**Supplementary Table 1**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **No.** | **Domain** | **TAG mutation position** | **Fluorescence (F) change** | | **Current (I) change** | |
| **ATP-**  **evoked**  **F change** | **Voltage-**  **evoked**  **F change** | **ATP-**  **evoked**  **I change** | **Voltage-evoked**  **I change** |
| 1 | Extracellular Domain (ECD), around ATP-binding site | D209 | + | - | + | + |
| 2 | A283 | + | - | + | + |
| 3 | S284 | - | - | - | - |
| 4 | S285 | n.d. | - | + | + |
| 5 | G286 | n.d. | - | + | + |
| 6 | ECD,  in extracellular linker | K53 | + | - | + | + |
| 7 | S54 | + | - | + | + |
| 8 | Y55 (\*\*) | n.d. | - | + | + |
| 9 | S58 | + | - | + | + |
| 10 | E63 | - | - | + | + |
| 11 | S65 | - | - | - | - |
| 12 | I67 | - | - | + | + |
| 13 | E91 | n.d. | - | + | + |
| 14 | T105 | n.d. | - | + | + |
| 15 | E167 | n.d. | - | + | + |
| 16 | R304 | n.d. | - | + | + |
| 17 | A309 | n.d. | - | + | + |
| 18 | R313 | - | - | + | + |
| 19 | I314 | n.d. | - | + | + |
| 20 | D315 | + | - | + | + |
| 21 | V316 | - | - | - | - |
| 22 | I317 | - | - | + | + |
| 23 | V318 | - | - | - | - |
| 24 | H319 | - | - | + | + |
| 25 | A322 | n.d. | - | + | + |
| 26 | K324 | - | - | + | + |
| 27 | F325 | + | - | + | + |
| 28 | Transmembrane 2 | S326 | + | - | + | + |
| 29 | L327 | - | - | + | + |
| 30 | I328 | - | - | + | - |
| 31 | P329 | - | - | + | + |
| 32 | T330 | - | - | + | + |
| 33 | I331 | + | - | + | + |
| 34 | I332 | + | - | + | + |
| 35 | N333 | - | - | + | + |
| 36 | L334 | - | - | + | + |
| 37 | A335 | + | - | + | + |
| 38 | T336 | - | - | - | - |
| 39 | A337 | + | + | + | + |
| 40 | L338 | - | - | + | + |
| 41 | T339 | - | - | + | - |
| 42 | S340 (\*\*) | - | - | - | - |
| 43 | I341 | + | + | + | + |
| 44 | G342 (\*\*) | - | - | - | - |
| 45 | V343 | + | - | + | + |
| 46 | G344 | - | - | +\* (1mM) | +\* (1mM) |
| 47 | S345 | - | - | + | + |
| 48 | F346 | + | - | + | + |
| 49 | L347 | - | - | + | + |
| **No.** | **Domain** | **TAG mutation position** | **Fluorescence (F) change** | | **Current (I) change** | |
| **ATP-**  **evoked**  **F change** | **Voltage-**  **evoked**  **F change** | **ATP-**  **evoked**  **I change** | **Voltage-evoked**  **I change** |
| 50 | Transmembrane 2 | C348 | - | - | - | - |
| 51 | D349 | - | - | - | - |
| 52 | Transmembrane 1 | R34 | n.d. | - | + | + |
| 53 | M35 | + | - | + | + |
| 54 | V36 | + | - | + | + |
| 55 | Q37 | + | - | + | + |
| 56 | L38 | n.d. | - | + | + |
| 57 | L39 | n.d. | - | + | + |
| 58 | I40 | n.d. | - | + | + |
| 59 | L41 | n.d. | - | + | + |
| 60 | L42 | n.d. | - | + | + |
| 61 | Y43 | + | - | + | - |
| 62 | F44 | - | - | - | - |
| 63 | V45 | + | - | + | + |
| 64 | W46 | + | - | + | + |
| 65 | Y47 | + | - | + | - |
| 66 | V48 | - | - | - | - |
| 67 | F49 | + | - | + | + |
| 68 | I50 | + | - | + | + |
| 69 | V51 | + | - | + | + |
| 70 | Q52 | - | - | + | + |
| 71 | Intracellular  C terminal | W350 | - | - | - | - |
| 72 | I351 | - | - | + (3mM) | + (3mM) |
| 73 | F355 | - | - | + | + |
| 74 | M356 | - | -- | + (\*\*\*) | -- |
| 75 | N357 | - | - | - | - |
| 76 | K358 | - | -- | + (\*\*\*) | -- |
| 77 | N359 | - | - | + | + |
| 78 | L361 | - | - | + | + |
| 79 | Y362 | - | -- | + (\*\*\*) | -- |
| 80 | S363 | - | -- | + (\*\*\*) | -- |
| 81 | H364 | - | - | + | + |
| 82 | F367 | - | - | - | - |
| 83 | D368 | - | - | - | - |
| 84 | V370 | - | -- | + (\*\*\*) | -- |
| 85 | R371 | + | - | + | + |
| 86 | T372 | - | - | + | + |
| 87 | P373 | + | - | + | + |
| 88 | K374 | + | - | + | + |
| 89 | Intracellular  N terminal | Y16 | - | - | - | - |
| 90 | E17 | - | - | - | - |
| 91 | T18 | - | - | - | - |
| 92 | P19 | - | - | - | - |
| 93 | K20 | - | - | - | - |
| 94 | V24 | - | -- | + (\*\*\*) | -- |
| 95 | N26 | - | -- | + (\*\*\*) | + |
| 96 | V32 | - | - | + | + |