SEQUENCE LISTING

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<120> USPA2 PROTEIN CONSTRUCTS AND USES THEREOF

<130> VR65032

<150> US 61/943,909
<151> 2014-02-24

<150> US 61/946,932
<151> 2014-03-03

<150> US 61/946,937
<151> 2014-03-03

<160> 88

<170> PatentIn version 3.5

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<212> PRT
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Asn Ala Gln Ala Lys
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Asn Asp Ile Thr Leu Glu Asp Leu Pro Tyr Leu
Ile Lys Lys Ile Asp
35 40
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Gln Asn Glu Leu Glu Ala Asp Ile Gly Asp Ile
Thr Ala Leu Glu Lys
50 55 60

Tyr Leu Ala Leu Ser Gln Tyr Gly Asn Ile Leu
Ala Leu Glu Glu Leu
65 70 75
80

Asn Lys Ala Leu Glu Glu Leu Asp Glu Asp Val
Gly Trp Asn Gln Asn
85 90
95

Asp Ile Ala Asn Leu Glu Asp Asp Val Glu Thr
Leu Thr Lys Asn Gln
100 105
110

Asn Ala Leu Ala Glu Gln Gly Glu Ala Ile Lys
Glu Asp Leu Gln Gly
115 120

125

Leu Ala Asp Phe Val Glu Gly Gln Glu Gly Lys
Ile Leu Gln Asn Glu
    130   135
140

Thr Ser Ile Lys Lys Asn Thr Gln Arg Asn Leu
Val Asn Gly Phe Glu
145   150   155
160

Ile Glu Lys Asn Lys Asp Ala Ile Ala Lys Asn
Asn Glu Ser Ile Glu
                165   170
175

Asp Leu Tyr Asp Phe Gly His Glu Val Ala Glu
Ser Ile Gly Glu Ile
            180   185
190

His Ala His Asn Glu Ala Gln Asn Glu Thr Leu
Lys Gly Leu Ile Thr
        195   200
205

Asn Ser Ile Glu Asn Thr Asn Asn Ile Thr Lys
Asn Lys Ala Asp Ile
    210   215
220

Gln Ala Leu Glu Asn Asn Val Val Glu Glu Leu
Phe Asn Leu Ser Gly
225 230 235
240

Arg Leu Ile Asp Gln Lys Ala Asp Ile Asp Asn
Asn Ile Asn Asn Ile
245 250
255

Tyr Glu Leu Ala Gln Gln Gln Asp Gln His Ser
Ser Asp Ile Lys Thr
260 265
270

Leu Lys Lys Asn Val Glu Glu Gly Leu Leu Glu
Leu Ser Gly His Leu
275 280
285

Ile Asp Gln Lys Thr Asp Ile Ala Gln Asn Gln
Ala Asn Ile Gln Asp
290 295
300

Leu Ala Thr Tyr Asn Glu Leu Gln Asp Gln Tyr
Ala Gln Lys Gln Thr
305 310 315
320

Glu Ala Ile Asp Ala Leu Asn Lys Ala Ser Ser
Glu Asn Thr Gln Asn
325 330
335

Ile Glu Asp Leu Ala Ala Tyr Asn Glu Leu Gln
Asp Ala Tyr Ala Lys
340 345
350

Gln Gln Thr Glu Ala Ile Asp Ala Leu Asn Lys
Ala Ser Ser Glu Asn
355 360
365

Thr Gln Asn Ile Glu Asp Leu Ala Ala Tyr Asn
Glu Leu Gln Asp Ala
370 375
380

Tyr Ala Lys Gln Gln Thr Glu Ala Ile Asp Ala
Leu Asn Lys Ala Ser
385 390 395
400

Ser Glu Asn Thr Gln Asn Ile Ala Lys Asn Gln
Ala Asp Ile Ala Asn
405 410
415

Asn Ile Asn Asn Ile Tyr Glu Leu Ala Gln Gln

Gln Asp Gln His Ser
420 425
430

Ser Asp Ile Lys Thr Leu Ala Lys Ala Ser Ala
Ala Asn Thr Asp Arg
435 440
445

Ile Ala Lys Asn Lys Ala Asp Ala Asp Ala Ser
Phe Glu Thr Leu Thr
450 455
460

Lys Asn Gln Asn Thr Leu Ile Glu Lys Asp Lys
Glu His Asp Lys Leu
465 470 475
480

Ile Thr Ala Asn Lys Thr Ala Ile Asp Ala Asn
Lys Ala Ser Ala Asp
485 490
495

Thr Lys Phe Ala Ala Thr Ala Asp Ala Ile Thr
Lys Asn Gly Asn Ala
500 505
510

Ile Thr Lys Asn Ala Lys Ser Ile Thr Asp Leu
Gly Thr Lys Val Asp

515 520
525

Gly Phe Asp Ser Arg Val Thr Ala Leu Asp Thr
Lys Val Asn Ala Phe
530 535
540

Asp Gly Arg Ile Thr Ala Leu Asp Ser Lys Val
Glu Asn Gly Met Ala
545 550 555
560

Ala Gln Ala Ala Leu Ser Gly Leu Phe Gln Pro
Tyr Ser Val Gly Lys
565 570
575

Phe Asn Ala Thr Ala Ala Leu Gly Gly Tyr Gly
Ser Lys Ser Ala Val
580 585
590

Ala Ile Gly Ala Gly Tyr Arg Val Asn Pro Asn
Leu Ala Phe Lys Ala
595 600
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Gly Ala Ala Ile Asn Thr Ser Gly Asn Lys Lys
Gly Ser Tyr Asn Ile
610 615

620

Gly Val Asn Tyr Glu Phe
625 630

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<400> 2

Met Lys Thr Met Lys Leu Leu Pro Leu Lys Ile
Ala Val Thr Ser Ala
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Met Ile Ile Gly Leu Gly Ala Ala Ser Thr Ala
Asn Ala Gln Ser Arg
20 25
30

Asp Arg Ser Leu Glu Asp Ile Gln Asp Ser Ile
Ser Lys Leu Val Gln
35 40
45

Asp Asp Ile Asn Thr Leu Lys Gln Asp Gln Gln
Lys Met Asn Lys Tyr
50 55 60

Leu Leu Leu Asn Gln Leu Ala Asn Thr Leu Ile
Thr Asp Glu Leu Asn
65 70 75
80

Asn Asn Val Ile Lys Asn Thr Asn Ser Ile Glu
Ala Leu Gly Asp Glu
85 90
95

Ile Gly Trp Leu Glu Asn Asp Ile Ala Asp Leu
Glu Glu Gly Val Glu
100 105
110

Glu Leu Thr Lys Asn Gln Asn Thr Leu Ile Glu
Lys Asp Glu Glu His
115 120
125

Asp Arg Leu Ile Ala Gln Asn Gln Ala Asp Ile
Gln Thr Leu Glu Asn
130 135
140

Asn Val Val Glu Glu Leu Phe Asn Leu Ser Gly
Arg Leu Ile Asp Gln
145 150 155
160

Glu Ala Asp Ile Ala Lys Asn Asn Ala Ser Ile

Glu Glu Leu Tyr Asp
165 170
175

Phe Asp Asn Glu Val Ala Glu Arg Ile Gly Glu
Ile His Ala Tyr Thr
180 185
190

Glu Glu Val Asn Lys Thr Leu Glu Asn Leu Ile
Thr Asn Ser Val Lys
195 200
205

Asn Thr Asp Asn Ile Asp Lys Asn Lys Ala Asp
Ile Asp Asn Asn Ile
210 215
220

Asn His Ile Tyr Glu Leu Ala Gln Gln Gln Asp
Gln His Ser Ser Asp
225 230 235
240

Ile Lys Thr Leu Lys Asn Asn Val Glu Glu Gly
Leu Leu Glu Leu Ser
245 250
255

Gly His Leu Ile Asp Gln Lys Ala Asp Leu Thr
Lys Asp Ile Lys Ala

260 265
270

Leu Glu Ser Asn Val Glu Glu Gly Leu Leu Asp
Leu Ser Gly Arg Leu
275 280
285

Leu Asp Gln Lys Ala Asp Leu Thr Lys Asp Ile
Lys Ala Leu Glu Ser
290 295
300

Asn Val Glu Glu Gly Leu Leu Asp Leu Ser Gly
Arg Leu Leu Asp Gln
305 310 315
320

Lys Ala Asp Ile Ala Gln Asn Gln Thr Asp Ile
Gln Asp Leu Ala Ala
325 330
335

Tyr Asn Glu Leu Gln Asp Gln Tyr Ala Gln Lys
Gln Thr Glu Ala Ile
340 345
350

Asp Ala Leu Asn Lys Ala Ser Ser Glu Asn Thr
Gln Asn Ile Glu Asp
355 360

365

Leu Ala Ala Tyr Asn Glu Leu Gln Asp Ala Tyr
Ala Lys Gln Gln Thr
    370   375
380

Glu Ala Ile Asp Ala Leu Asn Lys Ala Ser Ser
Glu Asn Thr Gln Asn
385   390   395
400

Ile Ala Lys Asn Gln Ala Asp Ile Ala Asn Asn
Ile Asn Asn Ile Tyr
                405   410
415

Glu Leu Ala Gln Gln Gln Asp Gln His Ser Ser
Asp Ile Lys Thr Leu
            420   425
430

Ala Lys Ala Ser Ala Ala Asn Thr Asn Arg Ile
Ala Thr Ala Glu Leu
        435   440
445

Gly Ile Ala Glu Asn Lys Lys Asp Ala Gln Ile
Ala Lys Ala Gln Ala
    450   455
460

Asn Ala Asn Lys Thr Ala Ile Asp Glu Asn Lys
Ala Ser Ala Asp Thr
465 470 475
480

Lys Phe Ala Ala Thr Ala Asp Ala Ile Thr Lys
Asn Gly Asn Ala Ile
485 490
495

Thr Lys Asn Ala Lys Ser Ile Thr Asp Leu Gly
Thr Lys Val Asp Gly
500 505
510

Phe Asp Gly Arg Val Thr Ala Leu Asp Thr Lys
Val Asn Ala Phe Asp
515 520
525

Gly Arg Ile Thr Ala Leu Asp Ser Lys Val Glu
Asn Gly Met Ala Ala
530 535
540

Gln Ala Ala Leu Ser Gly Leu Phe Gln Pro Tyr
Ser Val Gly Lys Phe
545 550 555
560

Asn Ala Thr Ala Ala Leu Gly Gly Tyr Gly Ser
Lys Ser Ala Val Ala
565 570
575

Ile Gly Ala Gly Tyr Arg Val Asn Pro Asn Leu
Ala Phe Lys Ala Gly
580 585
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Ala Ala Ile Asn Thr Ser Gly Asn Lys Lys Gly
Ser Tyr Asn Ile Gly
595 600
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Val Asn Tyr Glu Phe
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Ala Val Thr Ser Ala
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Leu Ile Ile Gly Leu Gly Ala Ala Ser Thr Ala
Asn Ala Gln Gln Gln

20 25
30

Leu Gln Thr Glu Thr Phe Leu Pro Asn Phe Leu
Ser Asn Asp Asn Tyr
35 40
45

Asp Leu Thr Asp Pro Phe Tyr His Asn Met Ile
Leu Gly Asp Thr Ala
50 55 60

Leu Leu Asp Lys Gln Asp Gly Ser Gln Pro Gln
Leu Lys Phe Tyr Ser
65 70 75
80

Asn Asp Lys Asp Ser Val Pro Asp Ser Leu Leu
Phe Ser Lys Leu Leu
85 90
95

His Glu Gln Gln Leu Asn Gly Phe Lys Lys Gly
Asp Thr Ile Ile Pro
100 105
110

Leu Asp Lys Asp Gly Lys Pro Val Tyr Gln Val
Asp Tyr Lys Leu Asp
115 120
125

Gly Lys Gly Lys Lys Gln Lys Arg Arg Gln Val
Tyr Ser Val Thr Thr
    130   135
140

Lys Thr Ala Thr Asp Asp Asp Val Asn Ser Ala
Tyr Ser Arg Gly Ile
145   150   155
160

Leu Gly Lys Val Asp Asp Leu Asp Asp Glu Met
Asn Phe Leu Asn His
                165   170
175

Asp Ile Thr Ser Leu Tyr Asp Val Thr Ala Asn
Gln Gln Asp Ala Ile
            180   185
190

Lys Asp Leu Lys Lys Gly Val Lys Gly Leu Asn
Lys Glu Leu Lys Glu
        195   200
205

Leu Asp Lys Glu Val Gly Val Leu Ser Arg Asp
Ile Gly Ser Leu Asn
    210   215
220

Asp Asp Val Ala Gln Asn Asn Glu Ser Ile Glu
Asp Leu Tyr Asp Phe
225 230 235
240

Ser Gln Glu Val Ala Asp Ser Ile Gly Glu Ile
His Ala His Asn Lys
245 250
255

Ala Gln Asn Glu Thr Leu Gln Asp Leu Ile Thr
Asn Ser Val Glu Asn
260 265
270

Thr Asn Asn Ile Thr Lys Asn Lys Ala Asp Ile
Gln Ala Leu Glu Asn
275 280
285

Asn Val Val Glu Glu Leu Phe Asn Leu Ser Gly
Arg Leu Ile Asp Gln
290 295
300

Lys Ala Asp Leu Thr Lys Asp Ile Lys Thr Leu
Glu Ser Asn Val Glu
305 310 315
320

Glu Gly Leu Leu Glu Leu Ser Gly His Leu Ile

Asp Gln Lys Ala Asp
325 330
335

Ile Ala Lys Asn Gln Ala Asp Ile Ala Gln Asn
Gln Ala Asn Ile Gln
340 345
350

Asp Leu Ala Ala Tyr Asn Glu Leu Gln Asp Ala
Tyr Ala Lys Gln Gln
355 360
365

Thr Glu Ala Ile Asp Ala Leu Asn Lys Ala Ser
Ser Glu Asn Thr Gln
370 375
380

Asn Ile Glu Asp Leu Ala Ala Tyr Asn Glu Leu
Gln Asp Ala Tyr Ala
385 390 395
400

Lys Gln Gln Thr Glu Ala Ile Asp Ala Leu Asn
Lys Ala Ser Ser Glu
405 410
415

Asn Thr Gln Asn Ile Ala Lys Asn Gln Ala Asp
Ile Ala Asn Asn Ile

420 425
430

Asn Asn Ile Tyr Glu Leu Ala Gln Gln Gln Asp
Gln His Ser Ser Asp
435 440
445

Ile Lys Thr Leu Ala Lys Ala Ser Ala Ala Asn
Thr Asp Arg Ile Ala
450 455
460

Lys Asn Lys Ala Asp Ala Asp Ala Ser Phe Glu
Thr Leu Thr Lys Asn
465 470 475
480

Gln Asn Thr Leu Ile Glu Lys Asp Lys Glu His
Asp Lys Leu Ile Thr
485 490
495

Ala Asn Lys Thr Ala Ile Asp Glu Asn Lys Ala
Ser Ala Asp Thr Lys
500 505
510

Phe Ala Ala Thr Ala Asp Ala Ile Thr Lys Asn
Gly Asn Ala Ile Thr
515 520

525

Lys Asn Ala Lys Ser Ile Thr Asp Leu Gly Thr
Lys Val Asp Gly Phe
    530   535
540

Asp Ser Arg Val Thr Ala Leu Asp Thr Lys Val
Asn Ala Phe Asp Gly
545   550   555
560

Arg Ile Thr Ala Leu Asp Ser Lys Val Glu Asn
Gly Met Ala Ala Gln
                565   570
575

Ala Ala Leu Ser Gly Leu Phe Gln Pro Tyr Ser
Val Gly Lys Phe Asn
            580   585
590

Ala Thr Ala Ala Leu Gly Gly Tyr Gly Ser Lys
Ser Ala Val Ala Ile
        595   600
605

Gly Ala Gly Tyr Arg Val Asn Pro Asn Leu Ala
Phe Lys Ala Gly Ala
    610   615
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Ala Ile Asn Thr Ser Gly Asn Lys Lys Gly Ser
Tyr Asn Ile Gly Val
625 630 635
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Asn Tyr Glu Phe

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<400> 4

Met Lys Thr Met Lys Leu Leu Pro Leu Lys Ile
Ala Val Thr Ser Ala
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Leu Ile Val Gly Leu Gly Ala Ala Ser Thr Ala
Asn Ala Gln Leu Val
20 25
30

Glu Arg Phe Phe Pro Asn Ile Phe Leu Asp Lys
Pro Leu Ala Lys Gln
35 40
45

His Tyr His Asn Val Val Val Gly Asp Thr Ser
Ile Val Ser Asp Leu
    50   55   60

Gln Ser Asn Ser Asp Gln Leu Lys Phe Tyr Ser
Asp Asp Glu Gly Leu
65   70   75
80

Val Pro Asp Ser Leu Leu Phe Asn Lys Met Leu
His Glu Gln Leu Leu
                85   90
95

Asn Gly Phe Lys Glu Gly Asp Thr Ile Ile Pro
Leu Asp Glu Asn Gly
            100   105
110

Lys Pro Val Tyr Lys Val Asp Tyr Lys Leu Asp
Gly Lys Glu Pro Arg
        115   120
125

Lys Val Tyr Ser Val Thr Thr Lys Ile Ala Thr
Ala Glu Asp Val Ala
    130   135
140

Thr Ser Ser Tyr Ala Asn Gly Ile Gln Lys Asp
Ile Asp Asp Leu Tyr

145 150 155
160

Asp Phe Asp His Gln Val Thr Glu Arg Leu Thr
Gln His Gly Lys Thr
165 170
175

Ile Tyr Arg Asn Gly Glu Arg Ile Leu Ala Asn
Glu Glu Ser Val Gln
180 185
190

Tyr Leu Asn Lys Glu Val Gln Asn Asn Ile Glu
His Ile Tyr Glu Leu
195 200
205

Ala Gln Gln Gln Asp Gln His Ser Ser Asp Ile
Lys Thr Leu Glu Ser
210 215
220

Asn Val Glu Lys Gly Leu Leu Glu Leu Ser Gly
His Leu Ile Asp Gln
225 230 235
240

Lys Ala Asp Leu Thr Lys Asp Ile Lys Thr Leu
Glu Ser Asn Val Glu
245 250

255

Glu Gly Leu Leu Asp Leu Ser Gly Arg Leu Ile
Asp Gln Lys Ala Asp
260 265
270

Leu Thr Lys Asp Ile Lys Thr Leu Glu Ser Asn
Val Glu Glu Gly Leu
275 280
285

Leu Asp Leu Ser Gly Arg Leu Ile Asp Gln Lys
Ala Asp Ile Ala Gln
290 295
300

Asn Gln Ala Asn Ile Gln Asp Leu Ala Ala Tyr
Asn Glu Leu Gln Asp
305 310 315
320

Gln Tyr Ala Gln Lys Gln Thr Glu Ala Ile Asp
Ala Leu Asn Lys Ala
325 330
335

Ser Ser Glu Asn Thr Gln Asn Ile Glu Asp Leu
Ala Ala Tyr Asn Glu
340 345
350

Leu Gln Asp Ala Tyr Ala Lys Gln Gln Thr Glu
Ala Ile Asp Ala Leu
355 360
365

Asn Lys Ala Ser Ser Glu Asn Thr Gln Asn Ile
Ala Lys Asn Gln Ala
370 375
380

Asp Ile Ala Asn Asn Ile Asn Asn Ile Tyr Glu
Leu Ala Gln Gln Gln
385 390 395
400

Asp Gln His Ser Ser Asp Ile Lys Thr Leu Ala
Lys Ala Ser Ala Ala
405 410
415

Asn Thr Asn Arg Ile Ala Thr Ala Glu Leu Gly
Ile Ala Glu Asn Lys
420 425
430

Lys Asp Ala Gln Ile Ala Lys Ala Gln Ala Asn
Ala Asn Lys Thr Ala
435 440
445

Ile Asp Glu Asn Lys Ala Ser Ala Asp Thr Lys
Phe Ala Ala Thr Ala
    450   455
460

Asp Ala Ile Thr Lys Asn Gly Asn Ala Ile Thr
Lys Asn Ala Lys Ser
465   470   475
480

Ile Thr Asp Leu Gly Thr Lys Val Asp Gly Phe
Asp Ser Arg Val Thr
                485   490
495

Ala Leu Asp Thr Lys Val Asn Ala Phe Asp Gly
Arg Ile Thr Ala Leu
            500   505
510

Asp Ser Lys Val Glu Asn Gly Met Ala Ala Gln
Ala Ala Leu Ser Gly
        515   520
525

Leu Phe Gln Pro Tyr Ser Val Gly Lys Phe Asn
Ala Thr Ala Ala Leu
    530   535
540

Gly Gly Tyr Gly Ser Lys Ser Ala Val Ala Ile

Gly Ala Gly Tyr Arg
545 550 555
560

Val Asn Pro Asn Leu Ala Phe Lys Ala Gly Ala
Ala Ile Asn Thr Ser
565 570
575

Gly Asn Lys Lys Gly Ser Tyr Asn Ile Gly Val
Asn Tyr Glu Phe
580 585
590

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<213> Moraxella catarrhalis

<400> 5

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Ala Val Thr Ser Ala
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Met Ile Ile Gly Leu Gly Ala Ala Ser Thr Ala
Asn Ala Gln Gln Gln
20 25
30

Gln Gln Gln Gln Gln Gln Gln Gln Ser Arg Thr

Glu Ile Phe Phe Pro
35 40
45

Asn Ile Phe Phe Asn Glu Asn His Asp Glu Leu
Asp Asp Ala Tyr His
50 55 60

Asn Ile Ile Leu Gly Asp Thr Ala Leu Leu Asp
Lys Gln Asp Gly Ser
65 70 75
80

Gln Pro Gln Leu Lys Phe Tyr Ser Asn Asp Lys
Asp Ser Val Pro Asp
85 90
95

Ser Leu Leu Phe Ser Lys Leu Leu His Glu Gln
Gln Leu Asn Gly Phe
100 105
110