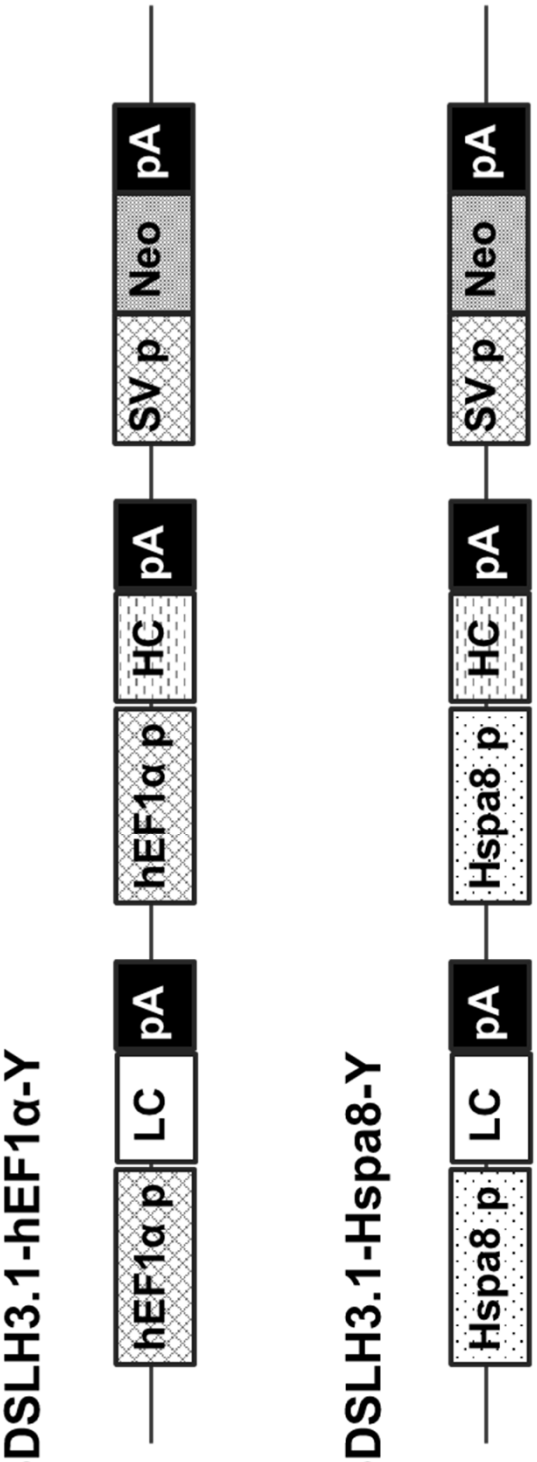
Figure 1


pDSLH3.1-hEF1α-Y
hEF1α p
LC
pA
hEF1α p
HC
pA
SV p
Neo
pA
pDSLH3.1-Hspa8-Y
Hspa8 p
LC
pA
Hspa8 p
HC
pA
SV p
Neo
pA

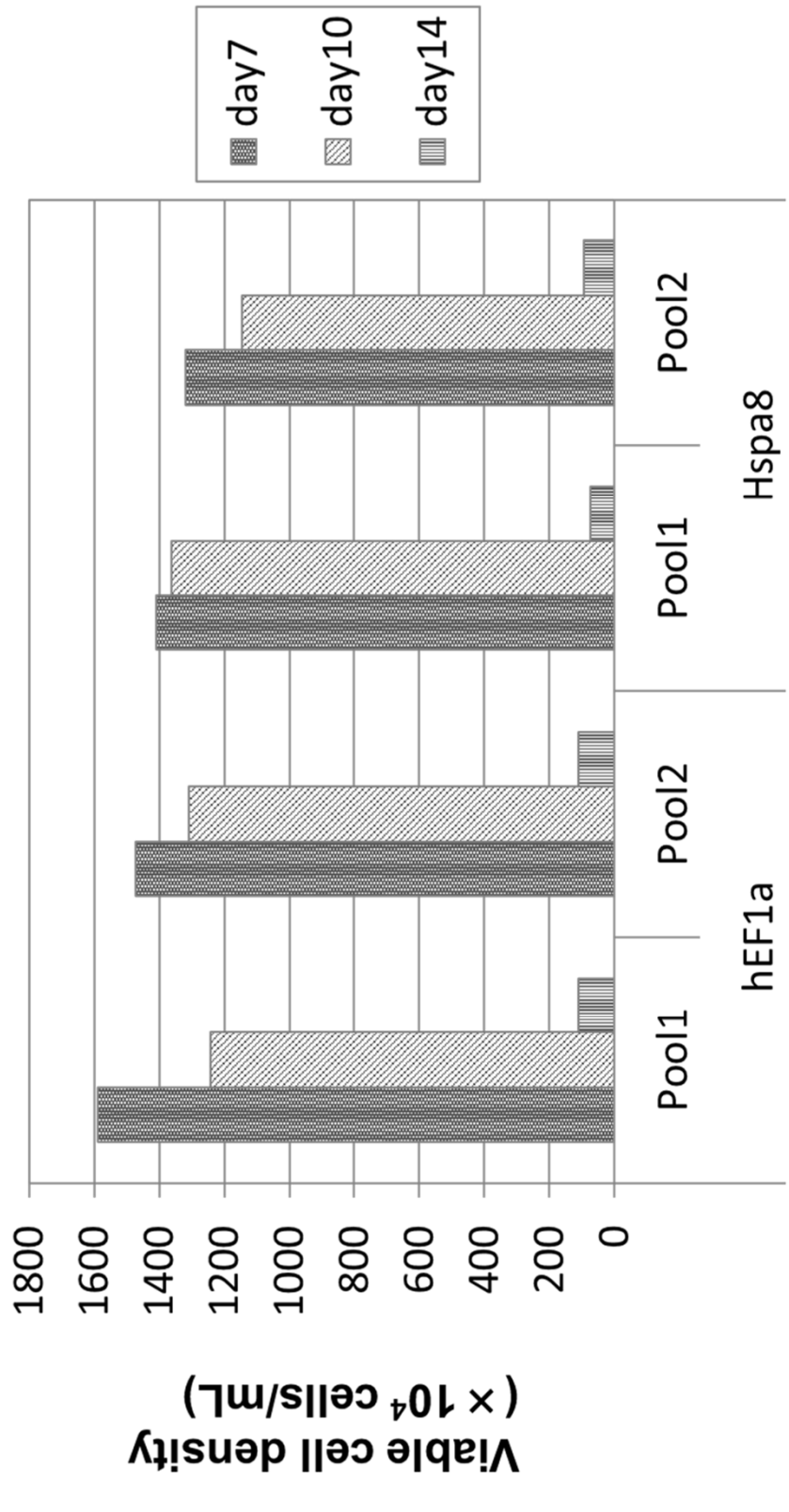

day7
day10
day14
Viable cell density
(× 10⁴ cells/mL)
1800
1600
1400
1200
1000
800
600
400
200
0
Pool1
Pool2
hEF1a
Pool1
Pool2
Hspa8

Figure 2A

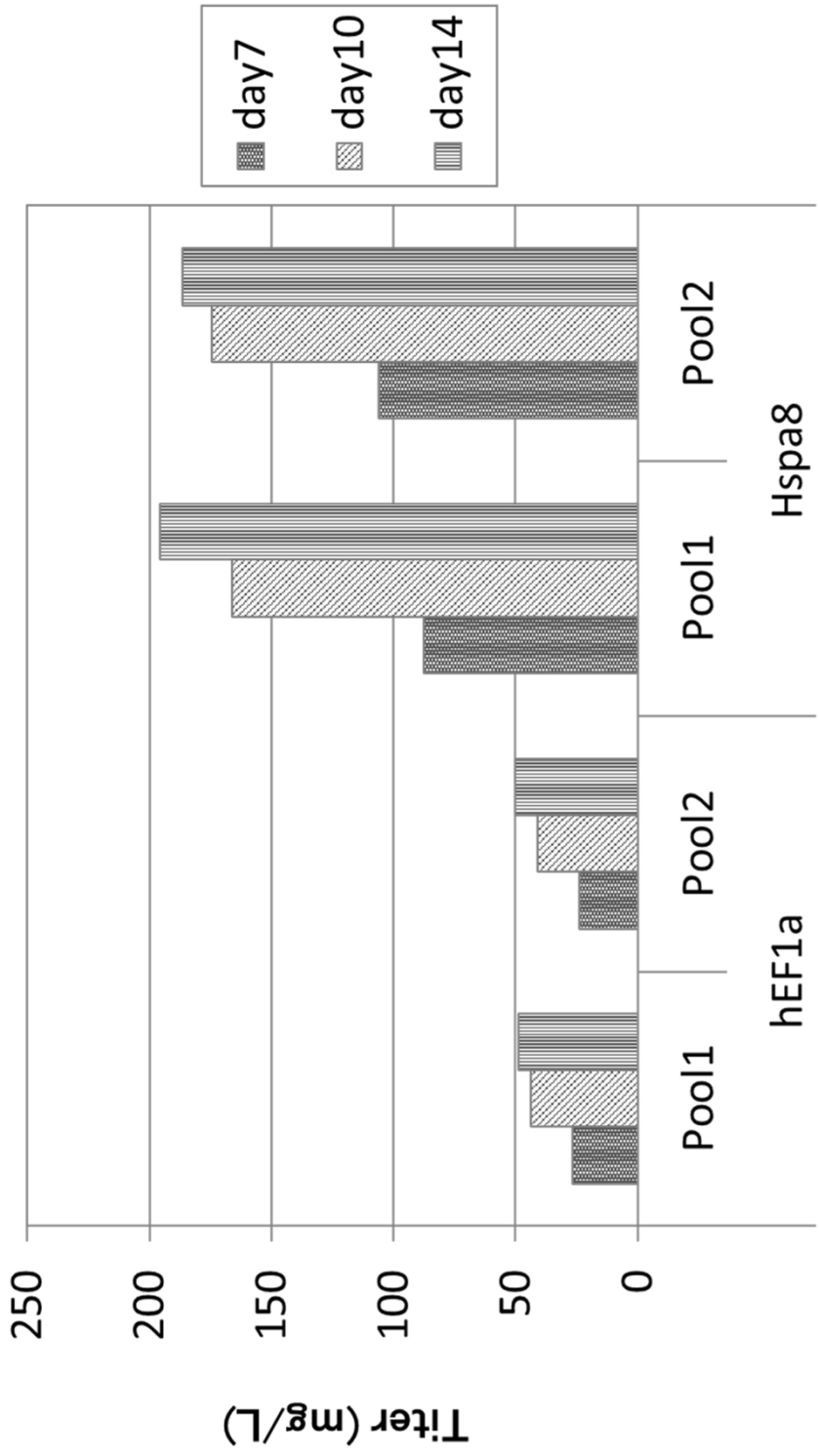

day7
day10
day14
250
200
150
100
50
0
Titer (mg/L)
Pool1
Pool2
hEF1a
Pool1
Pool2
Hspa8

Figure 2B

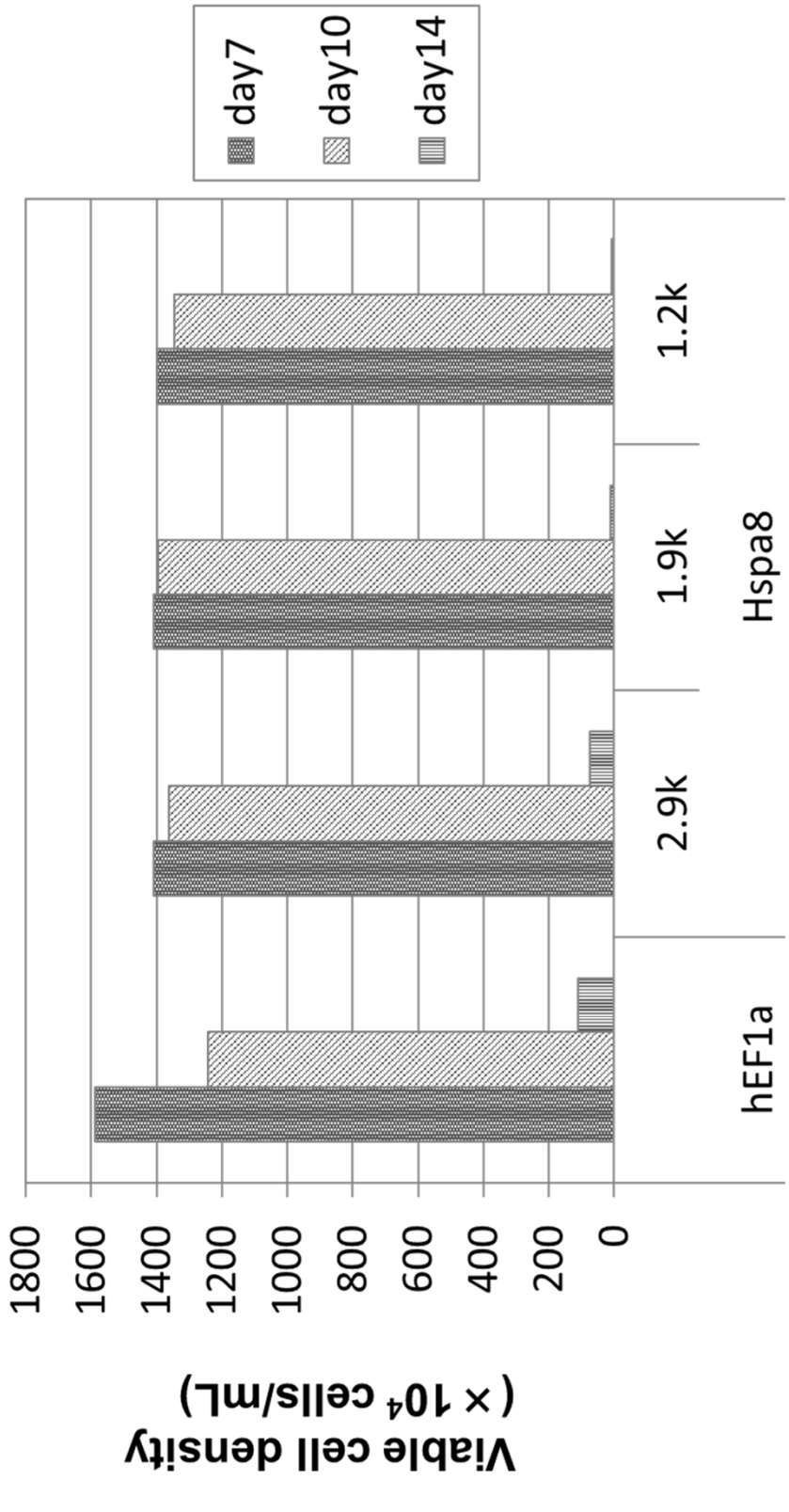

day7
day10
day14
Viable cell density
(× 10⁴ cells/mL)
1800
1600
1400
1200
1000
800
600
400
200
0
hEF1a
2.9k
1.9k
1.2k
Hspa8

Figure 3A

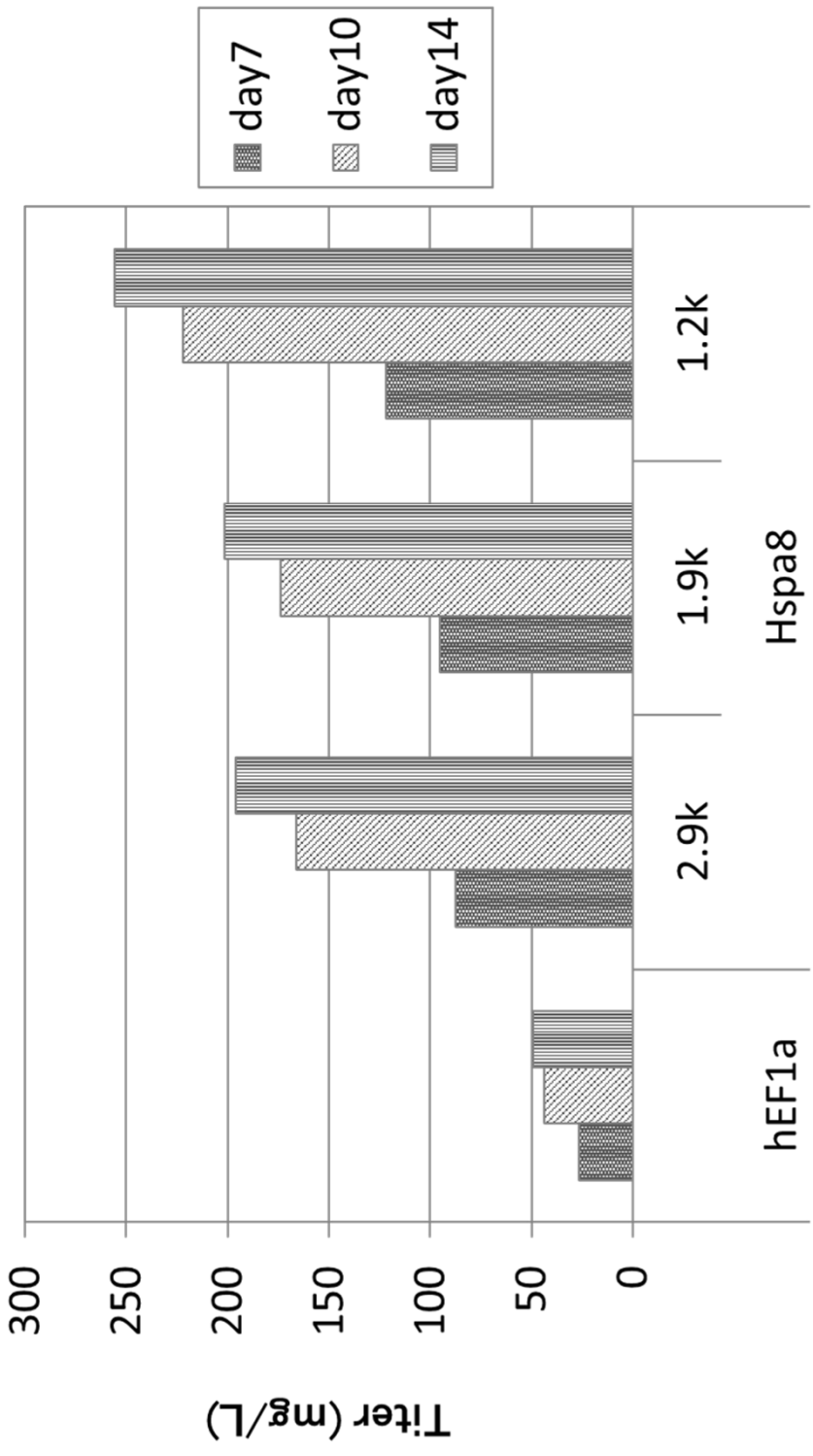

day7
day10
day14
Titer (mg/L)
300
250
200
150
100
50
0
hEF1a
2.9k
1.9k
1.2k
Hspa8

Figure 3B

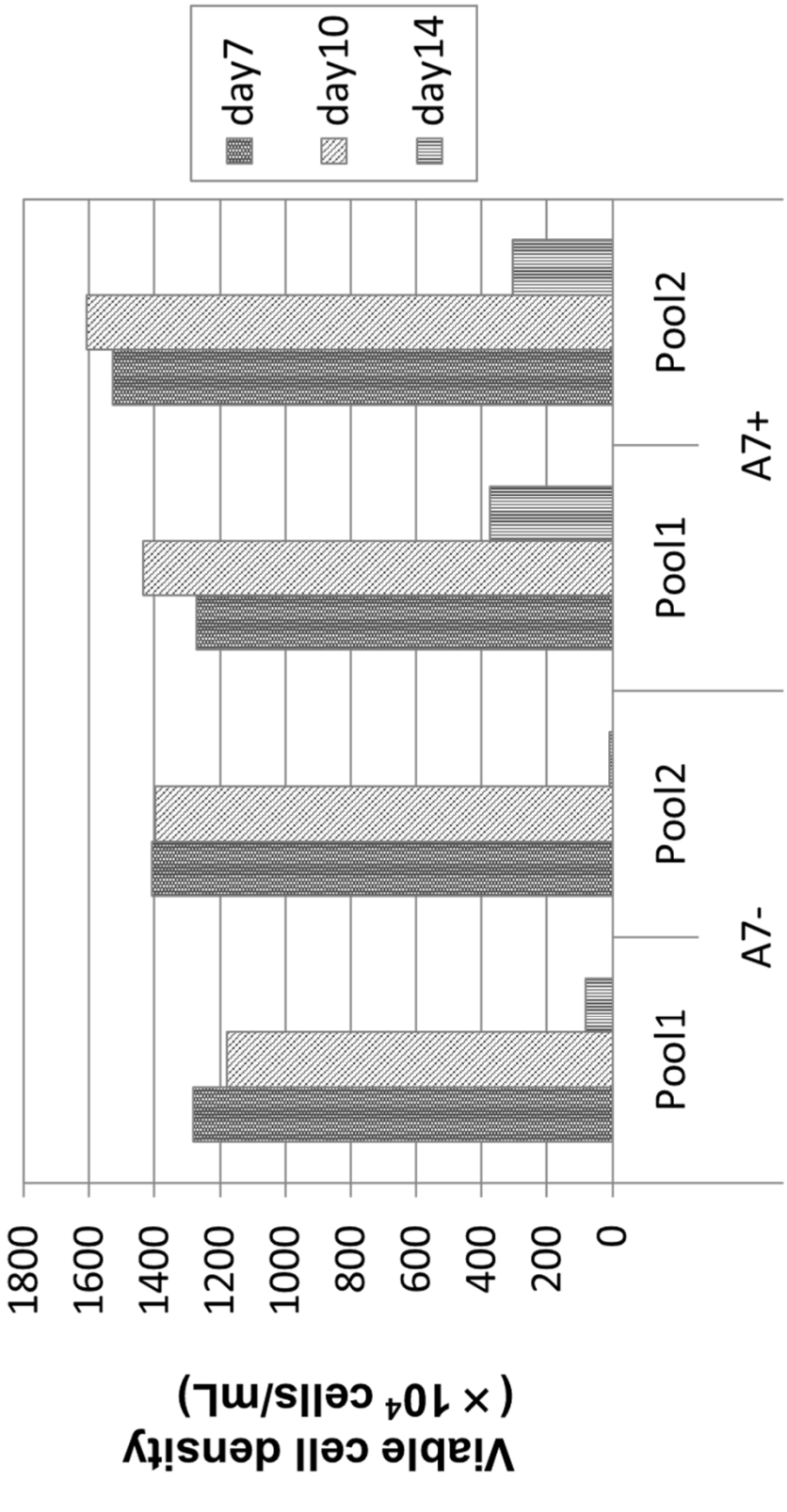

day7
day10
day14
Viable cell density
(× 10⁴ cells/mL)
1800
1600
1400
1200
1000
800
600
400
200
0
A7-
A7+
Pool1
Pool2
Pool1
Pool2

Figure 4A

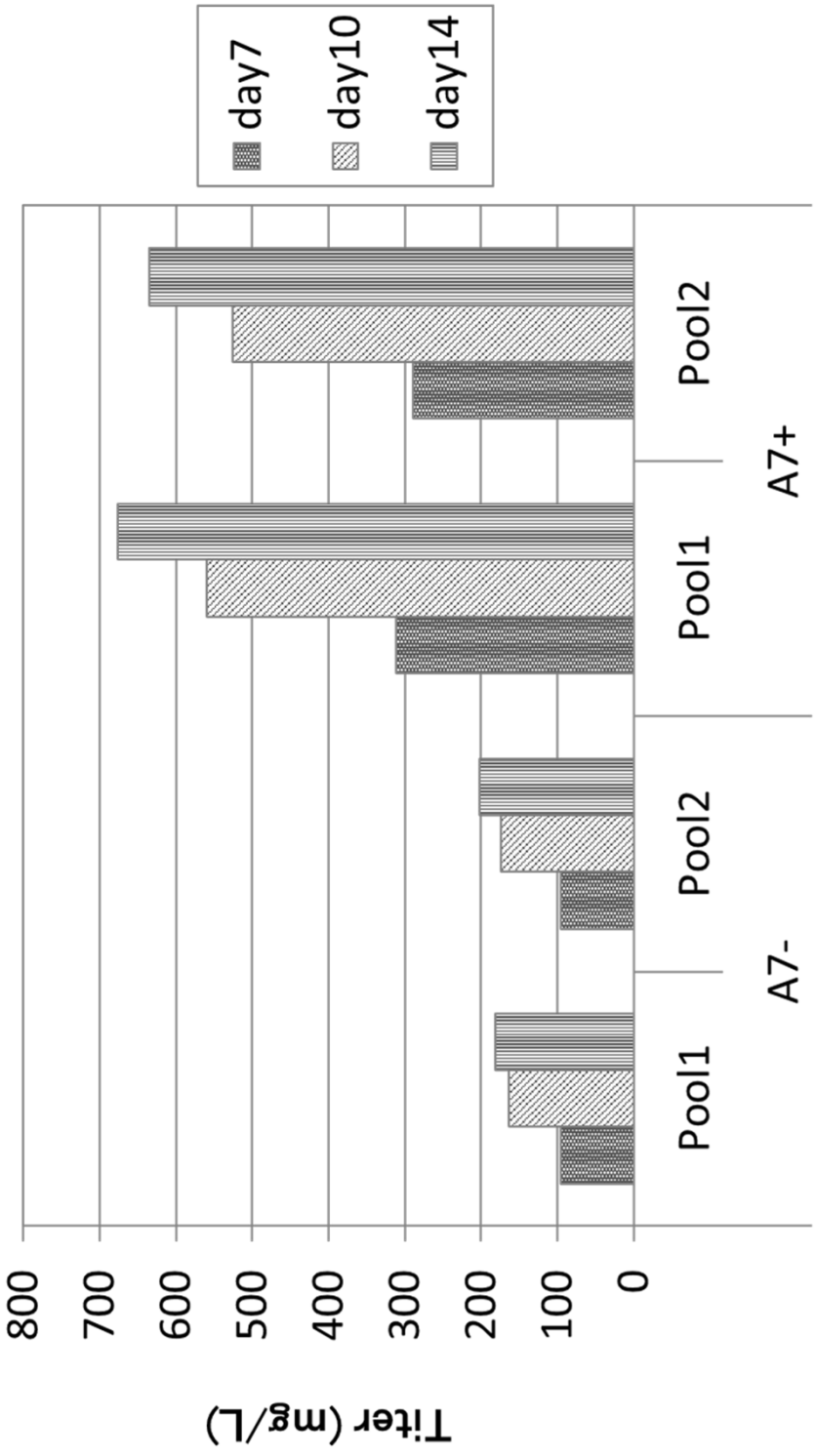

day7
day10
day14
Titer (mg/L)
800
700
600
500
400
300
200
100
0
A7+
A7-
Pool1
Pool2
Pool1
Pool2

Figure 4B

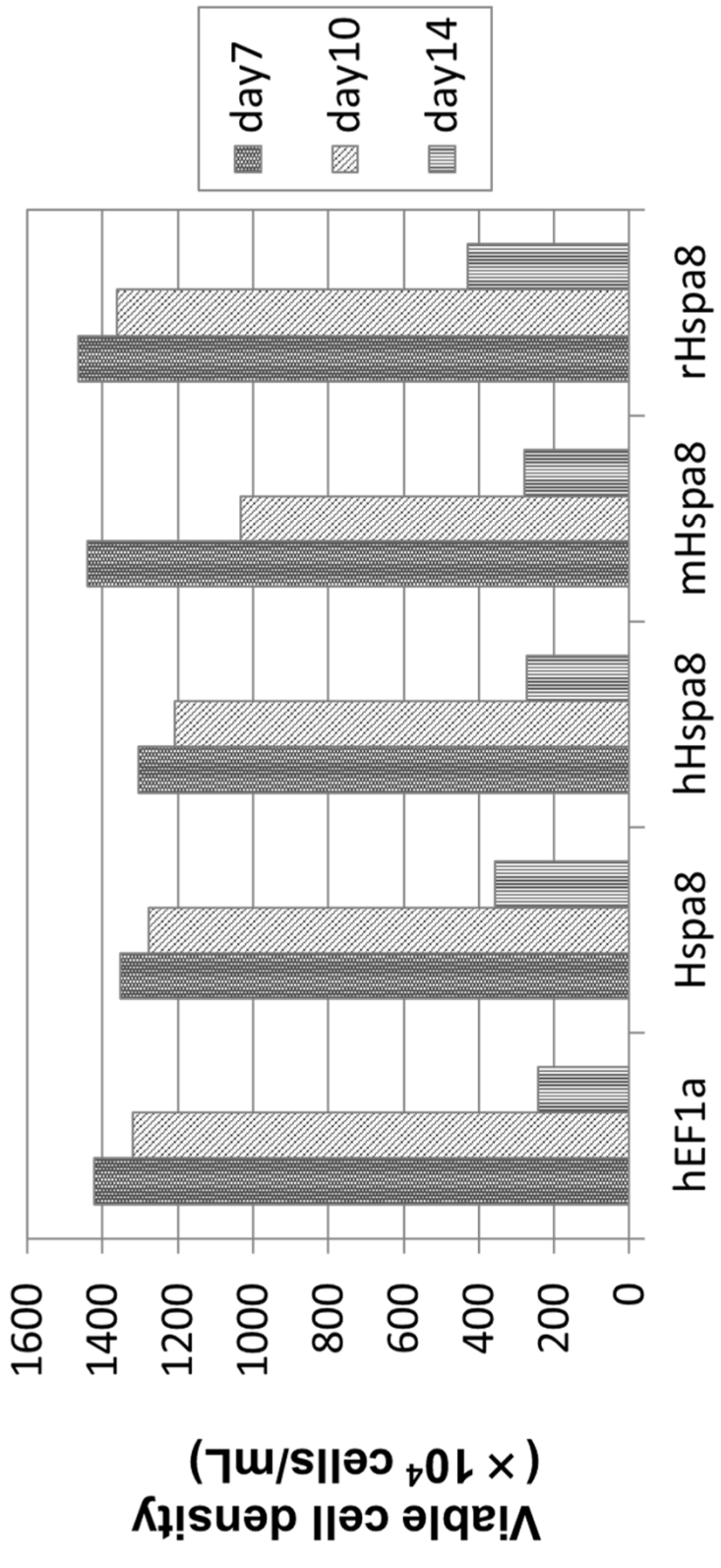

day7
day10
day14
Viable cell density
(× 10⁴ cells/mL)
1600
1400
1200
1000
800
600
400
200
0
hEF1a
Hspa8
hHspa8
mHspa8
rHspa8

Figure 5A

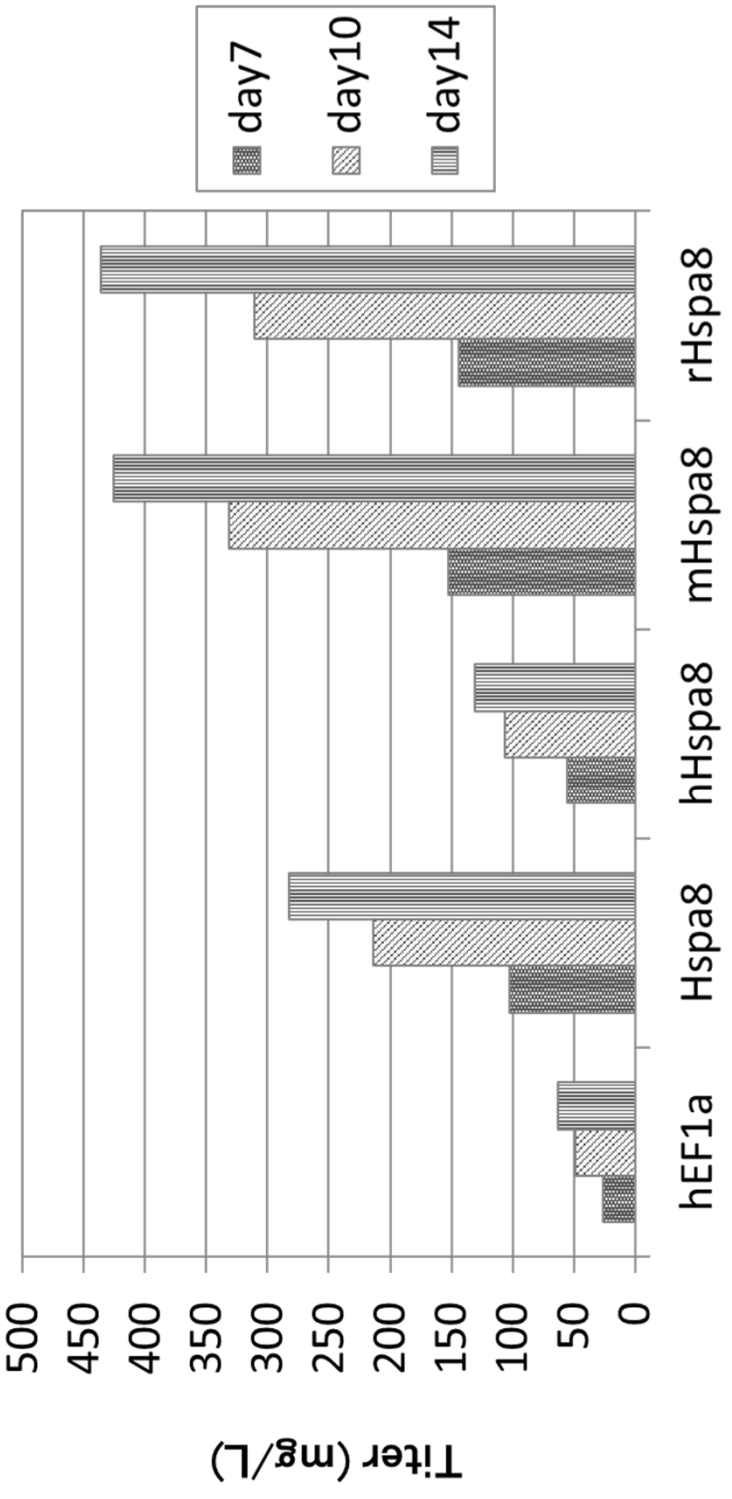

day7
day10
day14
Titer (mg/L)
0
50
100
150
200
250
300
350
400
450
500
hEF1a
Hspa8
hHspa8
mHspa8
rHspa8

Figure 5B

[Figure 6]

SEQ ID NO: 1: Nucleotide sequence of a polynucleotide which is a Chinese hamster-derived Hspa8 promoter

CAAGGCTGAGGCAGCGCCATCTGGTACTCCCTGCCCCCCTTTCTCTCTTGATAACTGAGA
TTATAGGTTGGCTCCACAGCTGCCTTGGCTGGAATTTCCATCTGATAAAATGAAGTCTGG
AGCCACTAGGATTGCACCAGGGGCTTAGTAAAAGCTCCCCCACCCCCACCCCAATGAATG
GGGCTTCTAGTGAGATTCCTGGAAAGGGAGGGCACTAAGCAGTTGGTAATTTAGCTGGAA
ATCTTGTTTTTCCTCAGGCACAAGGCTTCATCTGGATTCCTAGGTGAGGAGGGCTTCTTC
GCTGTTCTCCCCTCTCTCCCACACTCAGAATTTCCTTTCTTCCTATCTGGCCCTGCTTTT
CTTTCTTATTTTGAGACGGGGTTTCACTAAGTTGTCAGGCTAGCCTTTACTCACTTACTC
TGGAGTAGCTAGGGTCGAAAGCACTCTCCACCCACCCGATCTCCCAGAAAGCACACTTCT
CAAACAGACTCCGGCTCTTCATTTTTAAACTTAAATTTACAAATTGGTTGACAGTCTCAT
ATTCCAACCTGGTCTAGCAGAACTTTAGGTCCTCCACTTCCTGCGTGCCGACTATAAAGT
GTGAGCCACCACTCCCAGTTACACAGTAGCTTAGAAAAAGAGGACAGGATTGAGTCCAAG
ATAAACGTTGTCATGTCTTTGTGCCTTACGTTTCTAATATAGGGGTGAGTATTAGAAATA
CGGTTAAGAAGTATGCACTTTGAATGTAAAGTGCTTTTTACATTTACATAAAAAGCATTG
TATTAAAATGATCTTCTTGGACAGTAACAAAAAGTACTTCCCTCCAGGAACTCCAAGCCA
ACATTCTTCCCAAGATACAAATACAGAAGAAAAAAAAATATTCCCTTATTAGTGTCTCAG
TAATTACTGGCTATGATGAGGACAAAGCCTCCCCAGTCTTCTGATAGCCTTTCTCGCGTG
GTATGGAGAATTTCCAATCAAACACCGTAAGTGAAAGTTGCTACGGTATTCTTTTAAAAA
ACAACCTAACTAATAGCTGTCCTGCCCTTTTGAAAGGACACGTGGAAAGTGCTGGAGAGA
CGGGCTTAATGACAAGGCCCCAAACGAACGCCCTGCCTCCATGCCTTGCAGTTTCATAGT
CCAAGCACTGTCACGTTTTCAAGGACTCTGCGCGGTCGAGCGTTTAATTTTTGGTATAAG
TCAAGTCAGGGGAGACATTACCTCATGTTACTGAAAATAAAAGGTCGAGATCGCCGCATC
AAGGACACAGGGCTGCCGGAAACGAGGATTGCCAAGGCCTAGCTCACTCTCAGGGGGAAA
AAAATATACCCTTTTGCACATTTTTTTTCTTTTTTCACAAAGTGAGAGGTCTGGTGGGGC
AGGGAGGGGACGGAGGCCACGCTATCCTAGCCCGGGGGTGGGGAGGGGCGCTCGGCTCTG
GGGTCGGCCAAGAAGACGAGGCCATTTCTTTCACTGAGGGTCACAACCGAGCATCCTGGG
GACCTGTACAAGTCAGGCACGTCTAACCTCCGCACTGGGGGGCTGCGGACTGACGTGTTC
CATTTCTCAGAGACACCGCGCGGCGGCCGAGCCATCTCCAAACGCGGCGCCAGACCCAGC
TATCCTCGCGGTCCCCACTAGTCTCAGACTCAGACACCGGGGGCGCGCGAAGCCTCAGGC
CGCTGGCCCGGCAGCCCGACAGGCTGAGGGAGAAGGACCCAGGACGGGGTGGGGGAGGGG
CGCAACAACCTTCGCGGCCATTTTGTCCTCGCCCCACTTCCGTCTTCTCTTCCCGGACTC
CCCCTCCCTCAGGCTCTTCTCTCCGGCGGTCCGGGGTCCCGAGAGGCCCCGAACGCGGAG
AACACTGCTCTCATTGGTCCGCTGTGAATCCACCCGCCTCCCTTCGTCGGCTTCCTTCCG
CTCCCTCCCGCACGCGCTGACTGGGCGCGCATGCGTACAGGCTGCCGAGTCCCTCCCCTC
CCCCGCCAGCCGTGAGTGACAGAGGACTCCCGCGCGCGGGCTCTCGGCGCCCCGCCCTCC
CCTTTCCCCCGGGCCGTTCGGAGAGCGGGGGCGAGCATGAAAGTTCCAGAACGCTGCGGT

CGTGCGTCATCGCCAGGTGGGGCGGGGCGAGGGCGGGACCTAGGAGAGCGTCTCGGGCGT
TCATTGGTGCTGTTCGAAAAGCCCCATCGTCCATTGGCTAAGGAGCCATGATAGGCAGCG
GGACGGGGCGGGATCCTTCTGGAAGGTTCTGAGACAGGGTATAAGAGACAGTGAGGCGGG
CGGAAACCGGTCTCATTGAACGCGGAGGCAGCTTGTGAGGTTTTGTGTGGTCTCGTCGCC
AGCACAGCCGGGCCTACAGGCAAGGTGAGGCCTGGGGCTTGGGTGGTGGCGGGTGGCCTG
CTTTACTGCAGAGCGGCGGGGCACTGAGGCGGCGGGCGGGGGCTTAGGCCGCGGCCTCCG
GGGACCCGGGCTGCAGCTGAGGAGGATGGGCTTAGGTAGGGCGGCGCCGCCATGGCCTTG
AGGCTCGTCGCGGCGGGGGAGGGGTGCCGCAGCCGCCCGCGCCGCTCCCTTTCACCCGTC
TGCGGATTAAACGAGAGGGTTTCTGACCGCGGCCCAAGGGCGAGCTGCTTGGAATATTTC
AGCAGGCGAGTCTGGCGCCGCAATGCGCGGTCCTGGCGGCTGGAAGGGGGGAGGGGTTGG
GTTCTCCGAGTTGAGGCCACGTGCTCAACCATTGTCGCAGACCGTCAGGACAGATGGTTC
TTCAGCCAGGGGCGGGCTCTGCCAGGGTTGGCACGGCTACCGGACTGCAGCAGTGCCGCC
CTGACTGAGCCTTTTGCGTGGCCTCAGGTGATAGGTCTGGGCTGATGAGGACATACGGAT
TGCGGGTCTGGAAGCTGGGGAATAGCTGCTTAGCCGTTTTCGTGTTTGGTTTTCTTTCAG
CAACC

[Figure 7]

SEQ ID NO: 2: Nucleotide sequence of a polynucleotide which is a human-derived Hspa8 promoter

ATACAAACGTTCAGAAAGTCTAAATCAAGGACGCACGGCTACTGGAACCTATGATTCCTA
ATGCCTGGTTCACCTAACCAAGAACACACTCGCCACCATTTAAACCTGTTTATTTTATAA
ACAACGGGGAAATGTAGGGCTTGGGCTAGTTGGGGAAGGACTGAGCCAAGAAGCCGAATC
TGTTCTAGACGGAGGTGGGAAGGGGCCTAACGGTCAGGGCTCAGAGAAGCGGTTTCGCCT
TCTTTTCCGCGGAGGGATCCAGACACGACCGCGTCCTGAGGCGGTTCTGAAAAGCCGGGC
CCCTTAAACCTCTGCGTCGGGGGCTGCCTCCCGACAGTTGCCGTAGGGAAATGCAGGTGC
TGGGAGGCCTGCCGAGCTAACCCGCCCCACCCCGCGGCGGCCTGGCGGCTCCCTCCAATC
CCAATCCTGGGGGGCCGTGAGCGAGCAGCCCTAGTGGCACCCTGAAGCCGGAACCTTCGC
CCCAGCCCCTCGGGGTCAGCCCTTGTCCAAAGCCACGCTATGAAATACAGATTCGCGAAA
CCCGGGGCACTTAGAGGCCCGTCTGGAACACGAAGGTGGGGCATGGAAAGGAGGATTCGG
ACGTGGGTGGGGGAGGGGAGCAACAACCTTCGCAGCCATTTTGTCCTCGCTCCACTTCCG
TCTTCTCCTGCCCGGCTCCCGCGCCCAAACCCCTCCCTTCAGGCCCCGCGCGATTCCGCC
CCCAGTTCTGTGCCGGCCAAGATCCCGGCTAGCGCCGCTATCATTGGTTAGTTCCAAGTT
TGCCCGCCCCTCTTCCTCCTCCTTTTTCCGCCCCCTCCCTCCCGCGGAAGCTGGGGGCGC
ATGCGTAGAGGTGGACGCTCCCCTCCCCCGCCCGGGGTAACTGAGGACTCCCGCGCGCGG
ACTCGCTGCGCCCCACCCTCCCTTTCCCCGGGGCCGTCCGGAGAGCGGGGGCGAGCTTGA
AAGTTCCAGAACGCTGCGGTGAGTGCGTTATCGTGAGGCGGAGCGCGGTGGGGTGGGTGC
GGAAGGGGGCGAGGCCCGAGGAGTGGAGCCGGGCTTGTGATTGGGTCTTGTAAGGGCAGC
CGGGCGTCTATTGGCCGGGGAAGCCGTAATGGCAGGCAGCAGGGGCGGGCCCCTTCTGGA
AGGTTCTAAGATAGGGTATAAGAGGCAGGGTGGCGGGCGGAAACCGGTCTCATTGAACTC
GCCTGCAGCTCTTGGGTTTTTTGTGGCTTCCTTCGTTATTGGAGCCAGGCCTACACCCCA
GGTAAAACCTCTGCTCAAGAGTTGGGTTGTGGGTCTGGGAGCGTGCAGCCTCCACACAGG
CCTGTTGGGCTTGCTGAGGCTTGGGGGTTCTGAGAATCTCGTCGAGGCGAGTGTGCGGCT
CCTTCTACCGGCTTAAAGGGCCTCAGTTTTCGGTGGGATGGCAGCGGTATTTGGTTGCAG
CCGGCAGGACGGAAATGTAGGGAGTGGGCCGCAGTGGCCCCAGGGGAGGCTGGGAGACGC
CCGGCGGCCGCGTGGCGGGGGAGGGTTGCTGCATCGGTTTGCCTGGCGCGCGGGGAAGTG
GAGCCAGCGTTTTCTTTCACCCAGTTCCCTGCTTAGTCCAGTCCCACCGTGGTTCTTCAG
AGCTGTTCTTGGCGTGCTTCCAGTATGGGGGTACATTCCGGAGTAGTTAAAAGCCCGTTG
ACTCCCGGGGGCACTGGCACCTGGCGAGGGAGGGGAACAGACAGTGCTCAGTTCGGGGTA
AGACCACGTGTTGAGCAACGCCCCACGCCGTCTGGGTAGATGGGTCCTTCATCTAGGGCG
TGCTCTGCTGCGGTTGGCACGGCAACCTGGACTGCAGCACTAGTTCTGGACCTCGCGCGT
GCTTAGACAGGAGGTGATGGGCACTATTACCTCTTGGCAGTGGCCATACGTTTTTCCTGG
TTAAGTGTTCTGTTAAGGGATGAGGGAAATATTTTGATTAATTGAATTTTTAAACCAGAT
TTTTCTTTTTTTCAGCAACC

[Figure 8]

SEQ ID NO: 3: Nucleotide sequence of a polynucleotide which is a mouse-derived Hspa8 promoter

AGACCTTCCAATTTAAACGCCACAACAGTATTCTTTAAAAAATAAAAAGACAACCTATCT
AACTAATAAAGAGCTGCACTCCCTGCCTATTTGAAAGGACGCGTGGAAAGTGCTAGAGAG
CCGGGTGTGACGAGGCCCGGAACGCCCAGCCTCCAGGCACTGCGGTTTCAGAGTCTAAGC
ACTCGCTCCGGCCATTGGCTCAGTCACGTTTTCAAGGACTCAGCGCGGCCGGGCGTTTAA
TTTTTGGTAAAAGTCAAGTCAGGAGAGACATTACCTCATGTTACTGAAAATAAAAAGGTC
GCGATCACTCTATCAAGGACACGGGGCTGCCGGAAACCAGGAATGCCAGTGCCTAGCTCA
CCCACAAAGGGACAAAAAACATTTATCTTTCGTACATTTATTCCATTAACTGATGAGTCT
GGTGGAGCAGAGAGGGGACAGAGGTCACGCTGTCCCCTGTGGGACAGCGGAGGTGGGGAG
GGGCGTTCGGCTCAGGGGTAAGCAGAGAGGACTGGGCCATTTCTTTGATAGAGGATCACA
AACGATCCTGGGGACATGTGGCGAGCCAGGCAGATCGAGCCTCCGCACTGGGGGGGGGGG
GAATCGAGGTGTCCCATTTTGTGGGGGGTGAGGGGTGGGGAAAGCCAGCGAGATAGCGCG
GCGGCTTAGCCTCCCACAAGCTGGCAGCACGAAACAAGAAGCCTAGCAGTGCTCCTTAGT
CTCAGGCTGGGGTGGACCAAGCCCGAGGCCGGGAAACCGCCGGGCTCAGGGAGAAGGACC
GAGGGTCGTGTGGGGGAGGGGCGCAACAACCTTCGCAGCCATTTTGTCCTCGCCCCACTT
CCGTCTTCTCTTCCCGGACTCCCCCTCCCTCAGGCTCTTCTCTCAGGCAGCCCGGGGTCC
CAAGAGGTAGGGATCCGGCCGAACGCTGCTCTCATTGGTCCGTCGCGGAGGTACCCGCCT
TCCTCCCAGGGCATCCTTCCGCCCCCTCCCGCCTGCGCTGCCGGGTCGCGCACGCGCACT
CGCCGGCGACCCTCTCCCCTCCCCCAGCAGCTCTGAGTGACAGAGGACTCCCGCGCGCGG
GCTCCCGGCGCCCCGCCTTCTCCGCTCCCCCCGGGCCGTTCCCAGAGCGGGGGCGAGCGT
GAAAGTTCCAGAACGCCGCGGTCGTGCGTCATCGCGAGGCGGGGCGGGGAGAAGGCGGGA
CCTAGGCGAGCGTTCTGGCTCTTCATTAGTGCAGTCGGCAAGGGCTGGTCGTCCATTGGC
TAAGAAGCTATGATCGGCAGCGGGATGGGGCGGCACCCTTCTGGAAGGTTCTAAGACAGG
GTATAAGAGAGAGGGAAGCGGGCGGAAACCGGTCTCATTGAACGCGGAGGCAGCTGCCTG
GCATTTGTGTGGTCTCGTCGTCAGCGCAGCTGGGCCTACACACAAGGTGAGGCATGGGAC
TCGGGGGTTTGCGGGGGTCCGGGGTGGTGCAGGAGTCCCGGGGAGTCTCTTAGGCGGCGG
CTGCAGCTCAGGCCGTCACCACCAGGGACAGAGACTGCAGCAGATCCGGAGGATGGGCTG
AGTCAGGGCGGCGCCGCCATGGCCTTGTGGCTCCGCGTGGCGGGGGAGGGGAGCCACAGG
CGCCCTGGTCTTTTTATCCTGTCTGTGACTTCAAATATAAGGCTTCTGCCCGGCGCCCAC
AGGGCAGGGCCCCCCGAGGTGGGAAAGGGGGATCCTGGCTCCCGCGGTGCGCGGTCCGGG
TGGGGGGGGTTCGGGGGGCGCTCGGAGGTGGCCACGTGCTCCACCATTGTCGCAGACCTT
TAGGACAGATGGTTCCTTGAGCCTTGGGCGGGCTGTGCCAGGCTTGGCACAGACCACCTA
TACTGCAGCACTGCTGCCACGAGCCTGCCGCGTGGCTTCAGGTGATAGGTCTGGGTCACC
AAGTCCAGACCCACTGCGGACTGGATAAAAGCCGGAAAGCGAGTGCTTAGCCCCCCTCCT
TTTTTTTTCTAATAGCAACC

[Figure 9]

SEQ ID NO: 4: Nucleotide sequence of a polynucleotide which is a rat-derived Hspa8 promoter

CTTTTGATAGCCTTCCTCACATGGTCTGGAGACCTTCCAATTCAAACGCTACAACTAAAA
GTTGTTGCAGTATATATATTTAAAAAAAAAGAAAAAAACCAACCTATCTAACTAATAAAT
ATCTGTTCTCCCTGCCCATTTGAAAGGACACGTGGAAAGTGCTAGAGACAGGCTTGGTGT
GACAAGGCCCGGAACGCCCTGCCTCCATGCACTGCGGTTTCCTAGTCCGAGCATCGGCTC
TGGCCACTGGCTCAGTCACGTTTTCAAGGACTCTGCGCAGTCGGGCGTTTAATTTTTGGT
AAAAGTCAAGTCAGGAGAGACATTACCTCATGTTGCTGAAAATAAAAGGTCGAGATCACT
CAATCAAGGACACAGGGCTGCCGGAAACCAGGATTGCCAATGCCTAGCTCACCCACAAGG
GGAAATAAATTATCCTTTTGAACATTTATTCCATAAAGTGATAAGTCCAGTGGGGCAGAG
AGGGAATAGAGGCCACGCTGTCCTCGTCCAGAGATGGGGAGGGGCGCTCGGCTCCGGGGG
TCAGCAAAGAGGACTGGACCATTTCTTTCACAGAGGATTACCAACGAGGACCCTGGGGAC
ATGTGACAAGTCAGGCATTATCGAGCCCCCACACTGGGGGATCGACATGTTCCATTTTGC
TGGGGGGACAGCAAGGGAGGTCGCTCGGCGGCCTAGCCTTCCACAAGAGAGGCTCCACGA
AACAAGCCTAGCAGTGCTCCTTAGTCTCCGGCTCGGAAGCCGTGGGTGGACGAAACCGGA
GGCCGGGAAACTGCTGGACTCACGGAGAAGGACCGAGGGGTGGGGTGGGGGAGGGGTGCA
ACAACCTTCGCAGCCATTTTGTCCTCGCCCCACTTCCGTCTTCTCTTCCCGGACTCCCCC
TCCCTCAGGCTCTTCTTTCAGGCTGCACAGGGTCCCAAGAGGAACAGATAGCGCCGAGCA
CTGCTGCCATTGGTCCGTTGCGGGTGTACCCGCCCTCCTTCATGGGCATCCTTCCGCTCC
CTCCCGCCTGCGCTGACGGGTCACGCATGCGTACTCGGTGCCGACGCTCTCCCTTCCCCC
ACCAGCTCTGAGTGACAGAGGACTCCCGCGCGCGGGCTCTCGGCGCCCCGCCCTCCCCTT
TCCCCCGGGCCGTTCCGAGAGCGGGGGCGAGCGTGAAAGTTCCAGAACGCTGCGGTCGTG
CGTCATCGCCCGGAGGGGCGGAGTGGAGGCGGGTCCTAGGAGAGCGTTCTGGTTGTTCAT
TAGTGCACTCCGGAGAACCTGGCCGTCCATTGGCTAAGGAGCTCTGATCGGCAGCGGGAT
GGGGCGGAACCCTTCTGGAAGGTTCTAAGACAGGGTATAAGAGACAGTGAAGCGGGCGGA
AACCGGTCTCATTGAACGCGGAGCCAGCTCTCGGGGGTCTCTGTGTGGTCTCGTCATCAG
CACAGCTGGGCCTACACGCAAGGTGAGGCATGGGACTTGGGTGTTGGTGCGTGGCCGGTG
TGGTGCAGGGGTCAGTGGGATGCTTAGGCGGCGGGTGCGGCTTAGGCCGCTGTTGCCAGA
GACGGAGGCTGCTGCTGAAGGGGAGGATGAGCTGAGTCAGGGCGGCGCCGCCATGGCCTT
AAGCCTCCGCATGGCGGGGGAGGGGAGCTCAGGATTCCGGGGCCTTTTCTTTTTTCTGTC
TGCAAGCTAAAGGAGGGTCTCTTCCGCGCGTTCCCAGGGCACGGGTTTCAGAGATGGAAG
AGGCGATCCAGCCTCCCGCAGTGCGCGGTCCTGGGGGTGGGGGGGGCCCTCGGAGGTGGC
CACGTGCTCAGCCATTGTCGCAGACCTTTTGGACAGATGGTTCCTTCAGCCTAGGGCGGG
CTGTGCCAAGCCTGGCGCAGGCCACTCAAACTGCAGCAGTGTCGCCTGCGTGGCTTCAGG
TGATTGATAGGTCTGGGCCGGTGCAGAGTGAAAGCAGGGAGATGACCGCTTAGTCCTTTT
TTTTTTTCCTTCTAGCAACC