

eolf-seql

SEQUENCE LISTING

<110> F. Hoffmann-La Roche AG

<120> Novel soluble Sortase A

<130> P33089-W0

<150> EP 15186951.8

<151> 2015-09-25

<160> 44

<170> PatentIn version 3.5

<210> 1

<211> 5

<212> PRT

<213> Artificial Sequence

<220>

<223> LPXTG sortase-motif

<220>

<221> MISC\_FEATURE

<222> (3)..(3)

<223> X can be any amino acid residue

<400> 1

Leu Pro Xaa Thr Gly

1 5

<210> 2

<211> 4

<212> PRT

<213> Artificial Sequence

<220>

<223> cystein sortase motif 1

<400> 2

Cys Gly Gly Gly

1

<210> 3

<211> 4

<212> PRT

eolf-seql

<213> Artificial Sequence

<220>

<223> cystein sortase motif 2

<400> 3

Cys Ala Ala Ala

1

<210> 4

<211> 5

<212> PRT

<213> Artificial Sequence

<220>

<223> sortase motif

<400> 4

Leu Pro Glu Thr Gly

1

5

<210> 5

<211> 147

<212> PRT

<213> Artificial Sequence

<220>

<223> Staphylococcus aureus Sortase A shortened version N(1-59)

<400> 5

Gln Ala Lys Pro Gln Ile Pro Lys Asp Lys Ser Lys Val Ala Gly Tyr

1

5

10

15

Ile Glu Ile Pro Asp Ala Asp Ile Lys Glu Pro Val Tyr Pro Gly Pro

20

25

30

Ala Thr Pro Glu Gln Leu Asn Arg Gly Val Ser Phe Ala Glu Glu Asn

35

40

45

Glu Ser Leu Asp Asp Gln Asn Ile Ser Ile Ala Gly His Thr Phe Ile

50

55

60

Asp Arg Pro Asn Tyr Gln Phe Thr Asn Leu Lys Ala Ala Lys Lys Gly

eolf-seql

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 65  |     | 70  |     | 75  |     | 80  |     |     |     |     |     |     |     |     |     |
| Ser | Met | Val | Tyr | Phe | Lys | Val | Gly | Asn | Glu | Thr | Arg | Lys | Tyr | Lys | Met |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Thr | Ser | Ile | Arg | Asp | Val | Lys | Pro | Thr | Asp | Val | Gly | Val | Leu | Asp | Glu |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Gln | Lys | Gly | Lys | Asp | Lys | Gln | Leu | Thr | Leu | Ile | Thr | Cys | Asp | Asp | Tyr |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Asn | Glu | Lys | Thr | Gly | Val | Trp | Glu | Lys | Arg | Lys | Ile | Phe | Val | Ala | Thr |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Glu | Val | Lys |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 145 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

<210> 6  
 <211> 168  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Streptococcus pyogenes Sortase A shortened version

<400> 6

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Leu | Gln | Ala | Gln | Met | Ala | Ala | Gln | Gln | Leu | Pro | Val | Ile | Gly | Gly |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Ile | Ala | Ile | Pro | Glu | Leu | Gly | Ile | Asn | Leu | Pro | Ile | Phe | Lys | Gly | Leu |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Gly | Asn | Thr | Glu | Leu | Ile | Tyr | Gly | Ala | Gly | Thr | Met | Lys | Glu | Glu | Gln |
|     |     | 35  |     |     |     |     | 40  |     |     |     | 45  |     |     |     |     |
| Val | Met | Gly | Gly | Glu | Asn | Asn | Tyr | Ser | Leu | Ala | Ser | His | His | Ile | Phe |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Gly | Ile | Thr | Gly | Ser | Ser | Gln | Met | Leu | Phe | Ser | Pro | Leu | Glu | Arg | Ala |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |

# eolf-seql

Gln Asn Gly Met Ser Ile Tyr Leu Thr Asp Lys Glu Lys Ile Tyr Glu  
85 90 95

Tyr Ile Ile Lys Asp Val Phe Thr Val Ala Pro Glu Arg Val Asp Val  
100 105 110

Ile Asp Asp Thr Ala Gly Leu Lys Glu Val Thr Leu Val Thr Cys Thr  
115 120 125

Asp Ile Glu Ala Thr Glu Arg Ile Ile Val Lys Gly Glu Leu Lys Thr  
130 135 140

Glu Tyr Asp Phe Asp Lys Ala Pro Ala Asp Val Leu Lys Ala Phe Asn  
145 150 155 160

His Ser Tyr Asn Gln Val Ser Thr  
165

<210> 7  
<211> 5  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Arg-tag

<400> 7

Arg Arg Arg Arg Arg  
1 5

<210> 8  
<211> 6  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Arg-tag 2

<400> 8

Arg Arg Arg Arg Arg Arg  
1 5

eolf-seql

<210> 9  
<211> 6  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> His-tag

<400> 9

His His His His His His  
1 5

<210> 10  
<211> 19  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> amino acid tag

<400> 10

Lys Asp His Leu Ile His Asn Val His Lys Glu Phe His Ala His Ala  
1 5 10 15

His Asn Lys

<210> 11  
<211> 8  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> amino acid tag

<400> 11

Asp Tyr Lys Asp Asp Asp Asp Lys  
1 5

<210> 12  
<211> 22  
<212> PRT  
<213> Artificial Sequence

eolf-seql

<220>

<223> amino acid tag

<400> 12

Asp Tyr Lys Asp His Asp Gly Asp Tyr Lys Asp His Asp Ile Asp Tyr  
1 5 10 15

Lys Asp Asp Asp Asp Lys  
20

<210> 13

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> amino acid tag#

<400> 13

Ala Trp Arg His Pro Gln Phe Gly Gly  
1 5

<210> 14

<211> 8

<212> PRT

<213> Artificial Sequence

<220>

<223> amino acid tag

<400> 14

Trp Ser His Pro Gln Phe Glu Lys  
1 5

<210> 15

<211> 10

<212> PRT

<213> Artificial Sequence

<220>

<223> amino acid tag

<400> 15

Met Asp Val Glu Ala Trp Leu Gly Ala Arg

eolf-seql  
10

1 5

<210> 16  
<211> 16  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> amino acid tag

<400> 16

Met Asp Val Glu Ala Trp Leu Gly Ala Arg Val Pro Leu Val Glu Thr  
1 5 10 15

<210> 17  
<211> 38  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> amino acid tag

<400> 17

Met Asp Glu Lys Thr Thr Gly Trp Arg Gly Gly His Val Val Glu Gly  
1 5 10 15

Leu Ala Gly Glu Leu Glu Gln Leu Arg Ala Arg Leu Glu His His Pro  
20 25 30

Gln Gly Gln Arg Glu Pro  
35

<210> 18  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> amino acid tag

<400> 18

Glu Gln Lys Leu Ile Ser Glu Glu Asp Leu  
1 5 10

# eolf-seql

<210> 19  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> amino acid tag

<400> 19

Lys Glu Thr Ala Ala Ala Lys Phe Glu Arg Gln His Met Asp Ser  
 1 5 10 15

<210> 20  
 <211> 26  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> amino acid tag

<400> 20

Lys Arg Arg Trp Lys Lys Asn Phe Ile Ala Val Ser Ala Ala Asn Arg  
 1 5 10 15

Phe Lys Lys Ile Ser Ser Ser Gly Ala Leu  
 20 25

<210> 21  
 <211> 47  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> amino acid tag

<400> 21

Pro Ala Thr Thr Thr Gly Ser Ser Pro Gly Pro Thr Gln Ser His Tyr  
 1 5 10 15

Gly Gln Cys Gly Gly Ile Gly Tyr Ser Gly Pro Thr Val Cys Ala Ser  
 20 25 30

Gly Thr Thr Cys Gln Val Leu Asn Pro Tyr Tyr Ser Gln Cys Leu

eolf-seql

35

40

45

<210> 22  
 <211> 32  
 <212> PRT  
 <213> Butyrivibrio fibrisolvens

<400> 22

Met Asp Trp Asn Ala Asn Ile Ala Pro Gly Asn Ser Val Glu Phe Gly  
 1 5 10 15

Ile Gln Gly Ala Gly Ser Val Gly Asn Val Ile Asp Ile Thr Val Glu  
 20 25 30

<210> 23  
 <211> 51  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> chitin-binding-domain

<400> 23

Thr Asn Pro Gly Val Ser Ala Trp Gln Val Asn Thr Ala Tyr Thr Ala  
 1 5 10 15

Gly Gln Leu Val Thr Tyr Asn Gly Lys Thr Tyr Lys Cys Leu Gln Pro  
 20 25 30

His Thr Ser Leu Ala Gly Trp Glu Pro Ser Asn Val Pro Ala Leu Trp  
 35 40 45

Gln Leu Gln  
 50

<210> 24  
 <211> 209  
 <212> PRT  
 <213> Chondrus crispus

<400> 24

Met Pro Glu Ile Lys Leu Thr Tyr Phe Asp Met Arg Gly Arg Ala Glu

## eolf-seql

|             |                             |                         |             |
|-------------|-----------------------------|-------------------------|-------------|
| 1           | 5                           | 10                      | 15          |
| Ala Ser Arg | Leu Ala Leu Val Val         | Gly Glu Ile Pro Phe     | Glu Asp Glu |
|             | 20                          | 25                      | 30          |
| Arg Val Val | Phe Asp His Trp Lys         | Glu Ala Lys Pro Lys     | Thr Pro Tyr |
|             | 35                          | 40                      | 45          |
| Ala Ala Leu | Pro Met Leu Thr Val Asp     | Gly Met Gln Val Ala Gln | Ser         |
|             | 50                          | 55                      | 60          |
| Asp Ala Ile | Leu Arg Tyr Cys Gly Lys     | Leu Ala Gly Leu Tyr Pro | Ser         |
| 65          | 70                          | 75                      | 80          |
| Asp Pro Leu | Glu Ala Ala Lys Val Asp     | Glu Val Gly Gly Val Ile | Asp         |
|             | 85                          | 90                      | 95          |
| Asp Val Thr | His Ala Met Tyr Arg Tyr     | Arg Gly Asp Asp Lys Asp | Lys         |
|             | 100                         | 105                     | 110         |
| Leu Arg Glu | Glu Arg Asp Lys Phe Ser     | Lys Val Asp Val Pro Arg | Tyr         |
|             | 115                         | 120                     | 125         |
| Val Gly Ala | Leu Glu Lys Arg Leu Glu     | Ala Phe Gly Asp Gly Pro | Trp         |
|             | 130                         | 135                     | 140         |
| Ala Val Gly | Gly Asn Met Thr Ile Ala Asp | Leu His Ile Cys His     | Leu         |
| 145         | 150                         | 155                     | 160         |
| Val Thr Asn | Ile Arg Cys Gly Met Leu Asp | Phe Val Asp Lys Asp     | Leu         |
|             | 165                         | 170                     | 175         |
| Leu Glu Gly | Tyr Val Arg Ile Val Lys     | Ser Tyr Ser Ala Val Met | Glu         |
|             | 180                         | 185                     | 190         |
| His Pro Lys | Val Thr Glu Trp Tyr Glu     | Lys Lys Pro Val Lys Met | Phe         |
|             | 195                         | 200                     | 205         |

Ser

# eolf-seql

<210> 25  
<211> 396  
<212> PRT  
<213> Escherichia coli

<400> 25

Met Lys Ile Lys Thr Gly Ala Arg Ile Leu Ala Leu Ser Ala Leu Thr  
1 5 10 15

Thr Met Met Phe Ser Ala Ser Ala Leu Ala Lys Ile Glu Glu Gly Lys  
20 25 30

Leu Val Ile Trp Ile Asn Gly Asp Lys Gly Tyr Asn Gly Leu Ala Glu  
35 40 45

Val Gly Lys Lys Phe Glu Lys Asp Thr Gly Ile Lys Val Thr Val Glu  
50 55 60

His Pro Asp Lys Leu Glu Glu Lys Phe Pro Gln Val Ala Ala Thr Gly  
65 70 75 80

Asp Gly Pro Asp Ile Ile Phe Trp Ala His Asp Arg Phe Gly Gly Tyr  
85 90 95

Ala Gln Ser Gly Leu Leu Ala Glu Ile Thr Pro Asp Lys Ala Phe Gln  
100 105 110

Asp Lys Leu Tyr Pro Phe Thr Trp Asp Ala Val Arg Tyr Asn Gly Lys  
115 120 125

Leu Ile Ala Tyr Pro Ile Ala Val Glu Ala Leu Ser Leu Ile Tyr Asn  
130 135 140

Lys Asp Leu Leu Pro Asn Pro Pro Lys Thr Trp Glu Glu Ile Pro Ala  
145 150 155 160

Leu Asp Lys Glu Leu Lys Ala Lys Gly Lys Ser Ala Leu Met Phe Asn  
165 170 175

eolf-seql

Leu Gln Glu Pro Tyr Phe Thr Trp Pro Leu Ile Ala Ala Asp Gly Gly  
180 185 190

Tyr Ala Phe Lys Tyr Glu Asn Gly Lys Tyr Asp Ile Lys Asp Val Gly  
195 200 205

Val Asp Asn Ala Gly Ala Lys Ala Gly Leu Thr Phe Leu Val Asp Leu  
210 215 220

Ile Lys Asn Lys His Met Asn Ala Asp Thr Asp Tyr Ser Ile Ala Glu  
225 230 235 240

Ala Ala Phe Asn Lys Gly Glu Thr Ala Met Thr Ile Asn Gly Pro Trp  
245 250 255

Ala Trp Ser Asn Ile Asp Thr Ser Lys Val Asn Tyr Gly Val Thr Val  
260 265 270

Leu Pro Thr Phe Lys Gly Gln Pro Ser Lys Pro Phe Val Gly Val Leu  
275 280 285

Ser Ala Gly Ile Asn Ala Ala Ser Pro Asn Lys Glu Leu Ala Lys Glu  
290 295 300

Phe Leu Glu Asn Tyr Leu Leu Thr Asp Glu Gly Leu Glu Ala Val Asn  
305 310 315 320

Lys Asp Lys Pro Leu Gly Ala Val Ala Leu Lys Ser Tyr Glu Glu Glu  
325 330 335

Leu Ala Lys Asp Pro Arg Ile Ala Ala Thr Met Glu Asn Ala Gln Lys  
340 345 350

Gly Glu Ile Met Pro Asn Ile Pro Gln Met Ser Ala Phe Trp Tyr Ala  
355 360 365

Val Arg Thr Ala Val Ile Asn Ala Ala Ser Gly Arg Gln Thr Val Asp  
370 375 380

eolf-seql

Glu Ala Leu Lys Asp Ala Gln Thr Arg Ile Thr Lys  
385 390 395

<210> 26  
<211> 206  
<212> PRT  
<213> Staphylococcus aureus

<400> 26

Met Lys Lys Trp Thr Asn Arg Leu Met Thr Ile Ala Gly Val Val Leu  
1 5 10 15

Ile Leu Val Ala Ala Tyr Leu Phe Ala Lys Pro His Ile Asp Asn Tyr  
20 25 30

Leu His Asp Lys Asp Lys Asp Glu Lys Ile Glu Gln Tyr Asp Lys Asn  
35 40 45

Val Lys Glu Gln Ala Ser Lys Asp Lys Lys Gln Gln Ala Lys Pro Gln  
50 55 60

Ile Pro Lys Asp Lys Ser Lys Val Ala Gly Tyr Ile Glu Ile Pro Asp  
65 70 75 80

Ala Asp Ile Lys Glu Pro Val Tyr Pro Gly Pro Ala Thr Pro Glu Gln  
85 90 95

Leu Asn Arg Gly Val Ser Phe Ala Glu Glu Asn Glu Ser Leu Asp Asp  
100 105 110

Gln Asn Ile Ser Ile Ala Gly His Thr Phe Ile Asp Arg Pro Asn Tyr  
115 120 125

Gln Phe Thr Asn Leu Lys Ala Ala Lys Lys Gly Ser Met Val Tyr Phe  
130 135 140

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

eolf-seql

Val Lys Pro Thr Asp Val Gly Val Leu Asp Glu Gln Lys Gly Lys Asp  
165 170 175

Lys Gln Leu Thr Leu Ile Thr Cys Asp Asp Tyr Asn Glu Lys Thr Gly  
180 185 190

Val Trp Glu Lys Arg Lys Ile Phe Val Ala Thr Glu Val Lys  
195 200 205

<210> 27

<211> 222

<212> PRT

<213> *Listeria monocytogenes*

<400> 27

Met Leu Lys Lys Thr Ile Ala Ala Ala Leu Ala Ala Gly Leu Leu  
1 5 10 15

Leu Ile Phe Ser Pro Phe Ile Lys Asn Gly Ile Val Lys Tyr Met Ser  
20 25 30

Gly His Glu Thr Ile Glu Gln Tyr Lys Ala Ser Asp Ile Lys Lys Asn  
35 40 45

Asn Glu Lys Asp Ala Thr Phe Asp Phe Glu Ser Val Gln Leu Pro Ser  
50 55 60

Met Thr Ser Val Ile Lys Gly Ala Ala Asn Tyr Asp Lys Asp Ala Val  
65 70 75 80

Val Gly Ser Ile Ala Val Pro Ser Val Asp Val Asn Leu Leu Val Phe  
85 90 95

Lys Gly Thr Asn Thr Ala Asn Leu Leu Ala Gly Ala Thr Thr Met Arg  
100 105 110

Ser Asp Gln Val Met Gly Lys Gly Asn Tyr Pro Leu Ala Gly His His  
115 120 125

eolf-seql

Met Arg Asp Glu Ser Met Leu Phe Gly Pro Ile Met Lys Val Lys Lys  
 130 135 140

Gly Asp Lys Ile Tyr Leu Thr Asp Leu Glu Asn Leu Tyr Glu Tyr Thr  
 145 150 155 160

Val Thr Glu Thr Lys Thr Ile Asp Glu Thr Glu Val Ser Val Ile Asp  
 165 170 175

Asn Thr Lys Asp Ala Arg Ile Thr Leu Ile Thr Cys Asp Lys Pro Thr  
 180 185 190

Glu Thr Thr Lys Arg Phe Val Ala Val Gly Glu Leu Glu Lys Thr Glu  
 195 200 205

Lys Leu Thr Lys Glu Leu Glu Asn Lys Tyr Phe Pro Ser Lys  
 210 215 220

<210> 28  
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 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> oligoglycine

<400> 28

Gly Gly  
 1

<210> 29  
 <211> 3  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> oligoglycine

<400> 29

Gly Gly Gly  
 1

eolf-seql

<210> 30  
 <211> 4  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> oligoglycine

<400> 30

Gly Gly Gly Gly  
 1

<210> 31  
 <211> 5  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> oligoglycine

<400> 31

Gly Gly Gly Gly Gly  
 1 5

<210> 32  
 <211> 12  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> hexa-histidine tag with linker

<400> 32

Met Arg Gly Ser His His His His His Gly Ser  
 1 5 10

<210> 33  
 <211> 249  
 <212> PRT  
 <213> Streptococcus pyogenes

<400> 33

Met Val Lys Lys Gln Lys Arg Arg Lys Ile Lys Ser Met Ser Trp Ala  
 1 5 10 15

eolf-seql

Arg Lys Leu Leu Ile Ala Val Leu Leu Ile Leu Gly Leu Ala Leu Leu  
20 25 30

Phe Asn Lys Pro Ile Arg Asn Thr Leu Ile Ala Arg Asn Ser Asn Lys  
35 40 45

Tyr Gln Val Thr Lys Val Ser Lys Lys Gln Ile Lys Lys Asn Lys Glu  
50 55 60

Ala Lys Ser Thr Phe Asp Phe Gln Ala Val Glu Pro Val Ser Thr Glu  
65 70 75 80

Ser Val Leu Gln Ala Gln Met Ala Ala Gln Gln Leu Pro Val Ile Gly  
85 90 95

Gly Ile Ala Ile Pro Glu Leu Gly Ile Asn Leu Pro Ile Phe Lys Gly  
100 105 110

Leu Gly Asn Thr Glu Leu Ile Tyr Gly Ala Gly Thr Met Lys Glu Glu  
115 120 125

Gln Val Met Gly Gly Glu Asn Asn Tyr Ser Leu Ala Ser His His Ile  
130 135 140

Phe Gly Ile Thr Gly Ser Ser Gln Met Leu Phe Ser Pro Leu Glu Arg  
145 150 155 160

Ala Gln Asn Gly Met Ser Ile Tyr Leu Thr Asp Lys Glu Lys Ile Tyr  
165 170 175

Glu Tyr Ile Ile Lys Asp Val Phe Thr Val Ala Pro Glu Arg Val Asp  
180 185 190

Val Ile Asp Asp Thr Ala Gly Leu Lys Glu Val Thr Leu Val Thr Cys  
195 200 205

Thr Asp Ile Glu Ala Thr Glu Arg Ile Ile Val Lys Gly Glu Leu Lys  
210 215 220

# eolf-seql

Thr Glu Tyr Asp Phe Asp Lys Ala Pro Ala Asp Val Leu Lys Ala Phe  
225 230 235 240

Asn His Ser Tyr Asn Gln Val Ser Thr  
245

<210> 34

<211> 178

<212> PRT

<213> Artificial Sequence

<220>

<223> Staphylococcus aureus Sortase A shortened version N(2-29)

<400> 34

Met Asp Asn Tyr Leu His Asp Lys Asp Lys Asp Glu Lys Ile Glu Gln  
1 5 10 15

Tyr Asp Lys Asn Val Lys Glu Gln Ala Ser Lys Asp Lys Lys Gln Gln  
20 25 30

Ala Lys Pro Gln Ile Pro Lys Asp Lys Ser Lys Val Ala Gly Tyr Ile  
35 40 45

Glu Ile Pro Asp Ala Asp Ile Lys Glu Pro Val Tyr Pro Gly Pro Ala  
50 55 60

Thr Pro Glu Gln Leu Asn Arg Gly Val Ser Phe Ala Glu Glu Asn Glu  
65 70 75 80

Ser Leu Asp Asp Gln Asn Ile Ser Ile Ala Gly His Thr Phe Ile Asp  
85 90 95

Arg Pro Asn Tyr Gln Phe Thr Asn Leu Lys Ala Ala Lys Lys Gly Ser  
100 105 110

Met Val Tyr Phe Lys Val Gly Asn Glu Thr Arg Lys Tyr Lys Met Thr  
115 120 125

Ser Ile Arg Asp Val Lys Pro Thr Asp Val Gly Val Leu Asp Glu Gln

eolf-seql

130

135

140

Lys Gly Lys Asp Lys Gln Leu Thr Leu Ile Thr Cys Asp Asp Tyr Asn  
145 150 155 160

Glu Lys Thr Gly Val Trp Glu Lys Arg Lys Ile Phe Val Ala Thr Glu  
165 170 175

Val Lys

<210> 35

<211> 222

<212> PRT

<213> *Listeria monocytogenes*

<400> 35

Met Leu Lys Lys Thr Ile Ala Ala Ala Ala Leu Ala Ala Gly Leu Leu  
1 5 10 15

Leu Ile Phe Ser Pro Phe Ile Lys Asn Gly Ile Val Lys Tyr Met Ser  
20 25 30

Gly His Glu Thr Ile Glu Gln Tyr Lys Ala Ser Asp Ile Lys Lys Asn  
35 40 45

Asn Glu Lys Asp Ala Thr Phe Asp Phe Glu Ser Val Gln Leu Pro Ser  
50 55 60

Met Thr Ser Val Ile Lys Gly Ala Ala Asn Tyr Asp Lys Asp Ala Val  
65 70 75 80

Val Gly Ser Ile Ala Val Pro Ser Val Asp Val Asn Leu Leu Val Phe  
85 90 95

Lys Gly Thr Asn Thr Ala Asn Leu Leu Ala Gly Ala Thr Thr Met Arg  
100 105 110

Ser Asp Gln Val Met Gly Lys Gly Asn Tyr Pro Leu Ala Gly His His  
115 120 125

# eolf-seql

Met Arg Asp Glu Ser Met Leu Phe Gly Pro Ile Met Lys Val Lys Lys  
130 135 140

Gly Asp Lys Ile Tyr Leu Thr Asp Leu Glu Asn Leu Tyr Glu Tyr Thr  
145 150 155 160

Val Thr Glu Thr Lys Thr Ile Asp Glu Thr Glu Val Ser Val Ile Asp  
165 170 175

Asp Thr Lys Asp Ala Arg Ile Thr Leu Ile Thr Cys Asp Lys Pro Thr  
180 185 190

Glu Thr Thr Lys Arg Phe Val Ala Val Gly Glu Leu Glu Lys Thr Glu  
195 200 205

Lys Leu Thr Lys Glu Leu Glu Asn Lys Tyr Phe Pro Ser Lys  
210 215 220

<210> 36

<211> 173

<212> PRT

<213> Artificial Sequence

<220>

<223> Listeria monocytogenes Sortase A shortened variant A

<400> 36

Glu Lys Asp Ala Thr Phe Asp Phe Glu Ser Val Gln Leu Pro Ser Met  
1 5 10 15

Thr Ser Val Ile Lys Gly Ala Ala Asn Tyr Asp Lys Asp Ala Val Val  
20 25 30

Gly Ser Ile Ala Val Pro Ser Val Asp Val Asn Leu Leu Val Phe Lys  
35 40 45

Gly Thr Asn Thr Ala Asn Leu Leu Ala Gly Ala Thr Thr Met Arg Ser  
50 55 60

eolf-seq1

Asp Gln Val Met Gly Lys Gly Asn Tyr Pro Leu Ala Gly His His Met  
65 70 75 80

Arg Asp Glu Ser Met Leu Phe Gly Pro Ile Met Lys Val Lys Lys Gly  
85 90 95

Asp Lys Ile Tyr Leu Thr Asp Leu Glu Asn Leu Tyr Glu Tyr Thr Val  
100 105 110

Thr Glu Thr Lys Thr Ile Asp Glu Thr Glu Val Ser Val Ile Asp Asp  
115 120 125

Thr Lys Asp Ala Arg Ile Thr Leu Ile Thr Cys Asp Lys Pro Thr Glu  
130 135 140

Thr Thr Lys Arg Phe Val Ala Val Gly Glu Leu Glu Lys Thr Glu Lys  
145 150 155 160

Leu Thr Lys Glu Leu Glu Asn Lys Tyr Phe Pro Ser Lys  
165 170

<210> 37

<211> 156

<212> PRT

<213> Artificial Sequence

<220>

<223> *Listeria monocytogenes* Sortase A shortened variant B

<400> 37

Ser Val Ile Lys Gly Ala Ala Asn Tyr Asp Lys Asp Ala Val Val Gly  
1 5 10 15

Ser Ile Ala Val Pro Ser Val Asp Val Asn Leu Leu Val Phe Lys Gly  
20 25 30

Thr Asn Thr Ala Asn Leu Leu Ala Gly Ala Thr Thr Met Arg Ser Asp  
35 40 45

Gln Val Met Gly Lys Gly Asn Tyr Pro Leu Ala Gly His His Met Arg  
50 55 60

# eolf-seql

Asp Glu Ser Met Leu Phe Gly Pro Ile Met Lys Val Lys Lys Gly Asp  
65 70 75 80

Lys Ile Tyr Leu Thr Asp Leu Glu Asn Leu Tyr Glu Tyr Thr Val Thr  
85 90 95

Glu Thr Lys Thr Ile Asp Glu Thr Glu Val Ser Val Ile Asp Asp Thr  
100 105 110

Lys Asp Ala Arg Ile Thr Leu Ile Thr Cys Asp Lys Pro Thr Glu Thr  
115 120 125

Thr Lys Arg Phe Val Ala Val Gly Glu Leu Glu Lys Thr Glu Lys Leu  
130 135 140

Thr Lys Glu Leu Glu Asn Lys Tyr Phe Pro Ser Lys  
145 150 155

<210> 38  
<211> 150  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Listeria monocytogenes Sortase A shortened variant C

<400> 38

Ala Asn Tyr Asp Lys Asp Ala Val Val Gly Ser Ile Ala Val Pro Ser  
1 5 10 15

Val Asp Val Asn Leu Leu Val Phe Lys Gly Thr Asn Thr Ala Asn Leu  
20 25 30

Leu Ala Gly Ala Thr Thr Met Arg Ser Asp Gln Val Met Gly Lys Gly  
35 40 45

Asn Tyr Pro Leu Ala Gly His His Met Arg Asp Glu Ser Met Leu Phe  
50 55 60

eolf-seq1

Gly Pro Ile Met Lys Val Lys Lys Gly Asp Lys Ile Tyr Leu Thr Asp  
65 70 75 80

Leu Glu Asn Leu Tyr Glu Tyr Thr Val Thr Glu Thr Lys Thr Ile Asp  
85 90 95

Glu Thr Glu Val Ser Val Ile Asp Asp Thr Lys Asp Ala Arg Ile Thr  
100 105 110

Leu Ile Thr Cys Asp Lys Pro Thr Glu Thr Thr Lys Arg Phe Val Ala  
115 120 125

Val Gly Glu Leu Glu Lys Thr Glu Lys Leu Thr Lys Glu Leu Glu Asn  
130 135 140

Lys Tyr Phe Pro Ser Lys  
145 150

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<211> 137

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<213> Artificial Sequence

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<223> *Listeria monocytogenes* Sortase A shortened variant D

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Ala Asn Tyr Asp Lys Asp Ala Val Val Gly Ser Ile Ala Val Pro Ser  
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Val Asp Val Asn Leu Leu Val Phe Lys Gly Thr Asn Thr Ala Asn Leu  
20 25 30

Leu Ala Gly Ala Thr Thr Met Arg Ser Asp Gln Val Met Gly Lys Gly  
35 40 45

Asn Tyr Pro Leu Ala Gly His His Met Arg Asp Glu Ser Met Leu Phe  
50 55 60

Gly Pro Ile Met Lys Val Lys Lys Gly Asp Lys Ile Tyr Leu Thr Asp  
65 70 75 80

eolf-seql

Leu Glu Asn Leu Tyr Glu Tyr Thr Val Thr Glu Thr Lys Thr Ile Asp  
85 90 95

Glu Thr Glu Val Ser Val Ile Asp Asp Thr Lys Asp Ala Arg Ile Thr  
100 105 110

Leu Ile Thr Cys Asp Lys Pro Thr Glu Thr Thr Lys Arg Phe Val Ala  
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Val Gly Glu Leu Glu Lys Thr Glu Lys  
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<223> *Listeria monocytogenes* Sortase A shortened variant E

<400> 40

Gly Ser Ile Ala Val Pro Ser Val Asp Val Asn Leu Leu Val Phe Lys  
1 5 10 15

Gly Thr Asn Thr Ala Asn Leu Leu Ala Gly Ala Thr Thr Met Arg Ser  
20 25 30

Asp Gln Val Met Gly Lys Gly Asn Tyr Pro Leu Ala Gly His His Met  
35 40 45

Arg Asp Glu Ser Met Leu Phe Gly Pro Ile Met Lys Val Lys Lys Gly  
50 55 60

Asp Lys Ile Tyr Leu Thr Asp Leu Glu Asn Leu Tyr Glu Tyr Thr Val  
65 70 75 80

Thr Glu Thr Lys Thr Ile Asp Glu Thr Glu Val Ser Val Ile Asp Asp  
85 90 95

eolf-seq1

Thr Lys Asp Ala Arg Ile Thr Leu Ile Thr Cys Asp Lys Pro Thr Glu  
100 105 110

Thr Thr Lys Arg Phe Val Ala Val Gly Glu Leu Glu Lys Thr Glu Lys  
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Leu Thr Lys Glu Leu Glu Asn Lys Tyr Phe Pro Ser Lys  
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Leu Pro Xaa Thr Ala  
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Leu Pro Glu Thr Ala  
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Leu Pro Lys Thr Ala  
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