryptophan
TT	Thrombin time
TXA ₂	Thromboxane A ₂
Tyr	Tyrosine
UFH	Unfractionated heparin
UHPLC	Ultra high-performance liquid chromatography
UP	Uttar Pradesh
UV	Ultra violet
V _e	Elution volume

Abbreviation	Full form
VEGF	Vascular endothelial growth factor
VGD	Valine-Glycine-Aspartate
VINS	Vins Bioproducts Limited
V _o	Void volume
WB	West Bengal
WBC	White blood corpuscles
WBCT	Whole blood clotting time
WHO	World Health Organization
WP	Washed platelets
z	Charge
