

Supporting Information

Insight into Shared Properties and Differential Dynamics and Specificity of Secretory Phospholipase A₂ Family Members

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This file contains: 13 pages, 5 figures and 2 tables.

Supplementary Figures

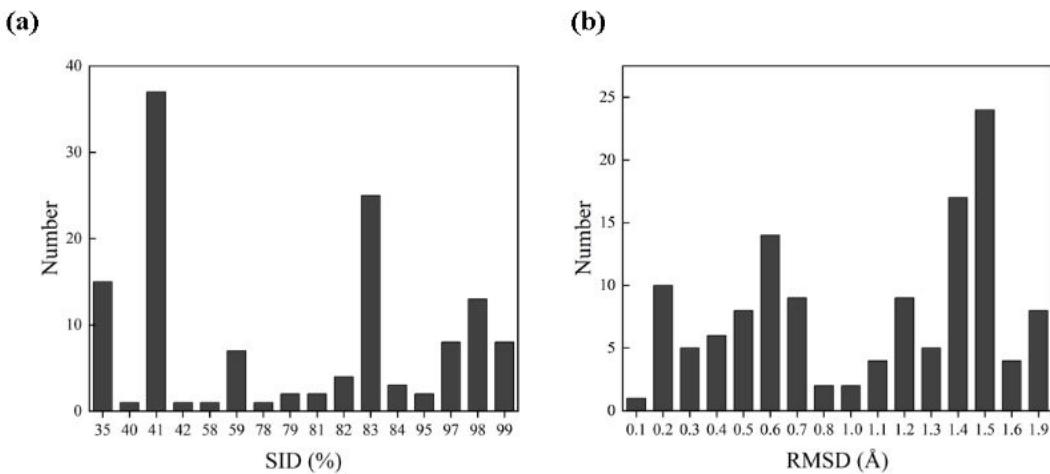


Figure S1. Distributions of percent sequence identity (SID) (a) and RMSDs (b) with respect to the reference structure 1vkq from group IB for the 130 sPLA₂ family members.

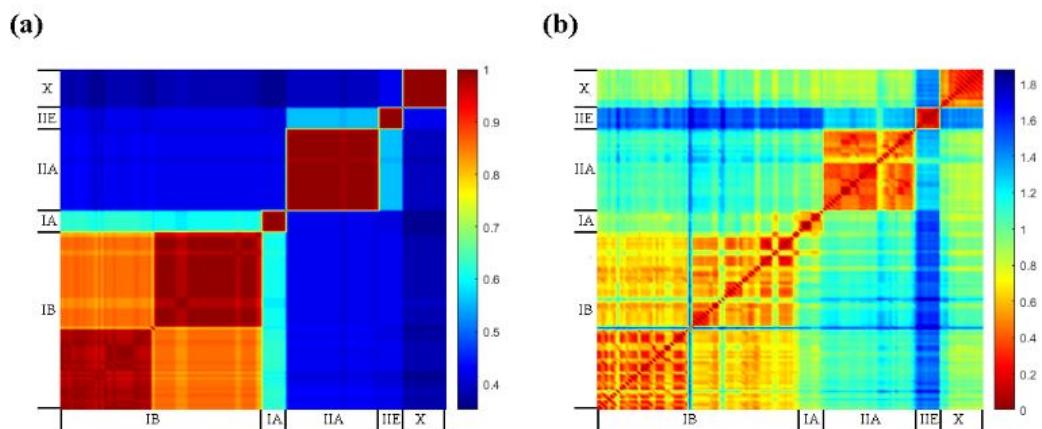


Figure S2. Heat maps of sequence identity (a) and RMSDs (b) between members for 130 sPLA₂ family members from groups IA, IB, IIA, IIE and X.

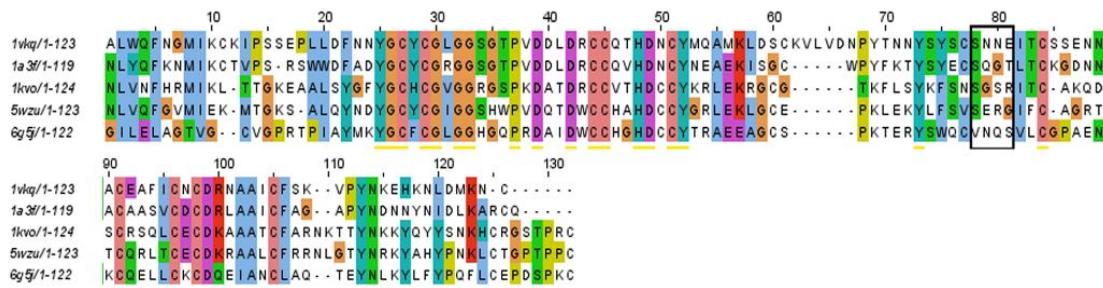


Figure S3. Diagram of sequence alignment of the five representative structures for groups IA, IB, IIA, IIE and X of sPLA₂ enzyme family. The sequences of region 3 are marked in the black box.

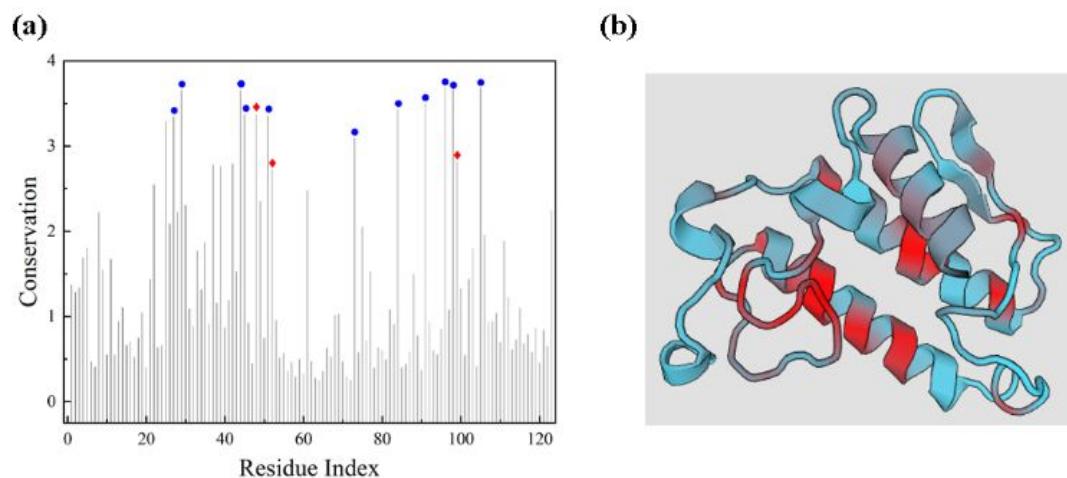


Figure S4. (a) Residue conservation of sPLA₂ family from a multiple sequence alignment of 789 sequences, with the sequence numbering corresponding to the reference structure 1vkq. The highly conserved residues Cys27, Cys29, Cys44, Cys45, Cys51, Cys84, Cys91, Cys96, Cys98, Cys105 and Tyr73 are marked in blue, and the other highly conserved residues His48, Tyr52 and Asp99 (catalytic residues) are marked in red. (b) Color-coded residue conservation of sPLA₂ enzyme mapped on the reference structure 1vkq (download from MISTIC web). A high level in conservation is shown in red and a low level is shown in blue.

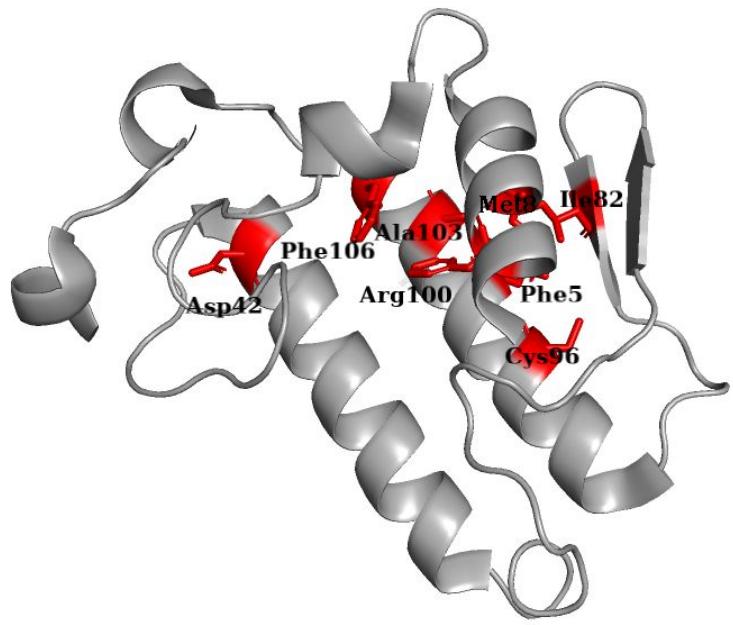


Figure S5. Residues (in red) with minimal sensitivity which are also characterized by the lowest variances among sPLA₂ enzyme members, are tightly packed in the structure.

Supplementary Tables

Table S1. The 130 sPLA₂ enzyme members used in this study.

	PDB	Uniprot ID	Protein Name	Sequence identity with the reference one	RMSD (Å) from the reference one
Group IB					
1	1vkq-A	PA21B BOVIN	phospholipase A ₂	1.000	0.000
2	1bpq-A	PA21B BOVIN	phospholipase A ₂	0.984	0.227
3	1bp2-A	PA21B BOVIN	phospholipase A ₂	0.976	0.441
4	1c74-A	PA21B BOVIN	phospholipase A ₂	0.992	0.197
5	1ceh-A	PA21B BOVIN	phospholipase A ₂	0.967	0.328
6	1fdk-A	PA21B BOVIN	phospholipase A ₂	0.976	0.259
7	1g4i-A	PA21B BOVIN	phospholipase A ₂	0.976	0.454
8	1gh4-A	PA21B BOVIN	phospholipase A ₂	0.984	0.830
9	1irb-A	PA21B BOVIN	phospholipase A ₂	0.967	0.246
10	1kvw-A	PA21B BOVIN	phospholipase A ₂	0.967	0.441
11	1kvx-A	PA21B BOVIN	phospholipase A ₂	0.967	0.466
12	1kvyy-A	PA21B BOVIN	phospholipase A ₂	0.967	0.381
13	1mks-A	PA21B BOVIN	phospholipase A ₂	0.951	0.300
14	1mkt-A	PA21B BOVIN	phospholipase A ₂	0.976	0.262
15	1mkku-A	PA21B BOVIN	phospholipase A ₂	0.951	0.562
16	1mkv-A	PA21B BOVIN	phospholipase A ₂	0.976	0.245
17	1o2e-A	PA21B BOVIN	phospholipase A ₂	1.000	0.241
18	1o3w-A	PA21B BOVIN	phospholipase A ₂	1.000	0.165
19	1une-A	PA21B BOVIN	phospholipase A ₂	0.976	0.441
20	1vl9-A	PA21B BOVIN	phospholipase A ₂	0.984	0.560
21	2b96-A	PA21B BOVIN	phospholipase A ₂	0.984	0.308
22	2bax-A	PA21B BOVIN	phospholipase A ₂	0.992	0.141
23	2bch-A	PA21B BOVIN	phospholipase A ₂	0.992	0.170
24	2bd1-A	PA21B BOVIN	phospholipase A ₂	0.992	0.607
25	2bd1-B	PA21B BOVIN	phospholipase A ₂	0.992	0.597
26	2bp2-A	PA21B BOVIN	phospholipase A ₂	0.976	0.531
27	2bpp-A	PA21B BOVIN	phospholipase A ₂	0.976	0.236
28	2zp3-A	PA21B BOVIN	phospholipase A ₂	0.967	0.204
29	2zp4-A	PA21B BOVIN	phospholipase A ₂	0.967	0.199
30	2zp5-A	PA21B BOVIN	phospholipase A ₂	0.967	0.360
31	3bp2-A	PA21B BOVIN	phospholipase A ₂	0.975	0.502
32	3elo-A	PA21B HUMAN	phospholipase A ₂	0.780	1.485

33	1fx9-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.665
34	1fx9-B	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.661
35	1fxf-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.633
36	1fxf-B	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.624
37	1l8s-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.642
38	1l8s-B	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.625
39	1p2p-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.604
40	1y6o-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.821	0.450
41	1y6o-B	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.821	0.435
42	1y6p-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.821	0.754
43	1y6p-B	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.821	1.037
44	2azy-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	1.209
45	2azz-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	1.242
46	2b00-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	1.212
47	2b01-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	1.041
48	2b03-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	1.307
49	2b04-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.838	1.385
50	2phi-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.837	0.569
51	2phi-B	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.837	0.505
52	3fvi-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.563
53	3fvi-B	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.484

54	3fvi-C	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.499
55	3fvi-D	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.560
56	3fvj-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.690
57	3hsw-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.691
58	3l30-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.632
59	3o4m-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.661
60	3p2p-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.805	1.139
61	3p2p-B	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.805	1.097
62	3qlm-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.676
63	4dbk-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.662
64	4g5i-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.620
65	4o1y-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.696
66	4p2p-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.829	0.650
67	5p2p-A	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.788	1.123
68	5p2p-B	PA21B PIG	Phospholipase A ₂ , major isoenzyme	0.788	1.093
Group IA					
69	1a3f-A	PA2A2 NAJNA	Acidic phospholipase A ₂ 2	0.590	1.215
70	1a3d-A	PA2A2 NAJNA	Acidic phospholipase A ₂ 2	0.590	1.268
71	1a3f-B	PA2A2 NAJNA	Acidic phospholipase A ₂ 2	0.590	1.222
72	1a3f-C	PA2A2 NAJNA	Acidic phospholipase A ₂ 2	0.590	1.219
73	1psh-A	PA2A2 NAJNA	Acidic phospholipase A ₂ 2	0.590	1.210
74	1psh-B	PA2A2 NAJNA	Acidic phospholipase A ₂ 2	0.590	1.197

75	1psh-C	PA2A2 NAJNA	Acidic phospholipase A ₂ 2	0.590	1.215
76	2wq5-A	PA2A2 NAJNA	Acidic phospholipase A ₂ 2	0.581	1.303
Group IIA					
77	1kvo-A	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.474
78	1ayp-A	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.468
79	1ayp-B	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.493
80	1ayp-C	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.473
81	1ayp-D	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.483
82	1ayp-E	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.486
83	1ayp-F	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.485
84	1db4-A	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.427
85	1db5-A	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.430
86	1dcy-A	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.430
87	1j1a-A	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.468
88	1j1a-B	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.465
89	1kqu-A	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.429
90	1kvo-B	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.476
91	1kvo-C	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.478
92	1kvo-D	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.497
93	1kvo-E	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.483
94	1kvo-F	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.461
95	1n28-A	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.496

96	1n28-B	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.557
97	1n29-A	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.417	1.525
98	1pod-A	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.583
99	1poe-A	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.595
100	1poe-B	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.503
101	3u8b-A	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.507
102	3u8d-A	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.422
103	3u8d-B	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.424
104	3u8h-A	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.470
105	3u8h-B	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.458
106	5g3n-A	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.461
107	5g3n-B	PA2GA HUMAN	Phospholipase A ₂ , membrane associated	0.409	1.649
Group IIE					
108	5wzu-A	PA2GE HUMAN	Phospholipase A ₂ , membrane associated	0.412	1.885
109	5wzm-A	PA2GE HUMAN	Phospholipase A ₂ , membrane associated	0.411	1.887
110	5wzo-A	PA2GE HUMAN	Phospholipase A ₂ , membrane associated	0.412	1.938
111	5wzs-A	PA2GE HUMAN	Phospholipase A ₂ , membrane associated	0.412	1.878
112	5wzt-A	PA2GE HUMAN	Phospholipase A ₂ , membrane associated	0.412	1.852
113	5wzv-A	PA2GE HUMAN	Phospholipase A ₂ , membrane associated	0.412	1.874
114	5wzw-A	PA2GE HUMAN	Phospholipase A ₂ , membrane associated	0.412	1.883
115	5y5e-A	PA2GE HUMAN	Phospholipase A ₂ , membrane associated	0.402	1.899
Group X					

116	6g5j-A	PA2GX HUMAN	Group 10 secretory phospholipase A ₂	0.348	1.357
117	1le6-A	PA2GX HUMAN	Group 10 secretory phospholipase A ₂	0.348	1.441
118	1le6-B	PA2GX HUMAN	Group 10 secretory phospholipase A ₂	0.348	1.506
119	1le6-C	PA2GX HUMAN	Group 10 secretory phospholipase A ₂	0.348	1.480
120	1le7-A	PA2GX HUMAN	Group 10 secretory phospholipase A ₂	0.348	1.355
121	1le7-B	PA2GX HUMAN	Group 10 secretory phospholipase A ₂	0.348	1.385
122	4uy1-A	PA2GX HUMAN	Group 10 secretory phospholipase A ₂	0.348	1.332
123	4uy1-B	PA2GX HUMAN	Group 10 secretory phospholipase A ₂	0.348	1.352
124	5g3m-A	PA2GX HUMAN	Group 10 secretory phospholipase A ₂	0.348	1.346
125	5g3m-B	PA2GX HUMAN	Group 10 secretory phospholipase A ₂	0.348	1.367
126	5ow8-A	PA2GX HUMAN	Group 10 secretory phospholipase A ₂	0.348	1.358
127	5ow8-B	PA2GX HUMAN	Group 10 secretory phospholipase A ₂	0.348	1.384
128	5owc-A	PA2GX HUMAN	Group 10 secretory phospholipase A ₂	0.348	1.350
129	5owc-B	PA2GX HUMAN	Group 10 secretory phospholipase A ₂	0.348	1.361
130	6g5j-B	PA2GX HUMAN	Group 10 secretory phospholipase A ₂	0.348	1.379

Table S2. The first ten pairs of residues ranked based on the mutual information between residues.

Residue	Residue	MI value
Cys11	Cys77	19.115
Tyr52	Met53	18.099
Ala102	Phe106	17.196
Phe5	Met8	14.956
Phe5	Ala102	14.593
Phe5	Ile9	14.041
Gly26	Gly33	13.591
His115	Leu118	13.363
Tyr111	Asn112	12.714
Ile13	Pro14	12.641