



*pvc*s (1) ADGQAAGNGAGGQPAGDRAAGQPAGDGAAGQPAGDRADGQAAGNGAGGQPAGDRAAGQPAGDGAAGQPAGDRADGQPAGD
*pvc*s (2) ADGQAAGNGAGGQPAGDRAAGQPAGDGAAGQPAGDRADGQAAGNGAGGQPAGDRAAGQPAGDGAAGQPAGDRADGQPAGD
*pvc*s (3) ADGQAAGNGAGGQPAGDRAAGQPAGDGAAGQPAGDRADGQAAGNGAGGQPAGDRAAGQPAGDGAAGQPAGDRADGQPAGD
*pvc*s (4) ADGQAAGNGAGGQPAGDRAAGQPAGDGAAGQPAGDRADGQAAGNGAGGQPAGDRAAGQPAGDGAAGQPAGDRADGQPAGD




*pvc*s (1) RAAGQPAGDRADGQPAGDRAAGQAAGNGAGGQAAGNGAGGQPAGDRAAGQPAGDRAAGQAAGNGAGGQAAGNGAGGQAAG
*pvc*s (2) RAAGQPAGDRADGQPAGDRAAGQAAGNGAGGQAAGNGAGGQPAGDRAAGQPAGDRAAGQAAGNGAGGQAAGNGAGGQAAG
*pvc*s (3) RAAGQPAGDRADGQPAGDRAAGQAAGNGAGGQAAGNGAGGQPAGDRAAGQPAGDRAAGQAAGNGAGGQAAGNGAGGQAAG
*pvc*s (4) RAAGQPAGDRADGQPAGDRAAGQAAGNGAGGQAAGNGAGGQPAGDRAAGQPAGDRAAGQAAGNGAGGQAAGNGAGGQAAG



*pvc*s (1) NGAGGQAAGNGAGGQAAGGNAANKKAEDAGGNAGGNAGGQQNNEGANAPNKS
*pvc*s (2) NGAGGQAAGNGAGGQAAGGNAANKKAEDAGGNAGGNAGGQQNNEGANAPNKS
*pvc*s (3) NGAGGQAAGNGAGGQAAGGNAANKKAEDAGGNAGGNAGGQQNNEGANAPNKS
*pvc*s (4) NGAGGQAAGNGAGGQAAGGNAANKKAEDAGGNAGGNAGGQQNNEGANAPNKS


Supplementary Fig. S1. Alignment of *Plasmodium vivax* circumsporozoite (CS) protein sequences. The sequence identified VK210 allelic variant. Red bar indicates 4 sequences are identical.


A


pvmsp1_F2 (1) GQSLRGASETGTTGNTVNAQTAVVQPQHVVNAVTVQPGTTGHQAQGGAEETQNSVQAAQVQQTTPAGAGGQVASTQTTS
pvmsp1_F2 (2) GQSLRGASETGTTGNTVNAQTAVVQPQHVVNAVTVQPGTTGHQAQGGAEETQNSVQAAQVQQTTPAGAGGQVASTQTTS
pvmsp1_F2 (3) GQSLRGASETGTTGNTVNAQTAVVQPQHVVNAVTVQPGTTGHQAQGGAEETQNSVQAAQVQQTTPAGAGGQVASTQTTS
pvmsp1_F2 (4) GQSLRGASETGTTGNTVNAQTAVVQPQHVVNAVTVQPGTTGHQAQGGAEETQNSVQAAQVQQTTPAGAGGQVASTQTTS



pvmsp1_F2 (1) QTPAPTQASPEPAPAVPPSTPAAAVAPAPTMSKLEYLQKLLDFLKSAYACHKHIFVTNSTMKKELLDQYKLNADENKIK
pvmsp1_F2 (2) QTPAPTQASPEPAPAVPPSTPAAAVAPAPTMSKLEYLQKLLDFLKSAYACHKHIFVTNSTMKKELLDQYKLNADENKIK
pvmsp1_F2 (3) QTPAPTQASPEPAPAVPPSTPAAAVAPAPTMSKLEYLQKLLDFLKSAYACHKHIFVTNSTMKKELLDQYKLNADENKIK
pvmsp1_F2 (4) QTPAPTQASPEPAPAVPPSTPAAAVAPAPTMSKLEYLQKLLDFLKSAYACHKHIFVTNSTMKKELLDQYKLNADENKIK



pvmsp1_F2 (1) ENKCDELDFLNVQNNLPAMYSIYDSMSSELQNLVIELYQKEMVYNIYKNKNTDTKLKAFLETLSKAAAAGPAKPAAKP
pvmsp1_F2 (2) ENKCDELDFLNVQNNLPAMYSIYDSMSSELQNLVIELYQKEMVYNIYKNKNTDTKLKAFLETLSKAAAAGPAKPAAKP
pvmsp1_F2 (3) ENKCDELDFLNVQNNLPAMYSIYDSMSSELQNLVIELYQKEMVYNIYKNKNTDTKLKAFLETLSKAAAAGPAKPAAKP
pvmsp1_F2 (4) ENKCDELDFLNVQNNLPAMYSIYDSMSSELQNLVIELYQKEMVYNIYKNKNTDTKLKAFLETLSKAAAAGPAKPAAKP


pvmsp1_F2 (1) IGQAVVPQVAPPTPVVAPNSGNTATPVTNTTIVSPGTQSEVSAPVAGESEEEPEASVVQLEKIYEKHLSSQIDKYNDYFQK
pvmsp1_F2 (2) IGQAVVPQVAPPTPVVAPNSGNTATPVTNTTIVSPGTQSEVSAPVAGESEEEPEASVVQLEKIYEKHLSSQIDKYNDYFQK
pvmsp1_F2 (3) IGQAVVPQVAPPTPVVAPNSGNTATPVTNTTIVSPGTQSEVSAPVAGESEEEPEASVVQLEKIYEKHLSSQIDKYNDYFQK
pvmsp1_F2 (4) IGQAVVPQVAPPTPVVAPNSGNTATPVTNTTIVSPGTQSEVSAPVAGESEEEPEASVVQLEKIYEKHLSSQIDKYNDYFQK


pvmsp1_F2 (1) FLESQKDEITKMDETKWKALGAER
pvmsp1_F2 (2) FLESQKDEITKMDETKWKALGAER
pvmsp1_F2 (3) FLESQKDEITKMDETKWKALGAER
pvmsp1_F2 (4) FLESQKDEITKMDETKWKALGAER

B


pvmsp1_F3 (1) LIPKVTTQESASAPAAAAVTPGAGVPAAGAGVVPAAAAAGVVPGASAAGVVPGAPAGAAPSAPRSTRNTNTSAGLRRG
pvmsp1_F3 (2) LIPKVTTQESASAPAAAAVTPGAGVPAAGAGVVPAAAAAGVVPGASAAGVVPGAPAGAAPSAPRSTRNTNTSAGLRRG
pvmsp1_F3 (3) LIPKVTTQESASAPAAAAVTPGAGVPAAGAGVVPAAAAAGVVPGASAAGVVPGAPAGAAPSAPRSTRNTNTSAGLRRG
pvmsp1_F3 (4) LIPKVTTQESASAPAAAAVTPGAGVPAAGAGVVPAAAAAGVVPGASAAGVVPGAPAGAAPSAPRSTRNTNTSAGLRRG


pvmsp1_F3 (1) LRTN
pvmsp1_F3 (2) LRTN
pvmsp1_F3 (3) LRTN
pvmsp1_F3 (4) LRTN

Supplementary Fig. S2. Alignment of *Plasmodium vivax* merozoite surface protein 1 (*mSP1*) protein F2 segment (A) and F3 segment (B) sequence. Red bar indicates 4 sequences are identical.