Validation and comparison of PanRV Results

**Additiona File 1**

**Table 1:** Validation of Seven PVCs predicted by PanRV

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S.No** | **COG ID** |  | **COG Annotation** | **UniProt Annotation** | **References** |
| 95 | COG3942 | M | Surface antigen | ssaA2\_1 | [[1](#_ENREF_1)] |
| 169 | COG1388 | M | LysM repeat | N-acetylmuramoyl-L-alanine amidase sle1alanine amidase sle1 | [[2-4](#_ENREF_2)] |
| 262 | COG0351 | H | Hydroxymethylpyrimidine/phosphomethylpyrimidine kinase | Putative pyridoxine kinase |  |
| 323 | COG1388 | M | LysM repeat | Probable autolysin SsaALP | [[1](#_ENREF_1)] |
| 998 | COG0265 | O | Periplasmic serine protease, S1-C subfamily, contain C-terminal PDZ domain | Serine protease Do-like HtrA | [[5](#_ENREF_5)] |
| 1303 | COG3942 | M | Surface antigen | Staphylococcal secretory antigen ssaA2\_2 | [[4](#_ENREF_4)] |
| 1306 | COG3942 | M | Surface antigen | Staphylococcal secretory antigen ssaA2\_3 | [[4](#_ENREF_4)] |

**Table 2:** Vaxign Identified PVCs cross checked with PanRV

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Protein Accession** | **Localization** | **PanRV** |
| 1 | HLFGLHOD\_00137\_group\_3062 | Extracellular | Non-Virulent |
| 2 | HLFGLHOD\_00271\_group\_1659 | Outermembrane | Non-Ess  Non-Vir |
| 3 | HLFGLHOD\_00297\_hel | Outermembrane | Non-Vir |
| 4 | HLFGLHOD\_00337\_group\_809 | Periplasmic | Non-Ess-Non-Vir |
| 5 | HLFGLHOD\_00584\_group\_5585 | Extracellular | Non-Ess-Non-Vir |
| 6 | HLFGLHOD\_00677\_group\_3865 | Extracellular | Non-Ess-Non-Vir |
| 7 | HLFGLHOD\_00990\_sspB | Extracellular | Non-Ess-Non-Vir |
| 8 | HLFGLHOD\_00995\_atl\_1 | Extracellular | Non-Ess-  Molweight |
| 9 | HLFGLHOD\_01034\_group\_3294 | Outer | Non-Ess-Non-Vir |
| 10 | HLFGLHOD\_01473\_group\_10323 | Extra | Non-Vir |
| 11 | HLFGLHOD\_01548\_kipA\_2 | Outer | Non-Ess-Non-Vir |
| 12 | HLFGLHOD\_02042\_sceD | Extracellular | Non-Vir |
| **13** | **HLFGLHOD\_02240\_ssaA2\_2** | **Extracellular** | **Pass** |
| **14** | **HLFGLHOD\_02244\_ssaA2\_3** | **Extracellular** | **Pass** |
| 15 | HLFGLHOD\_02320\_ydaG | Extra | Non-Ess-Non-Vir |
| 16 | HLFGLHOD\_02407\_dapF | Extra | Non-Ess-Non-Vir |
| 17 | HLFGLHOD\_02482\_ssaA2\_4 | Extracellular | Non-Ess-Non-Vir |
| 18 | HLFGLHOD\_02507\_isaA | Extracellular | Non-Vir |
| **19** | **HLFGLHOD\_00551\_pdxK** | **Periplasmic** | **Pass** |

### Table 3: Vaxgen: Vaccine-related Genes and Protective Antigens cross checked with PanRV

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Gene ID** | **Gene Name** | **Sequence Strain (Species/Organism)** | **Protein Name** | **Vaccines Involving this Gene** | **PanRV** |
| 1 | [**878**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=878) | aroA | *Staphylococcus aureus* subsp. aureus ED98 | 3-phosphoshikimate 1-carboxyvinyltransferase |  [Staphylococcus aureus aroA mutant vaccine](http://www.violinet.org/vaxquery/vaccine_detail.php?c_vaccine_id=3149) | Non-Core |
| 2 | [**847**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=847) | ClfA | *Staphylococcus aureus* subsp. aureus str. Newman | clumping factor A |  [S. aureus ClfA Protein Vaccine](http://www.violinet.org/vaxquery/vaccine_detail.php?c_vaccine_id=1082)   [S. aureus DNA vaccine pClfaSrtD13](http://www.violinet.org/vaxquery/vaccine_detail.php?c_vaccine_id=3895)   [S. aureus DNA vaccine encoding Efb, FnbpA, ClfA, Cna](http://www.violinet.org/vaxquery/vaccine_detail.php?c_vaccine_id=3896) | Non-Core |
| 3 | [**846**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=846) | cna | *Staphylococcus aureus* | collagen adhesin |  [S. aureus CNA Protein Vaccine](http://www.violinet.org/vaxquery/vaccine_detail.php?c_vaccine_id=1083)   [S. aureus DNA vaccine encoding Efb, FnbpA, ClfA, Cna](http://www.violinet.org/vaxquery/vaccine_detail.php?c_vaccine_id=3896) | Non Core |
| 4 | [**4180**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4180) | Csa1A | *Staphylococcus aureus* | Csa1A |  | Non-Core |
| 5 | [**1732**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=1732) | efb | *Staphylococcus aureus* subsp. aureus VRS11b | extracellular fibrinogen-binding protein Efb |  [S. aureus DNA vaccine encoding Efb, FnbpA, ClfA, Cna](http://www.violinet.org/vaxquery/vaccine_detail.php?c_vaccine_id=3896) | HLFGLHOD\_01096\_fib\_2 non Core |
| 6 | [**4168**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4168) | Efb extracellular fibrinogen binding protein | *Staphylococcus aureus* | Efb extracellular fibrinogen binding protein |  | HLFGLHOD\_01096\_fib\_2 non Core |
| 7 | [**4176**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4176) | ess extracellular A (EsxA) | *Staphylococcus aureus* | ess extracellular A (EsxA) |  | 88 non-Ess |
| 8 | [**4177**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4177) | ess extracellular B (EsxB) | *Staphylococcus aureus* | ess extracellular B (EsxB) |  | HLFGLHOD\_00280\_group\_5545 non Core |
| 9 | [**4179**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4179) | Fhud2 | *Staphylococcus aureus* | Fhud2 |  | 1169 HLFGLHOD\_02226\_fhuD\_2 (Cytoplasmic Membrane)  Cello2go Periplamis  PanRV Passed except localization |
| 10 | [**4183**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4183) | fibronectin-binding protein B FnBPB | *Staphylococcus aureus* | fibronectin-binding protein B FnBPB |  | HLFGLHOD\_02439\_group\_38 (Non Core) |
| 11 | [**849**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=849) | FnbA | *Staphylococcus aureus* subsp. aureus NCTC 8325 | Fibronectin-binding protein A |  [S. aureus FnbA Protein Vaccine](http://www.violinet.org/vaxquery/vaccine_detail.php?c_vaccine_id=1084)   [S. aureus DNA vaccine encoding Efb, FnbpA, ClfA, Cna](http://www.violinet.org/vaxquery/vaccine_detail.php?c_vaccine_id=3896) | HLFGLHOD\_02440 fnbA\_1  Non-Core |
| 12 | [**4173**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4173) | FnbpA | *Staphylococcus aureus* | FnbpA |  | HLFGLHOD\_02440 fnbA\_1  Non-Core |
| 13 | [**4181**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4181) | GapC | *Staphylococcus aureus* | GapC |  | HLFGLHOD\_00741\_gapA1 (Cytoplasmic ,human gut flora homologue) |
| 14 | [**4189**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4189) | GST | *Staphylococcus aureus* | GST |  | Non-Core |
| 15 | [**4178**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4178) | hla | *Staphylococcus aureus* | hla |  | KOEIBHHN\_02402\_group\_2838 (Non-Core) |
| 16 | [**4171**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4171) | HlgB | *Staphylococcus aureus* | HlgB |  | 1251 HLFGLHOD\_02360\_hlgB(Non-Essential) |
| 17 | [**893**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=893) | isdB | *Staphylococcus aureus* subsp. aureus str. Newman | iron-regulated heme-iron binding protein IsdB |  | HLFGLHOD\_01069\_isdB(Non-Core) |
| 18 | [**4170**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4170) | IsdB | *Staphylococcus aureus* | IsdB |  | HLFGLHOD\_01069\_isdB(Non-Core) |
| 19 | [**4188**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4188) | IsdH | *Staphylococcus aureus* subsp. aureus 71193 | IsdH |  | HLFGLHOD\_01664\_isdH (Non-Core) |
| 20 | [**4187**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4187) | leukotoxin LukF | *Staphylococcus aureus* | leukotoxin LukF |  | LJMPPIKL\_02313\_lukF (Non-Core) |
| 21 | [**4186**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4186) | LukS | *Staphylococcus aureus* | LukS |  | DOEELINF\_01463\_group\_5184 (Non-Core) |
| 22 | [**848**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=848) | MecA | *Staphylococcus aureus* subsp. aureus MRSA252 | penicillin-binding protein 2 prime (PBP2a) |  [S. aureus DNA Vaccine encoding PBP2a Protein](http://www.violinet.org/vaxquery/vaccine_detail.php?c_vaccine_id=1085) | HLFGLHOD\_00038\_pbp (Non-Core) |
| 23 | [**4169**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4169) | MntC | *Staphylococcus aureus* | MntC |  | 267 HLFGLHOD\_00601\_mntA  PanRV(CytoplasmicMembrane, Non-esse)  Cello2go periplasmic |
| 24 | [**4167**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4167) | SasA | *Staphylococcus aureus* | SasA |  | EOLEMGPD\_02931\_group\_121 (Non-Core) |
| 25 | [**4184**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4184) | SdrD | *Staphylococcus aureus* | SdrD |  | HLFGLHOD\_00534\_sdrD (Non-Core) |
| 26 | [**4191**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4191) | SEA | *Staphylococcus aureus* subsp. aureus SK1585 | SEA |  | JBAEKOOB\_01504\_group\_253 (Non-Core) |
| 27 | [**4185**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4185) | SEB | *Staphylococcus aureus* subsp. aureus COL | SEB |  | GJALMALH\_00855\_group\_6181 (Non-Core) |
| 28 | [**4174**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4174) | SpA | *Staphylococcus aureus* | SpA |  | GCMBAADG\_02724\_spa\_1 (Non-Core) |
| 29 | [**4172**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4172) | staphylococcal enterotoxin A | *Staphylococcus aureus* | staphylococcal enterotoxin A |  | GJALMALH\_02074\_entA\_5 (Non-Core) |
| 30 | [**4182**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4182) | target of RNAIII-activating protein TRAP | *Staphylococcus aureus* | target of RNAIII-activating protein TRAP |  | GBJDLPCM\_01769\_group\_4301 (Non-Core) |
| 31 | [**4175**](http://www.violinet.org/vaxgen/gene_detail.php?c_gene_id=4175) | TSST-1 | *Staphylococcus aureus* | TSST-1 |  | [JBAEKOOB\_02020\_tst\_3](https://blast.ncbi.nlm.nih.gov/Blast.cgi#alnHdr_Query_50116)(Non-Core) |

1. Etz, H., et al., *Identification of in vivo expressed vaccine candidate antigens from Staphylococcus aureus.* Proceedings of the National Academy of Sciences, 2002. **99**(10): p. 6573-6578.
2. Wang, X., et al., *Release of Staphylococcus aureus extracellular vesicles and their application as a vaccine platform.* Nature communications, 2018. **9**(1): p. 1379.

3. Szweda, P., et al., *Peptidoglycan hydrolases-potential weapons against Staphylococcus aureus.* Applied microbiology and biotechnology, 2012. **96**(5): p. 1157-1174.

4. Pastrana, F.R., et al., *Human antibody responses against non-covalently cell wall-bound Staphylococcus aureus proteins.* Scientific reports, 2018. **8**(1): p. 3234.

5. Weichhart, T., et al., *Functional selection of vaccine candidate peptides from Staphylococcus aureus whole-genome expression libraries in vitro.* Infection and immunity, 2003. **71**(8): p. 4633-4641.