

Supplementary Material

Table 1S. The composition of synapsin I as predicted by SOPMA server.

| <i>Amino acids</i> | <i>Number</i> | <i>%</i> |
|--------------------|---------------|----------|
| Ala | 72 | 10.2% |
| Arg | 39 | 5.5% |
| Asn | 20 | 2.8% |
| Asp | 28 | 4.0% |
| Cys | 3 | 0.4% |
| Gln | 59 | 8.4% |
| Glu | 20 | 2.8% |
| Gly | 75 | 10.6% |
| His | 17 | 2.4% |
| Ile | 19 | 2.7% |
| Leu | 42 | 6.0% |
| Lys | 31 | 4.4% |
| Met | 14 | 2.0% |
| Phe | 19 | 2.7% |
| Pro | 98 | 13.9% |
| Ser | 60 | 8.5% |
| Thr | 32 | 4.5% |
| Trp | 4 | 0.6% |
| Tyr | 13 | 1.8% |
| Val | 40 | 5.7% |

Table 2S: The percentage of secondary structure elements.

| | |
|-----------------|---------|
| Alpha Helix | 27.23 % |
| Extended strand | 8.09% |
| Beta Turn | 4.68% |
| Random coil | 60.00% |

Table 3S: Ramachandran plots statistics of SynIa model generated via MOE, SWISS Model and I-TASSER.

| Residues | MOE | SWISS Model | I-TASSER |
|---|-------|-------------|----------|
| In most favored regions | 92.3% | 94% | 66.6% |
| In additionally allowed regions | 7.6% | 4.8% | 26.% |
| In generously allowed regions | 0.0% | 1.1% | 5.3% |
| In disallowed regions | 0.2% | 0.0% | 1.9% |
| Number of non-glycine and non proline residue | 100% | 100% | 100% |
| End-residues | | | |
| Glycine residues | | | |
| Proline residues | | | |
| Total number of residues | 610 | 610 | 705 |

Table 4S: Details of Secondary structure elements of the homology model of SynIa.

| Domains | Description Secondary Structure |
|---|--|
| Domain A | Beta Sheets: 24-26 |
| | Coil Region: 1-23 |
| Domain B (Linker Domain) | Alpha Helices: 34-37; 58-61; 74-87 |
| | Beta Sheets: 101-103 |
| | Coil Region: 27-33; 38-57; 62-73; 88-100; 104-111 |
| Domain C (Synaptic- Vesicles and Actin-Binding Domain) | Alpha Helices: 127-130; 199-207; 216-222; 225-239; 285- 299; 351-365; 399-416 |
| | Beta Sheets: 112-119; 141-147; 149-156; 161-169; 173-179; 182- 185; 256-257; 250-252; 266-269; 279-282; 301- 306; 310-319; 322- 331; 342-347; 369-376; 382-388 |
| | Coil Region: 119-126; 131-140; 157-160; 170-172; 180-181; 185-199; 206-215; 223-226; 240- 249; 253-255; 258-265; 270-278; 283-284; 298-300; 307-309; 320-321; 330-341; 348-350; 365-368; 377-381; 389-398 |
| Domain D (Pro-Rich Linker Domain) | Alpha Helices: 488-490; 517-519; 523-529 |
| | Beta Sheets: 421-423; 480-482 |
| | Coil Region: 417-420; 424-479; 481-487; 550-516; 520-522; 530- 659 |
| Domain E | Alpha Helices: 660-668 |
| | Coil Region: 669-705 |

Table 5S: List the amino acids and their corresponding protonation states that changed between pHs.

| Amino Acids | pH 6.0 (pka) | pH 7.0 (pka) | pH 7.4 (pka) | pH 8.0 (pka) |
|--------------------|---------------------|---------------------|---------------------|---------------------|
| Asp10 | 3.83 | 3.65 | 4.67 | 4.55 |
| Asp24 | 8.25 | 4.45 | 7.19 | 7.06 |
| Asp120 | 5.54 | 4.08 | 5.6 | 5.71 |
| Asp125 | 6.49 | 3.95 | 4.67 | 6.1 |
| Asp140 | 7.56 | 3.48 | 6.37 | 3.3 |
| Asp150 | 7.37 | 4.61 | 9.67 | 8.19 |
| Asp164 | 7.32 | 4.44 | 4.9 | 4.79 |
| Asp181 | 5.39 | 3.4 | 5.93 | 5.1 |
| Asp197 | 4.34 | 2.24 | 4 | 3.64 |
| Asp224 | 7.54 | 5.15 | 7.04 | 7.83 |
| Asp248 | 8.82 | 4.04 | 7.73 | 4.56 |
| Asp290 | 8.37 | 4.3 | 7.41 | 7.97 |
| Asp309 | 6.57 | 2.9 | 5.05 | 5.21 |
| Asp313 | 3.57 | 4.86 | 5.49 | 4.16 |
| Asp351 | 4.19 | 2.75 | 7.53 | 6.35 |
| Asp358 | 6.03 | 4.43 | 4.77 | 7.33 |
| Asp368 | 5.01 | 2.05 | 3.96 | 4.43 |
| Asp379 | 5.01 | 3.96 | 6.43 | 6.26 |
| Asp382 | 7.18 | 2.37 | 4.55 | 4.4 |
| Asp397 | 6.77 | 3.93 | 6.43 | 7.41 |
| Asp400 | 6.91 | 2.07 | 7.25 | 5.29 |
| Asp402 | 3.8 | 3.1 | 3.66 | 3.04 |
| Asp425 | 4.66 | 3.25 | 7.26 | 5.56 |
| Asp643 | 6.7 | 3.79 | 5.13 | 6.51 |
| Asp685 | 5.94 | 3.84 | 7.45 | 5.26 |
| Asp705 | 8.42 | 2.94 | 6.51 | 3.61 |
| Glu52 | 5.9 | 3.57 | 8.12 | 8.3 |
| Glu97 | 6.46 | 4.64 | 6.99 | 8.36 |
| Glu121 | 9.47 | 5.06 | 8.99 | 8.62 |
| Glu138 | 5.56 | 3.46 | 7.36 | 6.67 |
| Glu144 | 4.67 | 2.58 | 4.39 | 5.53 |
| Glu147 | 11.3 | 5.55 | 9.21 | 11.02 |
| Glu66 | 5.37 | 2.61 | 5.03 | 6.15 |
| Glu242 | 7.12 | 4.44 | 7.61 | 7.07 |

| | | | | |
|--------|-------|-------|-------|-------|
| Glu243 | 7.82 | 4.65 | 9.37 | 8.33 |
| Glu257 | 6.73 | 4.53 | 7.3 | 8.06 |
| Glu305 | 5.55 | 5.05 | 5.36 | 4.28 |
| Glu345 | 7.78 | 4.65 | 7.45 | 6.98 |
| Glu362 | 5.51 | 5.15 | 8.28 | 8.35 |
| Glu373 | 7.77 | 6.7 | 8.35 | 7.67 |
| Glu386 | 4.85 | 2.41 | 2.43 | 5.3 |
| Glu401 | 7.5 | 3.67 | 6.11 | 8.41 |
| Glu408 | 6.42 | 4.69 | 4.97 | 4.78 |
| Glu674 | 7.14 | 4.74 | 6.28 | 5.48 |
| Glu686 | 7.18 | 4.68 | 6.41 | 7.72 |
| Glu690 | 690 | 5.62 | 5.12 | 7.36 |
| Tyr323 | 11.4 | 14.96 | 15.58 | 8.1 |
| Hsd236 | 20 | 20 | 20 | 20 |
| Hsd383 | 20 | 20 | 20 | 20 |
| Cys223 | 13.29 | 12.69 | 13.03 | 13.16 |
| Cys360 | 13.62 | 13.18 | 13.58 | 13.49 |
| Cys370 | 11.86 | 11.76 | 12.08 | 11.53 |
| Tyr3 | 11.97 | 11.76 | 10.69 | 12.06 |
| Tyr21 | 13.86 | 10.11 | 12.72 | 12.06 |
| Tyr129 | 14.74 | 12.4 | 16.81 | 16.28 |
| Tyr198 | 15.22 | 10.76 | 14.47 | 15.08 |
| Tyr207 | 12.56 | 10.87 | 13.4 | 14.67 |
| Tyr220 | 14.26 | 12.56 | 14.28 | 14.67 |
| Tyr252 | 13.96 | 11.23 | 12.62 | 13.71 |
| Tyr264 | 12.68 | 9.02 | 14.59 | 13.14 |
| Tyr301 | 15.05 | 16.34 | 14.86 | 14.24 |
| Tyr312 | 14.05 | 11.14 | 13.72 | 13.53 |
| Tyr326 | 16.98 | 12.03 | 17.83 | 16.76 |
| Tyr353 | 15.34 | 12.77 | 14.57 | 13.89 |
| Lys85 | 7.23 | 10.2 | 7.92 | 6.8 |
| Lys128 | 8.16 | 11.39 | 8.72 | 8.31 |
| Lys131 | 6.96 | 10.5 | 7.64 | 7.28 |
| Lys133 | 9 | 10.5 | 9.15 | 8.98 |
| Lys134 | 7.44 | 11.13 | 7.37 | 7.65 |
| Lys142 | 9.72 | 10.38 | 6.21 | 9.57 |
| Lys173 | 9.91 | 10.46 | 8.83 | 8.44 |
| Lys179 | 8.87 | 10.38 | 11.23 | 8.96 |
| Lys225 | 8.91 | 9.01 | 9.55 | 8.34 |

| | | | | |
|--------|-------|-------|-------|-------|
| Lys237 | 7.38 | 10.42 | 6.71 | 7.09 |
| Lys238 | 8.37 | 10.15 | 7.02 | 8.53 |
| Lys256 | 7.91 | 10.6 | 7.02 | 7.36 |
| Lys269 | 9.88 | 12.65 | 12.41 | 9.95 |
| Lys279 | 6.1 | 10.29 | 7.57 | 7.33 |
| Lys281 | 7.57 | 10.18 | 7.91 | 6.91 |
| Lys299 | 6.1 | 11.37 | 6.76 | 6.95 |
| Lys311 | 7.81 | 10.31 | 6.85 | 7.72 |
| Lys318 | 6.66 | 8.78 | 8.94 | 7.44 |
| Lys324 | 9.63 | 12.8 | 11.55 | 10.4 |
| Lys336 | 5.34 | 9.81 | 5.46 | 6.01 |
| Lys354 | 7.7 | 11.45 | 7.33 | 7.69 |
| Lys378 | 8.17 | 11.31 | 9.15 | 8.95 |
| Lys403 | 6.45 | 9.53 | 6.55 | 6.94 |
| Lys413 | 9.22 | 11.05 | 9.22 | 8.84 |
| Lys576 | 6.02 | 8.87 | 7.29 | 8.93 |
| Lys593 | 5.75 | 10.3 | 6.41 | 5.91 |
| Lys633 | 7.36 | 10.4 | 7.28 | 6.87 |
| Lys639 | 7.75 | 10.41 | 8.95 | 7.63 |
| Lys662 | 8.11 | 10.43 | 8.42 | 6.9 |
| Lys688 | 6.61 | 9.63 | 9 | 7.14 |
| Lys697 | 7.46 | 10.39 | 8.75 | 6.46 |
| Arg5 | 9.76 | 12.39 | 11.97 | 9.22 |
| Arg6 | 10.88 | 12.28 | 11.65 | 10.54 |
| Arg7 | 11.96 | 11.74 | 11.11 | 10.45 |
| Arg27 | 9.58 | 12.32 | 9.61 | 9.33 |
| Arg53 | 9.89 | 10.32 | 8.85 | 10.16 |
| Arg108 | 10.43 | 12.5 | 10.15 | 11.12 |
| Arg114 | 13.6 | 10.84 | 10.76 | 13.77 |
| Arg169 | 9.09 | 12.14 | 9.7 | 9.23 |
| Arg176 | 12.37 | 13.24 | 12.8 | 12.19 |
| Arg186 | 9.89 | 10.49 | 9.92 | 10.46 |
| Arg194 | 10.04 | 12.14 | 9.36 | 9.34 |
| Arg199 | 14.12 | 14.34 | 14.29 | 14.4 |
| Arg234 | 10.13 | 12.1 | 9.81 | 9.14 |
| Arg315 | 10.8 | 10.77 | 10.82 | 10.26 |
| Arg328 | 12.07 | 12.99 | 9.19 | 11.69 |
| Arg352 | 12.56 | 14.03 | 12.5 | 12.72 |
| Arg381 | 11.43 | 12.54 | 9.69 | 10.81 |

| | | | | |
|--------|-------|-------|-------|-------|
| Arg420 | 10.05 | 11.88 | 9.01 | 10.32 |
| Arg422 | 11.36 | 13.02 | 9.74 | 9.39 |
| Arg424 | 9.49 | 12.13 | 10.4 | 10.55 |
| Arg446 | 12.34 | 12.09 | 10.65 | 10.79 |
| Arg460 | 9.77 | 12.22 | 10.93 | 8.88 |
| Arg476 | 9.65 | 12.35 | 10.32 | 13.04 |
| Arg484 | 10.09 | 12.18 | 9.87 | 10.12 |
| Arg507 | 9.97 | 11.95 | 9.35 | 9.19 |
| Arg531 | 10.13 | 12.46 | 9.62 | 9.85 |
| Arg534 | 10.54 | 11.96 | 10.44 | 9.87 |
| Arg547 | 10.09 | 12.24 | 9.27 | 8.89 |
| Arg556 | 10.44 | 12.11 | 9.64 | 9.47 |
| Arg587 | 9.73 | 12.18 | 9.65 | 8.89 |
| Arg602 | 9.63 | 12.52 | 10.31 | 8.75 |
| Arg612 | 10.21 | 12.13 | 9.19 | 10.17 |
| Arg622 | 9.17 | 12.26 | 9.82 | 10.03 |
| Arg631 | 7.03 | 12.16 | 10 | 9.5 |
| Arg679 | 9.79 | 12.2 | 9.87 | 10.29 |
| Arg693 | 10.62 | 12.71 | 9.57 | 12.13 |
| Arg696 | 8.79 | 10.48 | 11.66 | 8.89 |
| Arg430 | 11.3 | 12.49 | 10.22 | 10.92 |
| Arg565 | 10.39 | 12.63 | 10.43 | 6.88 |

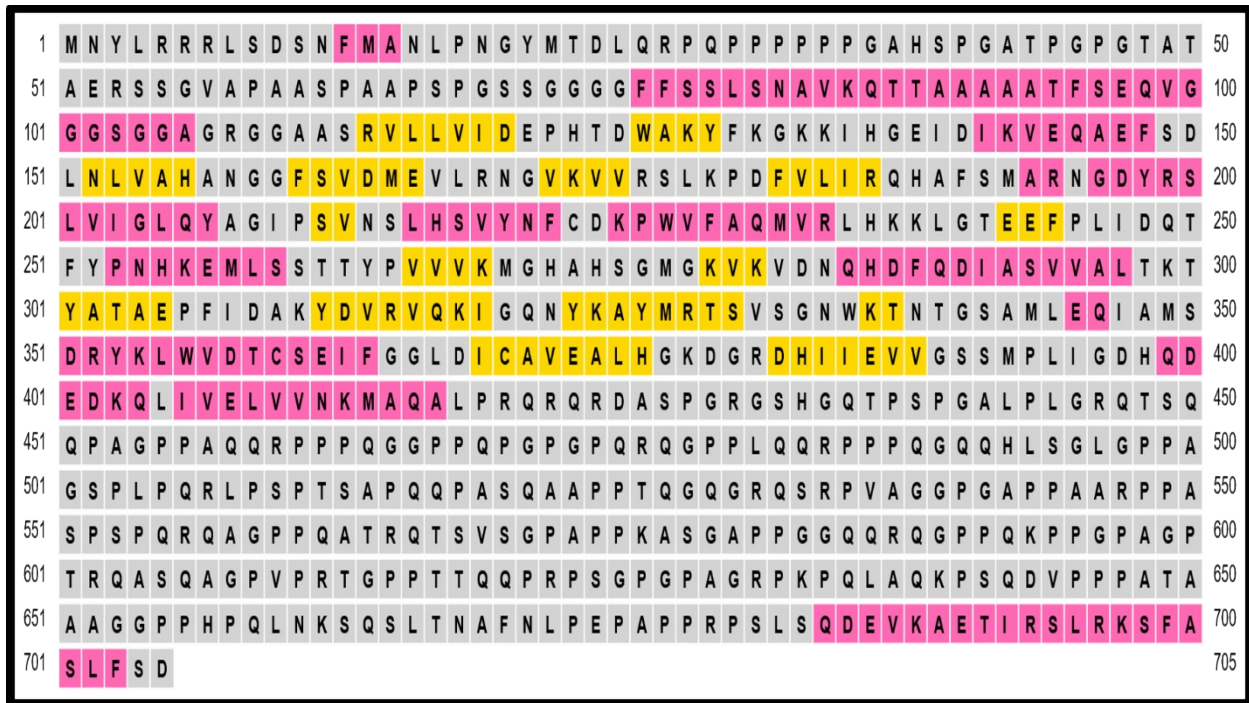


Figure 1S. Secondary structure elements of SynI are displayed in different colours; alpha helices (pink), beta sheets (yellow), loops/coils (grey).