

SEQUENCE LISTING

<110> LOFARMA S.P.A.

<120> HYPOALLERGENIC VARIANTS OF THE MAJOR ALLERGEN FROM BETULA
VERRUCOSA POLLEN

<130> 8025MEUR

<160> 12

<170> PatentIn version 3.3

<210> 1

<211> 133

<212> PRT

<213> Unknown

<220>

<223> Bet v 2 wt from Betula verrucosa

<400> 1

Met	Ser	Trp	Gln	Thr	Tyr	Val	Asp	Glu	His	Leu	Met	Cys	Asp	Ile	Asp
1				5					10					15	

Gly	Gln	Ala	Ser	Asn	Ser	Leu	Ala	Ser	Ala	Ile	Val	Gly	His	Asp	Gly
			20					25					30		

Ser	Val	Trp	Ala	Gln	Ser	Ser	Ser	Phe	Pro	Gln	Phe	Lys	Pro	Gln	Glu
		35					40					45			

Ile	Thr	Gly	Ile	Met	Lys	Asp	Phe	Glu	Glu	Pro	Gly	His	Leu	Ala	Pro
	50					55					60				

Thr	Gly	Leu	His	Leu	Gly	Gly	Ile	Lys	Tyr	Met	Val	Ile	Gln	Gly	Glu
65					70					75					80

Ala	Gly	Ala	Val	Ile	Arg	Gly	Lys	Lys	Gly	Ser	Gly	Gly	Ile	Thr	Ile
				85					90					95	

Lys	Lys	Thr	Gly	Gln	Ala	Leu	Val	Phe	Gly	Ile	Tyr	Glu	Glu	Pro	Val
			100					105					110		

Thr	Pro	Gly	Gln	Cys	Asn	Met	Val	Val	Glu	Arg	Leu	Gly	Asp	Tyr	Leu
		115					120					125			

Ile	Asp	Gln	Gly	Leu
	130			

<210> 2

<211> 133

2

<212> PRT
 <213> Unknown

<220>
 <223> Bet v 2 mutant

<400> 2

Met Ser Trp Gln Thr Tyr Val Asp Glu His Leu Met Cys Asp Ile Asp
 1 5 10 15

Gly Gln Ala Ser Asn Ser Leu Ala Ser Ala Ile Val Gly His Asp Gly
 20 25 30

Ser Val Trp Ala Gln Ser Ala Ser Phe Pro Gln Phe Lys Pro Gln Glu
 35 40 45

Ile Thr Gly Ile Met Lys Asp Phe Glu Glu Pro Gly His Leu Ala Pro
 50 55 60

Thr Gly Leu His Leu Gly Gly Ile Lys Tyr Met Val Ile Gln Gly Glu
 65 70 75 80

Ala Gly Ala Val Ile Arg Gly Lys Lys Gly Ser Gly Gly Ile Thr Ile
 85 90 95

Lys Lys Thr Gly Gln Ala Leu Val Phe Gly Ile Tyr Glu Glu Pro Val
 100 105 110

Thr Pro Gly Gln Cys Asn Met Val Val Glu Arg Leu Gly Asp Tyr Leu
 115 120 125

Ile Asp Gln Gly Leu
 130

<210> 3
 <211> 133
 <212> PRT
 <213> Unknown

<220>
 <223> Bet v 2 mutant

<400> 3

Met Ser Trp Gln Thr Tyr Val Asp Glu His Leu Met Cys Asp Ile Asp
 1 5 10 15

Gly Gln Ala Ser Asn Ser Leu Ala Ser Ala Ile Val Gly His Asp Gly
 20 25 30

3

Ser Val Trp Ala Gln Ser Ser Ser Phe Pro Gln Phe Thr Pro Gln Glu
35 40 45

Ile Thr Gly Ile Met Lys Asp Phe Glu Glu Pro Gly His Leu Ala Pro
50 55 60

Thr Gly Leu His Leu Gly Gly Ile Lys Tyr Met Val Ile Gln Gly Glu
65 70 75 80

Ala Gly Ala Val Ile Arg Gly Lys Lys Gly Ser Gly Gly Ile Thr Ile
85 90 95

Lys Lys Thr Gly Gln Ala Leu Val Phe Gly Ile Tyr Glu Glu Pro Val
100 105 110

Thr Pro Gly Gln Cys Asn Met Val Val Glu Arg Leu Gly Asp Tyr Leu
115 120 125

Ile Asp Gln Gly Leu
130

<210> 4
<211> 133
<212> PRT
<213> Unknown

<220>
<223> Bet v 2 mutant

<400> 4

Met Ser Trp Gln Thr Tyr Val Asp Glu His Leu Met Cys Asp Ile Asp
1 5 10 15

Gly Gln Ala Ser Asn Ser Leu Ala Ser Ala Ile Val Gly His Asp Gly
20 25 30

Ser Val Trp Ala Gln Ser Ser Ser Phe Pro Gln Phe Lys Pro Gln Glu
35 40 45

Ile Thr Gly Ile Met Lys Asp Phe Glu Glu Pro Gly His Leu Ala Pro
50 55 60

Thr Gly Leu His Leu Gly Gly Ile Lys Tyr Met Val Ile Gln Gly Glu
65 70 75 80

Ala Gly Ala Val Ile Arg Gly Gly Glu Gly Ser Gly Gly Ile Thr Ile
85 90 95

4

Lys Lys Thr Gly Gln Ala Leu Val Phe Gly Ile Tyr Glu Glu Pro Val
 100 105 110

Thr Pro Gly Gln Cys Asn Met Val Val Glu Arg Leu Gly Asp Tyr Leu
 115 120 125

Ile Asp Gln Gly Leu
 130

<210> 5
 <211> 133
 <212> PRT
 <213> Unknown

<220>
 <223> Bet v 2 mutant

<400> 5

Met Ser Trp Gln Thr Tyr Val Asp Glu His Leu Met Cys Asp Ile Asp
 1 5 10 15

Gly Gln Ala Ser Asn Ser Leu Ala Ser Ala Ile Val Gly His Asp Gly
 20 25 30

Ser Val Trp Ala Gln Ser Ser Ser Phe Pro Gln Phe Thr Pro Gln Glu
 35 40 45

Ile Thr Gly Ile Met Lys Asp Phe Glu Glu Pro Gly His Leu Ala Pro
 50 55 60

Thr Gly Leu His Leu Gly Gly Ile Lys Tyr Met Val Ile Gln Gly Glu
 65 70 75 80

Ala Gly Ala Val Ile Arg Gly Gly Glu Gly Ser Gly Gly Ile Thr Ile
 85 90 95

Lys Lys Thr Gly Gln Ala Leu Val Phe Gly Ile Tyr Glu Glu Pro Val
 100 105 110

Thr Pro Gly Gln Cys Asn Met Val Val Glu Arg Leu Gly Asp Tyr Leu
 115 120 125

Ile Asp Gln Gly Leu
 130

<210> 6
 <211> 133
 <212> PRT

<213> Unknown

<220>

<223> Bet v 2 mutant

<400> 6

Met Ser Trp Gln Thr Tyr Val Asp Glu His Leu Met Cys Asp Ile Asp
1 5 10 15

Gly Gln Ala Ser Asn Ser Leu Ala Ser Ala Ile Val Gly His Asp Gly
20 25 30

Ser Val Trp Ala Gln Ser Ala Ser Phe Pro Gln Phe Lys Pro Gln Glu
35 40 45

Ile Thr Gly Ile Met Lys Asp Phe Glu Glu Pro Gly His Leu Ala Pro
50 55 60

Thr Gly Leu His Leu Gly Gly Ile Lys Tyr Met Val Ile Gln Gly Glu
65 70 75 80

Ala Gly Ala Val Ile Arg Gly Gly Glu Gly Ser Gly Gly Ile Thr Ile
85 90 95

Lys Lys Thr Gly Gln Ala Leu Val Phe Gly Ile Tyr Glu Glu Pro Val
100 105 110

Thr Pro Gly Gln Cys Asn Met Val Val Glu Arg Leu Gly Asp Tyr Leu
115 120 125

Ile Asp Gln Gly Leu
130

<210> 7

<211> 402

<212> DNA

<213> Unknown

<220>

<223> sequence encoding Bet v 2 wt from *Betula verrucosa*

<400> 7

atgtcgtggc aaacgtacgt ggatgaacat ttgatgtgcg atatcgacgg gcaagccagc 60

aactcgctgg catctgcgat cgtcgggtcac gatggctctg tgtgggccca gagctcttcc 120

ttccacagct ttaagcctca ggaaatcact ggtatcatga aggactttga ggagccgggt 180

catcttgctc cgacgggctt acaccttggg ggcataaaat acatgggtcat ccagggagag 240

gctggtgctg tcatccgtgg aaagaaggga tctggaggta ttactataaa gaagactggt 300

6

caagctctcg tttttggcat ctatgaagag cctgtgacac caggacagtg caacatgggtt 360
 gttgagaggt tgggggatta ccttattgac cagggcctgt ag 402

<210> 8
 <211> 402
 <212> DNA
 <213> Unknown

<220>
 <223> sequence encoding a Bet v 2 mutant

<400> 8
 atgtcgtggc aaacgtacgt ggatgaacat ttgatgtgcg atatcgacgg gcaagccagc 60
 aactcgctgg catctgcgat cgtcgggtcac gatggctctg tgtgggcca gagcgcttcc 120
 ttcccacagt ttaagcctca ggaaatcact ggtatcatga aggactttga ggagccgggt 180
 catcttgctc cgacgggctt acaccttggg ggcataaaat acatgggtcat ccagggagag 240
 gctggtgctg tcatccgtgg aaagaaggga tctggaggta ttactataaa gaagactggt 300
 caagctctcg tttttggcat ctatgaagag cctgtgacac caggacagtg caacatgggtt 360
 gttgagaggt tgggggatta ccttattgac cagggcctgt ag 402

<210> 9
 <211> 402
 <212> DNA
 <213> Unknown

<220>
 <223> sequence encoding a Bet v 2 mutant

<400> 9
 atgtcgtggc aaacgtacgt ggatgaacat ttgatgtgcg atatcgacgg gcaagccagc 60
 aactcgctgg catctgcgat cgtcgggtcac gatggctctg tgtgggcca gagctcttcc 120
 ttcccacagt ttacgcctca ggaaatcact ggtatcatga aggactttga ggagccgggt 180
 catcttgctc cgacgggctt acaccttggg ggcataaaat acatgggtcat ccagggagag 240
 gctggtgctg tcatccgtgg aaagaaggga tctggaggta ttactataaa gaagactggt 300
 caagctctcg tttttggcat ctatgaagag cctgtgacac caggacagtg caacatgggtt 360
 gttgagaggt tgggggatta ccttattgac cagggcctgt ag 402

<210> 10
 <211> 402
 <212> DNA
 <213> Unknown

<220>
 <223> sequence encoding a Bet v 2 mutant

<400> 10

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atgtcgtggc aaacgtacgt ggatgaacat ttgatgtgcg atatcgacgg gcaagccagc      60
aactcgctgg catctgcgat cgtcgggtcac gatggctctg tgtgggcca gagctcttcc      120
ttcccacagt ttaagcctca ggaaatcact ggtatcatga aggactttga ggagccgggt      180
catcttgctc cgacgggctt acaccttggg ggcataaaat acatgggtcat ccagggagag      240
gctggtgctg tcatccgtgg aggggagggg tctggaggta ttactataaa gaagactggt      300
caagctctcg tttttggcat ctatgaagag cctgtgacac caggacagtg caacatgggt      360
gttgagaggt tgggggatta ccttattgac cagggcctgt ag                          402

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<210> 11
<211> 402
<212> DNA
<213> Unknown

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<220>
<223> sequence encoding a Bet v 2 mutant

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```

<400> 11
atgtcgtggc aaacgtacgt ggatgaacat ttgatgtgcg atatcgacgg gcaagccagc      60
aactcgctgg catctgcgat cgtcgggtcac gatggctctg tgtgggcca gagctcttcc      120
ttcccacagt ttacgcctca ggaaatcact ggtatcatga aggactttga ggagccgggt      180
catcttgctc cgacgggctt acaccttggg ggcataaaat acatgggtcat ccagggagag      240
gctggtgctg tcatccgtgg aggggagggg tctggaggta ttactataaa gaagactggt      300
caagctctcg tttttggcat ctatgaagag cctgtgacac caggacagtg caacatgggt      360
gttgagaggt tgggggatta ccttattgac cagggcctgt ag                          402

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<210> 12
<211> 402
<212> DNA
<213> Unknown

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<220>
<223> sequence encoding a Bet v 2 mutant

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<400> 12
atgtcgtggc aaacgtacgt ggatgaacat ttgatgtgcg atatcgacgg gcaagccagc      60
aactcgctgg catctgcgat cgtcgggtcac gatggctctg tgtgggcca gagcgcttcc      120
ttcccacagt ttaagcctca ggaaatcact ggtatcatga aggactttga ggagccgggt      180
catcttgctc cgacgggctt acaccttggg ggcataaaat acatgggtcat ccagggagag      240
gctggtgctg tcatccgtgg aggggagggg tctggaggta ttactataaa gaagactggt      300
caagctctcg tttttggcat ctatgaagag cctgtgacac caggacagtg caacatgggt      360
gttgagaggt tgggggatta ccttattgac cagggcctgt ag                          402

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