

Opis przedmiotu zamówienia

Przedmiotem zamówienia są:

- 1) synteza dwóch fragmentów DNA, klonowanie do plazmidu do produkcji lentiwirusa oraz wyprodukowany lentiwirus wraz z transportem (załącznik 1)
- 2) synteza 4 fragmentów DNA i klonowanie do wektora klonującego wraz z transportem (załącznik 2)

1. Przedmiot dostawy

- 2 wektory do produkcji lentiwirusów:
 - Zsyntetyzowane transgeny (sekwencje w załączniku 1) wklonowane do wektora lentiwirusowego jako kasetę ekspresyjną
 - Wektory dostarczone w formie liofilizatu, 5µg
- 2 x Oczyszczone cząsteczki lentiwirusa wyprodukowane na podstawie powyższych wektorów
 - Miano $\geq 1 \times 10^8$ TU/mL, 1ml
- 4 wektory klonujące typu pUC57:
 - Zsyntetyzowane transgeny wklonowane do wektora pUC57 (sekwencje w załączniku 2)
 - Wektory dostarczone w formie liofilizatu, 5µg

2. Wymagania dotyczące transportu

Wykonawca zobowiązany jest do:

- Transport w odpowiednich warunkach koniecznych do zachowania jego aktywności biologicznej oraz deklarowanego miana. Transport powinien odbywać się w temperaturze zalecanej przez producenta, z zachowaniem ciągłości łańcucha chłodniczego. W przypadku preparatów wymagających przechowywania w temperaturze $\leq -70^\circ\text{C}$ dostawa powinna być realizowana z wykorzystaniem suchego lodu lub równoważnego rozwiązania zapewniającego utrzymanie wymaganej temperatury przez cały okres transportu. Preparat nie może wykazywać oznak rozmrożenia w trakcie dostawy.

3. Wymagania dokumentacyjne

Wykonawca zobowiązany jest do przekazania wraz z dostawą:

-certyfikat analizy

-mapy wektorów,

-karty charakterystyki,



NARODOWE CENTRUM NAUKI

Projekt został sfinansowany ze środków Narodowego Centrum Nauki przyznanych na podstawie decyzji nr DEC-2024/52/C/NZ3/00219

Page 1 of 2



-informacje o preparatach lentiwirusowych (dotyczące między innymi przechowywania i użytkowania)

4. Wymagania dotyczące oferty

Oferta powinna zawierać szczegółowe zestawienie kosztów, w tym:

- koszt syntezy fragmentów DNA,
- koszt klonowania do odpowiednich wektorów,
- koszt produkcji lentiwirusów,
- koszt opakowania i zabezpieczenia przesyłki,
- koszt transportu do miejsca dostawy wskazanego przez Zamawiającego,

wszelkie podatki, cła, opłaty eksportowe, opłaty manipulacyjne oraz inne koszty obciążające Wykonawcę zgodnie z oferowanymi warunkami dostawy.

5. Miejsce dostawy

Sieć Badawcza Łukasiewicz – PORT Polski Ośrodek Rozwoju Technologii
ul. Stabłowicka 147
54-066 Wrocław, Polska



NARODOWE CENTRUM NAUKI

Projekt został sfinansowany ze środków Narodowego Centrum Nauki
przyznanych na podstawie decyzji nr DEC-2024/52/C/NZ3/00219

Page 2 of 2



Wektor LV-CMV-Chrnb1—WPRES-EF1a-Chrne-PGK-Blasticidin

1) Sekwencja transgenu

gtattagtcacgcctattacatggtgatgcggttttggcagtagcatcaatgggcgtggatagcgggttgactcacggggatttccaagtc
tccacccattgacgtcaatgggagttgttttggcaccacaaatcaacgggactttccaaaatgtcgtacaactccgccccattgac
gcaaatgggcggtaggcgtgtacggtgggaggtttatataagcagagctcgttttagtaaccgtcagatcgctggagacgccatcca
cgctgtttgacctccatagaagattctagagctagcgaattcgaattaaatcggatccgcggccgcgaaggatctgcgatcgctccg
gtgcccgtcagtttgaacctcgagggaattcatggccttagggcgctgcttctgcttctaggggtactcgggacgccccctgcccc
aggcgcccgcggtgcgaagccgaaggccaactgattaagaaacttttctccaactatgatagctcggtagggccggcgcgggagg
tgggagaccgcgtcggggtcagcatcgccctaccctggcgcaactcatcagcctgaacgagaaggatgaagaaatgagcaca
agggtgacttagacctggagtgagaccgactacaggttaagctgggacccccgagaacatgatggcatcgattctctccgcatcactg
ctgaatccgtttggctccctgatgtggtgctgctgaacaacaatgacggaaaatttcgacgttgccctggacatcaatgttggtatctt
cgagggtctgtgcgtggcaacccccctggcctgtaccgcagcagctgcagcatccaggacacacttccctttgactggcaga
actgcacccatggtgttttagttcctacagctatgacagctctgaggtcagcctgaagacgggcctggatcctgaaggagaggagaggc
aggaagtctacattcatgaaggaccttcattgagaatggccaatgggagattatccacaaaccttctaggttaatccaactccagg
ggatcagagagggtggaaggaagggcacatcatgaggaagtattcttctatctcattattcggcggaagcctctctctacctgtgtaacg
tcattgccccatgcacctcatcagctcctggccatcttcttctctacctcccaccagatgcaggagagaagatggggctctccat
ctttgcccctgctgacgtcactgtgttctgtgctgttggccgacaaagtgcctgagacctccctggcggtgcccatcattatcaagta
cctcatgtttacatggtccttgcaccttctccgttatccttagtgttggtcctcaacctgcacatcgcctacccccacccccacca
aatgccccttttgggtccgcagatcttcattcacaagctccctccatactgggtctgaagaggcccaaacccgagagagaccaac
tccctgaaccacatcactctcttctccaagaagtggctggggcagaggaaactgatgaatatttcacggaagcctccaagtattt
ctttccctaaacttaacaggttcagcctgaatcatctgccccggacctgcgacgattatcgatgggtccaacccgggctgtaggtct
gcctcaggagctacgagaggtcatttccatcagctacatggcccgacagcttcaggaaacaggaggaccacgacgcactgaag
gaggactggcagtttggccatggttggaccgtcttttctgaggacattcatcgttttcacaagcgtcgggacctagtcatttctc
agatgccacgtaccatttggccccctcctgaacctttcccttggagatccgcggccgcccctaggcctgcaggaatcaacctctggatt
acaaaatttggaaagattgactggtattcttaactatgttgctccttttacgctatgtggatacgtcgtttaatgcctttgtatcatgctat
tgctcccgtatggctttcatttctcctcctgtataaatcctggtgtgctctctttatgaggagttgtggcccgttgtaggcaacgtggc
gtggtgtgactgtgttctgacgcaacccccactggttggggcattgccaccacctgtcagctcctttccgggactttcgctttcccc
ctccctattgccacggcggaactcatcgccgcctgcttggccgctgctggacaggggctcggctgttgggactgacaattccgtgg
tggtgtcggggaaatcatcgtccttcttggctgctgcctgtgttgccacctggattctgcgcgggacgtccttctgctacgtccctcg
gccctcaatccagcgacacttcttcccgccgctgctgcccgtctgcggcctcttccgctctccgcttccgctcagacgagt
cggatctccctttggccgcctccccgccttagggaaagatctgcgatcgtccggtgcccgtcagtgggcagagcgacacatcgcc
cacagtccccgagaagttggggggagggtgcgcaattgaacgggtgcctagagaaggtggcgcggggttaaactgggaaagtgatg
tcgtgactggctccgccttttccgagggtgggggagaaccgtatataagtcagtagtcgccgtgaacgttcttttcgaacgggt
ttccgcccagaacacagctgaagcttcgaggggtcgcacatctccttcacgcgcggccgcccctacctgaggccgccatccacg
ccggttgagtcgcttctgccctcccgctgtgtgctcctgaactgcgtccgctctaggttaagtttaagctcaggtcgagac
cgggcctttgtccggcgctccttggagcctacctagactcagccggctctccacgcttgcctgacctgctgctcaactctacgtc
ttgtttctgcttctgttctgcgccgttacagatcgtcagcgccggcccaagctgtgaccggcgctacgctagacgccaccatggca
ggggctctgcttggctgcctgcttctcctgacactcttggcagaagccagggaagaatgaagagcttagcctgtatcaccatctctt
cgacaattatgatccagaatgccggccagttaggagacctgaggacactgtcaccatcacctcaaggtcacctaaccaacctc
atctcactgaacgagaagaagaactctgaccaccagtgtctggattggcattgactggcacgactatcgggtcaactacagcaa
ggacgattttgacgtgttaggaatcctccgggtcccttcagaacatgtatggctgccagagattgtctagaaaacaatattgatgggc
agtttggagtggcctacgacagcaatgttctagctatgagggaggctatgtgagctggttgcctccagccatctaccgcagcacctg
cgcagtggagggtcacctatttcccttggactggcagaactgctctctcattttcgtcccagacctacaatgctgaggaggtggagtt



catctttgccgtggatgacgacggcaataccatcaacaagattgacattgacacggcagctttaccgagaatggagaatgggcat
agactactgcccaggcatgattcgccgctatgaggagggttcacagaaggctcggagaaaactgacgtcatctatacgtcatcat
ccgccggaagccgctttttacgtcattaacatcattgtgccttgctgctcatttctggcttggtgctgctcgttacttctgcctg
aggctggtggccagaaatgcacggctctatcaacgtcctgtagcccagactgtcttctgtttctaattgccagaaaaattccagag
acttctctgagcgtgccactgctgggcaggtatcttatattgctcatggtggttggccacgctcattgtcatgaattgcgtcatcgtgctca
acgtatctttgaggacgccaacgactcatgctacatcccctcggtgctgccagattttattagagctgctccgctctcctgggctcg
agccccccccagaggatccccgaactgcctcaccagcagggcgtgcctcgtctgtgggcattctgctcagagcggaggagctca
tcttgaanaagccgaggagcgaactcgtgtttgagggtcagaggcatcgccacggaaacttgaccgcagccctctgccagaacctg
ggtgctgcagccccagaaatccgctgctgtgtggatgctgtgaactttgtggctgagagcacaagagaccaggaagccactggagag
gaactgtccgactgggtgctgtatggggaaggccctggacaatgtctgttttgggcagcttgggtgctcttcagcgttgggttctacttcat
cttcttgggggttacttcaaccaagtctctgatctcccttaccaccgctgcaccaaccacgcccggcgctacgggatctcggcggt
aggggagggcgcttttccaaggcagctctggagcatgcgcttagcagccccgctgggcacttggcgctacacaagtggcctctggcc
tcgcacacattccacatccaccggtaggcgccaaccggctccgttcttgggtggcccttcgcgccaccttctactcctccctagt
caggaagttcccccccgcccgagctcgcgtcgtgcaggacgtgacaaatggaagtagcacgtctcactagtctcgtgcagatgg
acagcaccgctgagcaatggaagcgggtaggccttggggcagcggccaatagcagcttgcctcctcgttcttgggctcagaggct
gggaagggggtgggtcggggggcgggctcaggggctcagggcgggggcgggcgccgaaggtcctcggaggcccgccgcatc
tgcacgcttcaaaagcgcacgtctgccgctgttctccttctcctcatctcgggccttctgatggccaagccttgtctcaagaaga
atccaccctcattgaaagagcaacggctacaatcaacagcatcccatctctgaagactacagcgtcgcagcgcagctctctcta
gcgacggccgcatcttactggtgtcaatgtatatcattttactgggggaccttgtgcagaactcgtggtgctgggcactgctgctgctg
cggcagctggcaacctgactgtatcgtcgcgcatcggaatgagaacaggggcatcttgagccctcggacgggtccgcagaggtg
cttctcgtatcgtcatcctgggatcaaagccatagtgaaagacagtgtgacagccgacggcagttgggattcgtgaattgctgcct
ctggttatgtgtgggagggttaactggtacctt

2) Sekwencja całego wektora

acgcgtgtagtcttatgcaatactctttagtcttgaacatggtaacgatgagtttagcaacatgccttacaaggagagaaaaagcac
cgtgcatgccgattggtggaagtaagggtgtacgatcgtgccttattaggaaggcaacagacgggtctgacatggattggacgaacca
ctgaattccgcattgcagagatattgtatttaagtgcttagctcgatacataaacgggtctctctggttagaccagatctgagcctggg
agctctctggctaactaggggaacccactgcttaagcctcaataaagcttgcttgagtgttcaagtagtgtgtgccgtctgttgtg
actctggttaactagatccctcagacccttttagtcagtgtgaaaaatctctagcagtgggcgccgaacagggacttgaaagcgaa
agggaaaccagaggagctctctgcagcaggactcggcttgcgtgaagcgcgcacggcaagaggcgagggggcggcgactggtgagt
acgcaaaaaattttagtagcggaggctagaaggagagatgggtgcgagagcgtcagtattaagcgggggagaattagatcgcg
atgggaaaaaattcggttaaggccagggggaaagaaaaatataaaataaaacatatagtgaggcaagcagggagctagaacgat
tcgcagttaatcctggcctgttagaaacatcagaaggctgtagacaaatactgggacagctacaacctccctcagacaggatcag
aagaacttagatcattatataatacagtagcaaccctctattgtgtcatcaaaggatagagataaaagacaccaaggaagcttag
acaagatagaggaagagcaaaacaaaagtaagaccaccgcacagcaagcggccactgatcttcagacctggaggaggagatat
gagggacaattggagaagtgaattatataaaatagaatgaataaattgaaccattaggagtagcaccaccaaggcaaaagagaa
gagtgggtgcagagagaaaaaagagcagtggggaataggagcttgttcttgggttcttgggagcagcaggaagcactatgggcgca
cgtaaatgacgtgacggtacaggccagacaattattgtctggtatagtgcagcagcagaacaatttctgagggctattgagggcga
acagcatctgttgaactcacagtctggggcatcaagcagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaac
agctcctggggatttggggtgctctggaaaactcattgcaccactgctgtgccttggaatgctagtggagtaataaatctctggaac
agatttggaatcacacgacctggtgagtgaggacagagaaattaacaattacacaagcttaatacactccttaattgaagaatcgc
aaaaccagcaagaaaaagaatgaacaagaattattggaattagataaatgggcaagtttgggaattggttaacataacaaattggct
tggtatataaaattattcataatgatagtaggaggcttgtaggttaagaatagttttgctgtacttctatagtgaatagagttaggca



gggatattcaccattatcgtttcagaccacccctcccaaccccgaggggaccgcagggcccgaaggaatagaagaagaaggtgg
agagagagacagagacagatccattcgattagtgaacggatctcgacgggtatcggttaacttttaaaagaaaaggggggattggggg
gtacagtgcaggggaaagaatagtagacataatagcaacagacatacaaaactaaagaattacaaaaacaaattacaaaattcaa
aattttatcgatactagtattatgccagttacatgaccttatgggactttcctactttggcagttacatctacgtattagtcatcgctattacc
atggtgatgcgggttttggcagttacatcaatgggctggtgatagcgggttgactcacggggatttccaagctccaccccattgacgtcaat
gggagtttgttttggcaccaaaatcaacgggacttttcaaaatgtcgtaaacaactccgccccattgacgcaaattgggcggtaggcgtg
tacgggtgggaggtttatataagcagagctcgttttagtgaaccgtcagatcgccctggagacgccatccacgctgtttgacctccataga
agattctagagctagcgaattcgaatttaaattcggatccgcggccgcgaaggatctgcgatcgctccgggtgcccgctcagtttcgaac
tcgaggggaattcatggccttaggggctgctgttctgcttctaggggtactcgggacgcccctcgccccaggcgcccgcgggtcggaa
gccgaaggccaactgattaagaaaacttttctcaactatgatagctcggtagggccggcgcggggaggtgggagaccgcgctcggggtc
agcatcggcctcacccctggcgcaactcatcagcctgaacgagaaggatgaagaaatgagcacaaaaggtgtacttagacctggagt
ggaccgactacaggttaagctgggaccccgacagaacatgatggcatcgatttctctcgcatacactgtcgaatccgtttggctccctga
tgtgtgtcgtcgtgaacaacaatgacggaaaatttcgacgttgccctggacatcaatgtttgtgtatctttcaggggctcgtgctgctggca
acccccctggcctgtaccgcagcagctgcagcatccaggtcacctaacttcccccttgactggcagaactgcacatgggtgttttagttcc
tacagctatgacagctctgaggtcagcctgaagacgggctggtacccctgaaggagagggagaggcaggaagtctacattcatgaagg
gaccttcattgagaatggccaatgggagattatccacaaaacttctaggttaatccaacttccaggggatcagagaggtgggaagga
agggcatcatgaggaagtattctctatctcattattcggcggaagcctctctctacctgggtcaacgtcattgccccatgcatcctcat
cacgctcctggccatctttgtcttctacctcccaccagatgcaggagagaagatggggctctccatctttgccctgctgacgctcactg
tgttcttgctgctgttggccgacaaaagtgcctgagacctcctggcggtgcccatcattatcaagtaacctcatgtttaccatggctcctgt
caccttctccgttatccttagtgtgtgtgctcctaacctgcatcatcgctcacccacacccaccaaatgcccttttgggtccgcag
atcttcattcacaaagctccctccatacctgggtctgaaggagcccaaacccgagagagaccaactccctgaaccacatcactctct
ttctccaagaagtggctggggcagaggaactgatgaatatttcatccggaagcctccaagtgttttctttccctaaacttaacaggtt
tcagcctgaatcatctgccccggacctgcgacgattatcgatggtccaacccgggctgtaggtctgcctcaggagctacgagaggt
catttctcaatcagctacatggcccgacagcttcagggaacaggaggaccacgacgcactgaaggaggactggcagtttgggcca
tggttgtggaccgtcttttctgtggacattcatcgttttcacaagcgtcgggacccctagtcattttcctagatgccacgtaccatttgccc
cctcctgaacctttcccttgaggatccgcggccgccttaggcctgcaggaatcaacctctggattacaaaatttgtgaaagattgact
ggattcttaactatgttgctcctttacgctatgtggatacgtcgtttaatgcctttgtatcatgctattgcttcccgatggctttcattttc
tcctccttgataaatcctgggtgctgtctctttatgaggagttgtggcccggtgtcaggcaacgtggcggtgtgtgactgtgtttgtgac
gcaacccccactggttggggcattgccaccacctgtcagctcctttccgggactttcgctttccccctccctattgccacggcggaac
tcatcgccgcctgcttggccgctgctggacaggggctcggctgttgggcactgacaattccgtggtgtgtgctgggggaaatcatcgctcc
ttccttggtgctcgcctgtgttggccacctggattctgcgcgggacgtccttctgctacgtcccttcggccctcaatccagcggacctt
ccttcccgcgccctgctgcccggctctgcggcctcttcgcgtctccgccttcgcctcagacgagtcggatctccctttgggcccgcct
ccccgccttagggaaggatctgcgatcgctccgggtgccgctcagtgggcagagcgcacatcgccacagtccccgagaagtgggg
gggagggggtcggaattgaacgggtgcctagagaaggtggcgcgggggtaaactgggaaagtgatgtcgtgtactggctccgcctttt
cccgaggggtgggggagaaccgtatataagtgcagtagtcgccgtgaacgttcttttcgcaacgggtttgccgcagaaacacagctg
aagcttcgagggggtcgcatctctccttcacgcgcccgcggccctacctgaggccgcatccacgccggttgagtcgcgttctgccg
cctccgcctgtggtgcctcctgaactgcgtccgcctgttaggtaagtttaaagctcaggtcgagaccgggctttgtccggcgctcc
cttgagcctacctagactcagccggctctccacgctttgcctgacctgtgtgctcaactctacgtctttgtttctgttctgctgc
cgttacagatcgtcgacggccggcccaagctgtgaccggcgctacgctagacgccaccatggcaggggctctgcttgggtgcctg
cttctcctgacactctttggcagaagccagggaagaatgaagagcttagcctgtatcaccatctcttcgacaattatgatccagaat
gccggccagttaggagacctgaggacactgtcaccatcacccctcaaggtcacccctaaccaacctcatctcactgaacgagaaag
aagaaaactctgaccaccagtgtctggttggcattgactggcacgactatcgggtcaactacagcaaggacgattttgcaggtgtagg
aatcctccgggtcccttcagaacatgtatgggtgccagagattgttctagaaaacaatattgatgggcagtttgaggtggcctacgaca
gcaatgttctagtctatgagggaggctatgtgagctggttgccccagccatctaccgcagcacctgcgcagtgagggtcacctatttt

ccctttagactggcagaactgctctctctctctctccagaccagactacaaatgctgaggagggtggaggttcatttgcctcggtgatgacgac
ggcaataccatcaacaagattgacattgacacggcagcttttaccgagaatggagaatggggccatagactactgccagggcatgatt
cgccgctatgaggggaggttccacagaaggctcttgagaaactgacgtcatctatacgctcatcatccgccggaagccgcttttttacg
tcattaacatcattgtgccttgcgtgctcatttctggccttggtgctgctcgcttacttctctgctgctgcgagggctggtggccagaaaatgcac
gggtctctatcaacgtcctgctagcccagactgtcttctgtttctaattgccagaaaaattccagagacttctctgagcgtgccactgct
gggcaggtatcttatattcgtcatggttggtggccacgctcattgtcatgaattgcgtcatcgtgctcaacgtatctttgaggacgccaacg
actcatgctacatcccctcggctgcgcccagattttattagagctgctgcccgcgtctcctgggctcgagccccccccagaggatccc
cgaaactgctcaccagcagggcgtgctcgtctgtgggcattctgctcagagcggaggagctcatcttgaaaaagccgcgggagcga
actcgtgtttgaggggtcagaggcatcggcacggaaactggaccgcagccctctgccagaacctgggtgctgcagccccagaaatcc
gctgctgtgtggatgctgtgaactttgtggctgagagcacaagagaccaggaagccactggagaggaactgtccgactgggtgctgat
gggggaaggccctggacaatgtctgtttttgggcagctttggtgctcttcagcgttggttctactctcatcttcttgggggttacttcaacc
aagtttctgatctcccttaccaccgtgcatccaaccacgcggcgctacggggtatctgcgggtagggggaggcgcttttcccaagg
cagtctggagcatcgctttagcagccccgctgggcacttggcgctacacaagtggcctctggcctcgcacacattccacatccac
cggtaggcgccaaccggctccgttcttgggtggcccccttcgcgccaccttctactctctcccctagtacggaagttcccccccgcccc
gcagctcgcgtcgtgcaggacgtgacaaatggagtagcacgtctcactagtctcgtgcagatggacagcacccgctgagcaatgga
agcgggtagggcctttgggggacgcggccaatagcagcttctccttcgcttcttgggctcagaggctgggaagggggtgggtccggggg
cgggctcaggggcggggctcaggggcgggggcgggcgccccgaaggtcctcggaggcccggcattctgcacgcttcaaaagcgcac
gtctgccgcgtgttctcctcttctcatctccgggcccccttcgatggccaagccttctcctcaagaagaatccaccctcattgaaagag
caacggctacaatcaacagcatccccatctctgaagactacagcgtcgccagcgcagctctctctagcgacggccgcacatcttca
gggtgcaatgtatatcattttactgggggaccttgtgcagaactcgtggtgctgggcactgctgctgctgcgggcagctggcaacctgact
tgtatcgctcgcgatcggaatgagaacaggggcatcttgagcccctgcggacgggtgccgacaggtgcttctcgcagtctgcacctggga
tcaaagccatagtgaaggacagtgtaggacagccgacggcagttgggattcgtgaattgtgccctctggttatgtgtgggaggggcta
actggtagctttaaagaccaatgacttacaaggcagctgtagatcttagccactttttaaagaaaagggggggactggaagggttaatt
cactcccaacgaagataagatctgcttttgccttgactgggtctctctggttagaccagatctgagcctgggagctctctgggtaacta
gggaacccactgcttaagcctcaataaagcttgccttgagtgttcaagtagtgtgtgccgctctgttgtgtgactctggttaactagaga
tccctcagacccttttagtcagtgtggaaaaatctctagcagtagtagttcatgtcatcttattattcagtattttataacttgcaaagaaatg
aatatcagagagtgaagggaactgtttattgcagcttataatggttacaaataaagcaatagcatcacaatttcacaaataaagcat
tttttcactgcattctagtgtgtgttgtccaaactcatcaatgtatcttatcatgtctggctctagctatccgcccccctaactccgcccat
ccgcccccctaactccgccagttccgccattctccgccccatggctgactaattttttttatgacagaggccgaggccgcctcg
gcctctgagctattccagaagtagtgaggaggcctttttggaggccctagacttttgagagaccaaattcgaatcatgtcatagctgtt
cctgtgtgaaattgttatccgctcacaattccacacaacatacagagccggaagcataaagtgtaaagcctgggggtgcctaataagtg
agctaactcacattaattgcgttgcgctcactgcccgtttccagtcgggaaacctgtcgtgccagctgcattaatgaatcgccaac
gcgcgggggagaggcggtttgcgtattggcgctcttccgcttctcgtcactgactcgtcgcgtcggctgttcgggtgcggcgagcg
gtatcagctcactcaaaggcggttaatacgggtatccacagaatcaggggataacgcaggaagaacatgtgagcaaaaggccagc
aaaaaggccaggaaccgtaaaaaggccgcgttgctggcgtttttccataggctccgccccctgacgagcatcacaaaaatcgacg
ctcaagtgcagaggtggcgaaaccgcagggactataaagataccaggcggttccccctggaagctccctcgtgcgtctcctgttcc
gaccctgccgcttaccggatacctgtccgcctttctcccttcgggaagcgtggcgcttctcatagctcacgctgtaggtatctcagttc
gggtgtaggtcgttcgctccaagctgggctgtgtgcacgaacccccgttcagccccagcgtgcgccttatccggtaactatcgctt
gagtccaacccggtaagacacgacttatcgccactggcagcagccactggtaacaggattagcagagcgagggtatgtaggcggtgc
tacagagttctgaagtggtggcctaactacggctacactagaagaacagtatttggtatctgcgctcgtcgtgaagccagttacctcg
gaaaaagagttggtagctcttgatccggcaacaaaccaccgctggtagcgggtggtttttgtttgcaagcagcagattacgcgcag
aaaaaaaaggatctcaagaagatccttgatctttctacgggggtcgtacgctcagtggaacgaaaactcacgttaagggtatttggtca
tgagattatcaaaaaggatcttcacctagatccttttaaattaaaaatgaagtttaaatacaatcaaaagtatatatgagtaaaactggtc
tgacagttaccaatgcttaatcagtgaggcacctatctcagcgatctgtctatttctgttcatccatagttgcctgactccccgctcgtgtag

ataactacgatacgggagggccttaccatctggccccagtgctgcaatgataccgcgagacccacgctcaccggctccagattatc
agcaataaaccagccagccgggaagggcggagcgcagaagtggtcctgcaactttatccgcctccatccagcttattaattgttgccg
ggaagctagagtaagtagttccagtttaagtttgcgaacgttggtgcatgctacaggcatcgtggtgtcacgctcgtcgtttgtt
atggcttcattcagctccggttcccaacgatcaaggcgagttacatgatccccatgttgcaaaaaagcggttagctccttcgggtcc
tccgatcgttgctcagaagtaagttggccgcagtggttatcactcatggttatggcagcactgcataattcttactgtcatgccatccgta
agatgcttttctgtgactggtgagtactcaaccaagtcattctgagaatagtgtatgcggcgaccgagttgctcttggccggcgtaata
cgggataataccgcgccacatagcagaactttaaaagtctcatcattggaaaaacgttcttcggggcgaaaaactctcaaggatctta
ccgctgttgagatccagttcgtatgaaccactcgtgcacccaactgatcttcagcatcttttactttaccagcgtttctgggtgagca
aaaacaggaagggcaaaatgccgcaaaaaaggggaataagggcgacacggaaatgttgataactcatactcttcttttcaatattatt
gaagcatttatcaggggtattgtctcatgagcggatacatatttgatgtatttagaaaaataaacaataggggttccgcgcacattc
cccgaaaagtgccacctgacgtctaagaaaccattattatcatgacattaacctataaaaaataggcgatcacaggcccttctgtct
cgcgctttcgggtgatgacgggtgaaaacctctgacacatgcagctcccggagacgggtcacagcttctgtgaagcgggatccggggag
cagacaagcccgtcagggcgctcagcgggtgttgccgggtgtcggggctggcttaactatgcggcatcagagcagattgtactgag
agtgcaccatgatcggtgtgaaataccgcacagatgcgtaaggagaaaaataccgcacagcgccattcgccattcaggctgcgca
actgttgggaagggcgatcggtgcgggcctcttcgctattacgccagctggcgaaaagggggatgtgctgcaaggcgattaagttgggt
aacgccagggtttccagtcacgacgttgtaaaacgacggccagtgcgaagctg

Wektor LV-CMV-Chrna1--WPRE-EF1-Chrnd-PGK-PURO

1) Sekwencja transgenu

cgataagcttgggagttccgcgttacataacttacggtaaatggccgcctggctgaccgccaacgacccccgccattgacgtc
aataatgacgtatgttcccatagtaacgccaatagggactttccattgacgtcaatgggtggagattttacggttaaactgccacttgg
cagtacatcaagtgtatcatatgccaagtacccccctattgacgtcaatgacggttaaatggccgcctggcattatgccagttacat
gaccttatgggactttcctacttggcagttacatctacgtattagtcacgtctattaccatgggtgatcggttttggcagttacatcaatggg
cgtggatagcgggttctacacggggatttccaaagtctccacccattgacgtcaatgggagttgttttggcaccaaaatcaacggga
ctttccaaaatgtcgtacaactccgccccattgacgcaaatgggcggttaggcgtgtacgggtgggaggtctatataagcagagctcgt
ttagtgaaccgtcagatcgctggagacgccatccacgtgttttgacctccatagaagacaccgactctactagaggatctatttcc
gggtgaattcctcagcctcaggggaattcatggagctctcagctgttctcctgctgtaggcctctgctccgctggccttcttctgggctc
cgaacatgagacgcgtctggtggcaagctctttgaagactacagcagtgtagtccggccagtgaggaccaccgtgagattgtaca
agtccacgtgggtctacagctgatccagcttatcaatgtggatgaagtaaatcagattgtgacaaccaatgtacgtctgaaacagcaa
tggtgctgattacaacttgaaatggaatccagatgactatggaggagtgaaaaaattcacatccccctcggaagagatctggcggccg
gacgtcgttctctataacaacgcagacggcgactttgccattgtcaaattcaccaaggtgctcctggactacaccggccacatcacc
tggaacaccgccagccatctttaaagctactgtgagatcattgtcactcactttcccttcgatgagcagaactgcagcatgaagctgg
gcacctggacctatgacggctctgtggtggcattaacccggaaagtaccagcccgacctgagtaactcatggagagcggggag
tggtgatcaaggaagctcggggctggaagcactgggtgttctactcctgctgccccaccactccctacctggacatcacctaccac
ttcgtcatgcagcgctgcccctctacttcattgtcaacgtcatcttccctgcctgctcttctccttctaaccagcctggtgttctacct
gccacagactcaggggagaagatgacgtgagcatctctgttactgtccctgaccgtgttctccttctggtcattgtggagctaacc
cttccacctccagcgtgtgcccctgatcgggaagtatatgttgttaccatgggtcttctgattgctccatcatcatcaccgtcatcgt
catcaacacacaccaccgttcgcccagcaccacatcatgcccgagtggtgagggaaggttttatcgacactatcccaacatc
atgttttctccacaatgaaaagaccatccagagataaacaagagaaaaggattttacagaagacatagatatctgacatctctg
ggaagccgggtcctccacctatgggcttctactctccgctgatcaagcaccctgaggtgaaaagcgccatcgagggcggtgaagtac
attgcagagaccatgaagtcagaccaggagccaataacgccgctgaggaatggaagtattgtccatgggtgatggatcacatctc
ctcggagcttttatgctggtgtgtctcatcgggacgctggctgtgttcaggctcggtcattgagttacatcaacaaggatgacctaggt
tcgaaggatccaatcaacctctggattacaaaattgtgaaagattgactggtattcttaactatgttgccttttacgctatgtggatac



gctgctttaatgctcttgcattgcttccgctatggctcttctctctctctgtataaatcctggttgcctgtctcttattgagggag
ttgtggcccgttgcacggcaacgtggcgtgggtgtgactgtgttgctgacgcaacccccactggttggggcattgccaccacctgtca
gctcctttccgggactttcgctttccccctccctattgccacggcggaactcatcgccgcctgccttggccgctgtctggacaggggct
cggctgttggggcactgacaattccgtgggtgtgtcgggggaagctgacgtcctttccatggctgtctgcctgtgttggccacctggattctgc
cggggacgtccttctgctacgtcccttcggccctcaatccagcggaccttctctccgcggcctgtctccggctctgcggcctcttcc
gcgtcttcgccttcgccctcagacgagtcggatctccctttggggccgcctccccgcactagtaaggatctcgccggcgggcgatcgct
ccgggtgcccgtcagtgggcagagcgcacatcgcccacagtccccgagaagttggggggaggggtcggcaattgaacgggtgccta
gagaaggtggcgcggggtaaaactgggaaaagtgtgtgtgtactggctccgcctttttccgaggggtgggggagaaccgtatataagt
gcagtagtcgcctgaacgttcttttgcgaacgggtttgcccgcagaacacagctgaagcttcgaggggctcgcatctctccttcac
cgccccgcgcctcacttgaggccgcctaccacgcgggttgagtcgcgttctgcgcctccgcctgtgtgtgcctcctgaactgcgt
ccgcctgtatagtaagttaaagctcaggtcgagaccggcctttgtccggcgctcccttgagacctactagactcagccggctctc
cacgctttgcctgacctgctgtcactctacgtctttgtttctgttctgcgccgttacagatcatgcatttaattaacaagctg
tgaccggcgccctactctagcatggcagggcctgtgtctacactggggctgtcggctgccttgtgtgtgtgcctcccaggcagttgg
ggcctgaatgaggaacaaaggctgatccagcacctattcaatgagaagggtacgacaaagacctgcggccgggtggctcgaaagg
aggacaaaagtggatgtcgccctaagtctcacctctccaacctcatctccctgaaagaagtggaggagacctcaccaccaacgt
gtggatagatcatgcctgggtagacagccgtctacagtgggatgccaacgacttcgggaacatcactgtcctgcgcctgccccctga
catggtgtggctaccagagattgtactggagaacaacaatgatggctcgttcagatttcttatgcctgcaatgtgcttgcctatgactcg
ggctatgtgacctggctgcgcgcccatcttcgctcctcctgccccatctcagtcacctacttcccttgcactggcagaactgct
ccctcaaattcagttcactcaagtatacagccaaggagatcacacttagcctgaagcaggaggaggaaaaacaaccgctcttacc
catcgagtggatcatcattgacctgaagggttacagagaacgggtgagtgaggagatagtgcatcgggcagccaagctcaatgtgga
ccccagtgtccgatggacagcaccaaccaccaagatgtcaccttctaccttatcatcgcgcgcaagccctcttctacatcatca
acattctggtacctctgcgtgtctatctcttcatgatcaacctagtcttctacctgccaggcgactgtggagagaagacctccgtggcc
atctcagtgtcctggccaatctgtcttctgtctgttatctccaagggtgcgggccacttccatggccatcccttggtaggcaa
gttctctgttttcggcatgggtgtcggtcacatgtgtgtgtgtgtatctgtgtcatcgtactgaacatccacttccggacgccagcaccca
tgtgtgtgtcaggggagtaagaagtcttctcgtggagacctgcccaagctcctgcacatgtcccgccagcagagggaagaccag
gccccagggtctcatcgggagaagcagctctctgggatacatctgcaaagcagaggagtatttctacttaagtcccgcagtacc
tcatgtttgagaagcaatcagagcggcatggggctggccccggcgctcaccacagcccgacggcctccagcaagctctgagcaggt
ccaacaggagctcttcaatgagatgaagccagctgtggatggggcaaaacttcatcgtcaaccatagagagacaaaacagttaca
atgaggagaaggacaactggaaccaggtggccgcacagtggaccgtctctgcctgtttgtggtgacaccgctcatggtgggtgggca
cagcctggatcttctgcagggtgtctacaaccagccccactccagcctttccctggggaccccttctctatagcgaacaggac
aagcgcttcatcgcggccgcttctagagcggccgctgggttaggggaggcgcttttccaaggcagcttgaggcatgcgcttagcag
ccccgctgggcacttggcgctacacaagtggcctctggcctcgcacacattccacatccaccgtaggcgccaaccggctccgttc
tttggtggcccccttcgcgccaccttctactcctccctagttaggaagttccccccgccccgcagctcgcgtcgtgcaggacgtga
caaatggaagtagcacgtctcactagtctcgtgcagatggacagcacccgtgagcaatggaagcgggtagggccttggggcagcgg
ccaatagcagctttgtccttctgttctgtgggtcagaggctgggaagggggtgggtccggggggcgggctcagggggcgggctcagggggc
ggggcgggcgccccgaaggtctccggaggcccgccattctgcacgcttcaaaagcgcacgtctgccgcgtgttctccttctccta
tctccgggccttctgcgggatgaccgagtacaagcccacgggtgcgcctcgccaccgcgacgacgtcccaggggccgtacgca
ccctcgccgccggttcgccgactaccccgccacgcgccacaccgtcgatccggaccgccacatcgagcgggtcaccgagctg
caagaactcttctcacgcgcgtcgggctcgacatcggcaaggtgtgggtcgcggacgacggcgccgcggtggcggtctggaccac
gcccggagagcgtcgaagcggggggcggtgttcgccgagatcgcccgcgcatggccgagttgagcgggttccgggtggccgcgag
caacagatggaaggcctccttgccgcccacccggcccaaggagcccgcgtggttcttgccaccgtcggcgtctcggccgaccac
caggggcaagggtctgggcagcgcgcgtcgtgtcctcccgagtgaggggcgccgagcgcgcgggggtgcccgccttcttgagacct
ccgcgccccgcaacctcccccttctacgagcggctcggcttcaccgtcaccgcccagctcgagggtgcccgaaggaccgcgcacct
ggtgcatgaccgcgaagcccgggtgcctgaatctaggtcgacaatcacgcg

2) Sekwencja całego wektora

tggaagggctaattcactcccaaagaagacaagatatccttgatctgtggatctaccacacacaaggctacttccctgattagcaga
actacacaccagggccaggggtcagatatccactgacctttggatgggtgtacaagctagtaccagttgagccagataaggtagaa
gaggccaataaaggagagaacaccagcttgttacaccctgtgagcctgcatgggatggatgacccggagagagaagtgttagagt
gaggtttgacagccgcttagcatttcacgtggcccgagagctgcatccggagtacttcaagaactgtgatatcgagcttgctac
aagggaactttccgctggggactttccagggaggcgtggcctgggaggactggggagtggcgagccctcagatcctgcataaagca
gctgctttttgctgtactgggtctctctggttagaccagatctgagcctgggagctctctggctaactagggaaaccactgcttaagcc
tcaataaagcttgcttgatgttcaagtagtgtgtgcccgtctgtgtgactctggttaactagagatccctcagacccttttagtca
gtgtggaaaatctctagcagtgccgcccgaacagggaactgaaagcgaaagggaaccagaggagctctctcgacgcaggactcg
gcttgctgaagcgcgcacggcaagaggcgagggcgaggactggtgagtagccaaaaatttgactagcggaggctagaaggag
agagatgggtgagagagcgtcagtattaagcgggggagaattagatcgcatgggaaaaattcggtaaggccagggggaaagaa
aaaatataaattaaaacatatagtagggcaagcaggagctagaacgattcgagttaatcctggcctgttagaaacatcagaagg
ctgtagacaaatactgggacagctacaaccatcccttcagacaggatcagaagaacttagatcattatataacagtagcaaccct
ctattgtgtgcatcaaaggatagagataaaagacaccaaggaagctttagacaagatagaggaaagacaaaacaaaagtaagacc
accgcacagcaagcggccggcgtgatcttcagacctggaggaggagatatgagggacaattggagaagtgaattatataaatat
aaagtagtaaaaattgaaccattaggagtagcaccaccaaaggcaagagaagagtgggtgcagagagaaaaagagcagtgggga
ataggagctttgtccttgggtcttgggagcagcaggaagcactatgggagcagcgtcaatgacgctgacggtacaggccagacaat
tattgtctggtatagtgacgagcagaacaattgtgagggtattgaggcgcaacagcatctgttgaactcacagtctggggcatc
aagcagctccaggcaagaatcctggctgtggaaagatacctaaggatcaacagctcctggggatttggggtgctctggaaaactc
atttgaccactgctgtgcttggaatgctagtgtgagtaataaatctctggaacagatttggaaacacacgacctggatggagtggga
cagagaaattaacaattacacaagcttaatacactcctaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattat
tggaattagataaatgggcaagtttgggaattgtttaacataacaaattggctgtggtatataaaattattcataatgatagtaggagg
cttggttaggttaagaatagttttgctgtactttctatagtgaaatagtagtaggcagggatattcaccattatcgttcagaccacctcc
caaccccgaggggacccgacagggcccgaaggaatagaagaagaggtggagagagagacagagacagatccattcgattagt
aacggatctcgacggatcgctttaaaagaaaaggggggattggggggtagcgtgcaggggaaagaatagtagacataatagcaa
cagacatacaaaactaaagaattacaaaaacaaattacaaaaatttccgggtttattacaggggacagcagagatccagttt
atcgataagcttgggagttccgcttacataacttacggtaaatggcccgcctggctgaccgccaacgacccccgcccattgacgt
caataatgacgtatgttccatagtaacgccaatagggactttccattgacgtcaatgggtggagtattacggtaaaactgccacttg
gcagtacatcaagtgtatcatatgccaaagtacccccctattgacgtcaatgacggtaaatggccgcctggcattatgccagtac
atgaccttatgggactttcctacttggcagtagcatctacgtattagtcacgtattacatgggtgatcggttttggcagtagcatcaatgg
gcgtggatagcgggttactcacggggatttcaagtctccacccattgacgtcaatgggagttgttttggcaccaaaatcaacggg
actttccaaaatgtcgtacaactccgcccattgacgcaaatggcggttaggcgtgtacggtgggaggtctatataagcagagctc
gttttagtaaccgtcagatcgctggagacgccatccacgctgtttgacctccatagaagacaccgactctactagaggatctattt
ccggtgaattcctcgagcctcgaggggaattcatggagctctcgactgttctctgctgtaggcctctgctccgctggccttgttctggg
ctccgaacatgagacgctgtggtggcaagctctttgaagactacagcagtgtagtccggccagtgaggaccacctgagattgt
acaagtcaccgtgggtctacagctgtacagcttatcaatgtggatgaagtaaatcagattgtgacaaccaatgtacgttgaacag
caatgggtcgattacaactgaaatggaatccagatgactatggaggagtgaaaaaaattcacatcccctcgaaaaagatctggcgg
ccggacgtcgttctctataacaacgcagacggcgactttgccattgtcaaatcaccaggtgctcctggactacaccggccacatc
acctggacaccgccagccatctttaaagctactgtgagatcattgtcactcactttcccttcgatgagcagaactgcagcatgaagc
tgggcacctggacctatgacggctctgtgtggccattaacccggaaagtgaccagcccagcctgagtaacttcagtagagcggg
gagtggtgtatcaaggaagctcggggctggaagcactgggtgttctactcctgctgccccaccactccctacctggacatcacctac
cacttcgtcatgcagcgcctgcccctctacttcattgtcaacgtcatcttccctgctgcttctctctttaaaccagcctggttct
acctgccacagactcaggggagaagatgacgctgagcatctctgttactgtccctgaccgttccctctggtcattgtggagcta



atcccttccacctccagcgctgtgcccctgatcggggaagtatatgtgttcaccatggctttgtcattgctccatcatcatcaccgtc
atcgatcatcaacacacaccaccgttcgcccagcaccacatcatgcccgagtggtgctggaaggttttatcgacactatccaaa
catcatgttttctccacaatgaaaagaccatccagagataaacaagagaaaaggattttacagaagacatagatatatctgacatc
tctgggaagccgggtctccacatgggctttcactctccgctgatcaagcaccctgaggtgaaaagcgccatcgagggcggtgaag
tacattgcagagaccatgaagtcagaccaggaggtccaataacgcgcgtgaggaatggaagtatgttgcacgtggtgatggatcacatc
ctcctcgaggtctttatgctggtgtgtctatcgggacgctggctgtgttgcaggtcggtcattgagttacatcaacaaggtatgaccta
ggttcgaaggatccaatcaacctctggattacaaaaattgtgaaagattgactggtattcttaactatgttgccttttacgctatgtgga
tacgctgcttaaatgcctttgtatcatgctattgcttcccgtatggctttcattttctccttgtataaatcctggtgtgtctctttatgag
gagttgtggccggtgtcaggaacgtggcggtgtgtgactgtgttgcagcaacccccactggttggggcattgccaccacctg
tcagctcctttccgggactttcgctttccccctccctattggcacggcggaactcatcgccgctgcttggccgctgctggacaggg
gctcggtgttgggactgacaattccgtggtgtgtcggggaagtgacgtcctttccatggctgctcgctgtgttgcacctggattc
tgcgcgggacgtccttctgctacgttccctcgccctcaatccagcggaccttccctcccgcgctgctgcccgtctgcccgtct
tccgcttctcgcttccctcagacgagtcggatctcctttgggcccctcccgcactagtaaggatctcgcggcggtgac
gctccggtgcccgtcagtgaggcagagcgcacatcgcccacagtccccgagaagttggggggagggtcggcaattgaacgggtgc
ctagagaaggtggcggggtaactgggaaagtgtgctgtactggctccgcctttttccgaggggtgggggagaaccgtatata
agtgcagtagtcgctgaacgttcttttgcacgggttggccgagaacacagctgaagcttcgaggggctgcacatctccttc
acgcgcccgcgcctacctgaggccgcatccacgcgggtgagtcgcttctgcccctcccgcctgtggtgcctcctgaactg
cgctccgcttaggttaagttaaagctcaggtcgagaccgggcttctgcccgcctccttggagcctacctagactcagccggct
ctccacgctttgcctgacctgcttgcactctacgtcttttctgttctgctgcccgttacagatcatgcatttaattaacaag
ctgtgaccggcgctactctagcatggcaggcgctgtgctcacactgggctgctgctgcccctgtgtgtgcccctccaggcagt
tggggcctgaatgaggaacaaaggctgatccagcacctattcaatgagaagggtacgacaaagacctgcccgggtggctcga
aggaggacaaagtggatgtcgcctaagtctcacctctccaacctcatctcctgaaagaagtggaggagacctcaccaccaa
cgtgtgtagatcatgcctgggttagacagccgtctacagtgggatgccaacgacttcgggaacatcactgtcctgcgcctgcccc
tgacatggtgtggctaccagagattgtactggagaacaacaatgatggctcgttccagatttctatgcctgcaatgtgctgtctatgac
tcgggctatgtgacctggctgcccgcctccttccgctcctcctgccccatctcagtcacctacttcccttgcactggcagaact
gctccctcaaattcagttcactcaagtatacagccaaggagatcacacttagcctgaagcaggaggaggaaaacaaccgctcttac
cccatcgagtggatcatcattgacctgaaggtttcacagagaacgggtgagtgaggagatagtcacgggcagccaagctcaatgtg
gacccagtgctccgatggacagcaccaaccaccaagatgtcaccttctaccttatcatccgcgcaagcccccttctacatcat
caacattctggtacctgcgtgctcatctcctcatgatcaacctagtcttctacctgccaggcgactgtggagagaagacctccgtg
gccatctcagtgtcctgcccgaatctgttctctgctgcttatctccaagaggctgcccggcacttccatggccatcccctggtagg
caagttcctgcttttggcatggtgctggtcaccatggtggtggtgatctgtgtcatcgtactgaacatccacttccggacgccagcac
ccatgtgctgtctgaggagtcagaagtcttctgagaccctgcccagctcctgcacatgtcccggccagcagaggaagacc
caggccccagggtctcatccggagaagcagctctctgggatacatctgaaaagcagaggagtatttctacttaagtcccgcagt
acctcatgtttgagaagcaatcagagcggcatgggctggccggcgctcaccacagcccgcaggcctccagcaagctctgagca
ggtccaacaggagcttctcaatgagatgaagccagctgtggatggggcaaaacttcacgtcaacatagagagacaaaacagtt
acaatgaggagaaggacaactggaaccaggtggccgcacagtggaccgtctctgcctgtttgtgtgacaccgtcatggtgtgtg
gcacagcctggatcttctgcagggtgtctacaaccagccccactccagccttccctggggaccccttctctatagcgaacag
gacaagcgttcatcgccgcttctagagcggcgctgggtaggggaggcgcttttccaaggcagtctggagcatgcgcttag
cagccccgtgggacttggcgctacacaagtggcctctggcctcgcacacattccacatccaccgtaggcgccaaccggctcc
gttcttgggtggcccttgcgcccacttctactcctccctagtcaggaaagttccccccgccccgcagctcgctgctgcaggac
gtgacaaatggaagtagcacgtctcactagtctcgtgcagatggacagcaccgctgagcaatggaagcgggtaggcctttggggcag
cggccaatagcagctttgctccttgccttctgggctcagaggctgggaagggtgggtccggggcggggtcagggcggggtcagg
ggcgggcgggcgcccgaaggtcctccggaggccggcattctgcacgttcaaaagcgcacgtctccgcgctgttctcctcttc
ctcatctccgggcttctgcccgggatgaccgagtacaagcccacgggtgcgcctcgccaccgcgacgacgtcccaggggccta



cgccccctcgccgcccgttcgcccactacccccgccacgcgccacaccgtcgatccggaccgccacatcgagcgggtcaccga
gctgcaagaactcttctcacgcgcgtcgggctcgacatcggaaggtgtgggtcgccggacgacggcgccgcgggtggcgttggga
ccacgcccggagagcgtcgaagcggggggcgggtgttcgcccagatcgcccgccgcatggccgagttgagcgggtcccggtggccgc
gcagcaacagatggaagcctcctggcgccgcaccggcccaaggagcccgcgtggttcctggccaccgtcgggcgtctcgcccga
ccaccagggcaagggtctgggcagcgcgctcgtgctccccggagtgaggggcggccgagcgcgcccgggtgcccgccttcctggag
acctccgcgccccgcaacctccccctctacgagcggctcggttcaccgtcaccgcccagctcgaggtgcccgaaggaccgcgc
acctgggtgatgacccgcaagcccgggtgcctgaatctaggtcgacaatcacgcgtctggaacctggaattaattctgcagtcgagac
ctagaaaaacatggagcaatcacaagtagcaatacacgagctaccaatgtgattgtgcctggctagaagcacaaggaggaggag
agggtgggttttccagtcacacctcaggtaccttaagaccaatgacttacaaggcagctgtagatcttagccactttttaaagaaaag
aggggactggaagggttaattcactcccaacgaagacaagatatccttgatctgtggatctaccacacacaaggctacttccctgat
tagcagaactacacaccagggccaggggtcagatatccactgacctttggatgggtctacaagctagtagtaccagttgagccagataa
ggtagaaggagccaataaaggagagaacaccagcttgttacacctgtgagcctgcatgggatggatgacccggagagagaagtgt
tagagtggaggtttgacagccgccttagcatttcacacgtggcccagagctgcatccggagtactcaagaactgctgatatcgagc
ttgctacaagggactttccgctggggactttccaggggagcgtggcctggggcgggactggggagtggtggcagccctcagatcctgcata
taagcagctgcttttgcctgtactgggtctctctggttagaccagatctgagcctgggagctctctggctaactaggaacccactgct
taagcctcaataaagcttgccttgagtgttcaagtagtgtgtgccgtctgttgtgtgactctggttaactagagatccctcagaccctt
tagtcagtggtgaaaatctctagcagtagtagttcatgtcatcttattattcagtttataacttgcaagaaatgaatatcagagagt
agaggccttgacattgtagcgtttaccgtcgacctctagctagagcttggcgtaatcatggctatagctgttccctgtgtgaaattgtat
ccgctcacaattccacacaacatacagaccggaagcataaagtgtaaagcctgggggtgcctaatagtgagctaaactcacattaat
tgcgttgccgtcactgcccgtttccagtcgggaaacctgtcgtgccagctgcattaatgaatcggccaacgcgcggggagaggcgg
tttgcgtattggcgctcttccgcttctcgtcactgactcgtcgcctcggtcgttcggctcgggcgagcgggtatcagctcactaaa
ggcggtataacggttatccacagaatcaggggataacgcaggaagaacatgtgagcaaaaggccagcaaaaggccaggaaccg
taaaaaggccgcgttgctggcgttttccataggctccgccccctgacgagcatcacaaaaatcgacgtcaagttagaggtggc
gaaacccgacaggactataaagataaccaggcgtttccccctggaagctccctcgtcgcgtctcctgttccgacctgcccgttaccg
gatacctgtccgcttctccttcgggaagcgtggcgcttctcagatcgcgtgtaggtatctcagttcggtgtaggtcgttcgctc
caagctgggctgtgtgcacgaacccccgttcagccgaccgtcgccttatccgtaactatcgttcttgagccaacccggttaag
acacgacttatcgccactggcagcagccactggtaacaggattagcagagcaggtatgtaggcgggtgctacagagttctgaagt
gtggcctaactacggctacactagaagaacagtatttggtatctgcgtctgtgaagccagttaccttcggaaaaagagttggtagct
cttgatccggcaaaacacaccgctggtagcgggtgtttttgtttgcaagcagcagattacgcgcagaaaaaaaggatctcaag
aagatccttgatcttttctacggggctgacgctcagtggaacgaaaactcacgttaagggttttggctatgagattacaaaaagga
tcttcacctagatccttttaattaaaaatgaagtttaaatcaatcctaagtatatatgagtaaaacttggtctgacagttaccaatgctta
atcagtgaggcacctatctcagcgtatgtctatttctgtcatccatagttgcctgactccccgtcgttagataactacgatacgggag
ggcttaccatctggccccagtgctgaatgataccgcgagacccacgtcaccggctccagattatcagcaataaacagccag
ccgggaaggccgagcgcagaagtgggtcctgcaactttatccgcctccatccagctatttaattgttgcgggaagctagagtaagtag
ttcgccagttaatagtttgcgaacgttggccattgtctacaggcatcgtggtgtcacgctcgtcgttggtaggttcattcagctccg
gttccaacgatcaaggcgagttacatgatccccatgttgtgcaaaaaagcggttagctccttcggctcctccgatcgttgcagaagt
aagttggccgagtggttatcactcatggttatggcagcactgcataattcttactgtcatgccatccgtaagatgctttctgtgactgg
tgagtactcaaccaagtattctgagaatagtgatcgggcgaccgagttgctcttggccggcgtcaatacgggataataccgcgcca
catagcagaactttaaagtgtcatcattggaaaacgttcttcggggcgaaaactctcaaggatcttaccgctgttgagatccagttc
gatgtaaccactcgtgcacccaactgatcttcagcatctttactttaccagcgtttctgggtgagcaaaaacaggaaggcaaaat
gccgcaaaaaagggaataaggcgacacggaaatgtgaatactcatactcttcttttcaatattattgaagcatttatcagggttat
tgtctcatgagcggatacatattgaatgtatttagaaaaataaacaataagggttccgcgcacatttccccgaaaagtccacctg
acgtcgacggatcgggagatcaactgtttattgcagcttataatggttacaaataaagcaatagcatcacaaatttcacaaataaag
cattttttcactgcattctagttgtgtgttgcataactcatcaatgtatcttatcatgtctggatcaactggataactcaagctaacc



aatcatcccaaacttcccaccccataccctattaccactgccaattacctgtggtttcatttactctaaacctgtgattcctctgaatta
ttttcattttaaaagaaattgtatttgttaaataatgtactacaaacttagtagtttttaaagaaattgtatttgttaaataatgtactacaaactta
gtagt



NARODOWE CENTRUM NAUKI

Projekt został sfinansowany ze środków Narodowego Centrum Nauki
przyznanych na podstawie decyzji nr DEC-2024/52/C/NZ3/00219

Strona 1 z 4

Sieć Badawcza Łukasiewicz – PORT Polski Ośrodek Rozwoju Technologii
54-066 Wrocław, ul. Stabłowicka 147, Tel: +48 71 734 77 77,
E-mail: sekretariat@port.lukasiewicz.gov.pl | NIP: 894 314 05 23, REGON: 386585168
Sąd Rejonowy dla Wrocławia – Fabrycznej we Wrocławiu, VI Wydział Gospodarczy KRS,
Nr KRS: 0000850580



Sekwencja 1

AGGGACACAGGATGGGGCAGCTGCCTCCCCACCCCCACAGCAGGGGCAGAGGATTAGGTGACA
GTCCCCAAACCTAGCCCGAACTAACACCCTCCTCCCCTTCACACAGGCACCTTGGCCTGTTCCCT
CAAGCTTGTCAAAGCTCAGAATAACCTGAGAACCAGACATCAGGggagtcgctgcgcgctgccttcgccccgtg
ccccgctccgcccgcctcgcgcgccccgccccggctctgactgaccgcgttactcccacaggtgagcggggcgggacggccct
tctcctccgggctgtaattagctgagcaagaggttaagggttaagggtggttggtgggttattaatgtttaattacctggagcacc
tgctgaaatcacttttttcagactagtgcacgcgCGGCCGCGAGCTCctcagagtctagaGAATTCGTCGACTGGATC
CGGTACCGAGGAGATCTGGCCGGCCCATATGGCTAGCGcctACCGGTatcgatacgcgagccaccgcctgg
ctgcctacgtccatggcgcggcagcctggactccgcccggccagcgggggagacgacgcgctccccgaagacgcggaggccaaa
ggggaggccgagggggaggtagagagcagggtcggggaagaagagagcagacggaggtagacagtgagtcggaagaagagag
cgagaccgaggaagacagtgaggatgagagtgacgaggagagtgaaagacacgcgaggaagagatggaggatgagcagagaga
gcgaggcgggaagaagacaaccaagaagaagggaatcagaggcagaaggagaaactgaggcagaaagcgaatttgacccccga
aatagaaatggaagcggagagagtgccaagagggaagtgtccagaccatgggctggattgagcacctattgtcaggaagataggc
agctcatctgtgtcctgtgtccagtcattggggctcaccggggccaccagctgtccacgctggacgaagccttcgaagaactgagaa
gcaaactcgggtggactgaaggcagcaatgatagagttgggtgaaagggttaagttcacgagctcagaccctaaagtaactcga
gaccagatgaagatatttatacagcaagaatttaagaaagttcagTGTATCTTAAATCAACCTCTGGATTACAAAATTTGT
GAAAGATTGACTGGTATTCTTAATATGTTGCTCCTTTTACGCTATGTGGATACGCTGCTTTAATGCCTTTG
TATCATGCTATTGCTTCCCGTATGGCTTTCATTTCTCCTCCTTGATAAATCCTGGTTGCTGTCTCTTTATG
AGGAGTTGTGGCCCGTTGTCAGGCAACGTGGCGTGGTGTGCACTGTGTTTGCTGACGCAACCCCCA
CTGGTTGGGGCATTGCCACCACCTGTCAGCTCCTTCCGGGACTTTCGCTTTCCTCCTCCTATTGC
CACGGCGGAACATCGCCGCCTGCCCTGCCCGCTGCTGGACAGGGGCTCGGCTGTTGGGCACT
GACAATCCGTGGTGTGTCGGGGAAATCATCGTCCTTTCTTGGCTGCTCGCCTGTGTTGCCACCTG
GATTCTGCGCGGGACGTCCTTCTGCTACGTCCTTCCGGCCCTCAATCCAGCGGACCTTCCTTCCCG
CGGCCTGCTGCCGGCTCTGCGGCCTCTTCCGCGTCTTCCGCTTCCGCCCTCAGACGAGTCGGATCT
CCCTTTGGGCCGCTCCCCGCAACTTGTTTATTGCAGCTTATAATGGTTACAAATAAAGCAATAGCATC
ACAAATTTACAAATAAAGCATTTTTTTTACTGCATTCTAGTTGTGGTTTGTCCAAACTCATCAATGTATCTT
ATCATGTCTGGATC

Sekwencja 2

GGCAGCTGCCGGCAGCTGCCGGCAGCTGCCGGCAGCTGCCGGCAGCTGCCAGGGACACAGGAT
GGGGCAGCTGCCTCCCCACCCCCACAGCAGGGGCAGAGGATTAGGTGACAGTCCCCAAACCTA
GCCCCGGAACCTAAGCCCCGGAACCTAAGCCCCGGAACCTAAGCCCCGGAACCTAAGCCCC
GGAACCTAACACCCTCCTCCCCTTCACACAGGCACCTTGGCCTGTTCCCTCAAGCTTGTCAAAGCTCA
GAATAACCTGAGAACCAGACATCAGGggagtcgctgcgcgctgccttcgccccgtgccccgctccgcccgcgcctcgc
gcccggccccggcctctgactgaccgcgttactcccacaggtgagcggggcgggacggcccttctcctccgggctgtaattagctg
agcaagaggttaagggttaagggtggttggtgggttattaatgtttaattacctggagcacctgcctgaaatcacttttttcagac
tagtgcatgcgCGGCCGCGAGCTCctcagagtctagaGAATTCGTCGACTGGATCCGGTACCGAGGAGATCTG
GCCGGCCCATATGGCTAGCGcctACCGGTatcgatacgcgagccaccgcctggctgcctacgtccatggcgcggcagc
cctggactccgcccggccagcgggggagacgacgcgctccccgaagacgcggaggccaaaggggaggccgagggggaggtaga
gagcggaggtcgggggaagaagagagcagagcggaggttagacagtgagtcggaagaagagagcagagaccgaggaagacagtgagg



NARODOWE CENTRUM NAUKI

Projekt został sfinansowany ze środków Narodowego Centrum Nauki
przyznanych na podstawie decyzji nr DEC-2024/52/C/NZ3/00219

Strona 1 z 4

Sieć Badawcza Łukasiewicz – PORT Polski Ośrodek Rozwoju Technologii
54-066 Wrocław, ul. Stabłowicka 147, Tel: +48 71 734 77 77,
E-mail: sekretariat@port.lukasiewicz.gov.pl | NIP: 894 314 05 23, REGON: 386585168
Sąd Rejonowy dla Wrocławia – Fabrycznej we Wrocławiu, VI Wydział Gospodarczy KRS,
Nr KRS: 0000850580



atgacagtgacgaggagagtgtaagaagacagcgagggaagagatggagggatgagcgagagagcgaggcggaagaagacaacca
gaagaagggggaatcagaggcgagaaggagaaaactgaggcgagaaagcgaatttgaccccgaaatagaaatggaagcggagagagtg
gccaagagggaagtgtccagaccatgggctggatttgacacctattgtcaggaagataggcgagctcatctgtgtcctgtgtccagtc
tggggctcaccggggccaccagctgtccacgctggacgaagccttcgaagaactgagaagcaaacactccggtggactgaaggc
agcaatgatagagttggtggaaggttaaagttcacgagctcagaccctaaagtaactcgagaccagatgaagatatttatacagca
agaatttaagaaagttcagTGTATCTTAAATCAACCTCTGGATTACAAAATTTGTGAAAGATTGACTGGTATTCTT
AACTATGTTGCTCCTTTACGCTATGTGGATACGCTGCTTTAATGCCTTTGTATCATGCTATTGCTTCCCGT
ATGGCTTTCATTTCTCCTCCTTGTATAAATCCTGGTTGCTGTCTCTTATGAGGAGTTGTGGCCCGTTGT
CAGGCAACGTGGCGTGGTGTGCACTGTGTTTGCTGACGCAACCCCCACTGGTTGGGGCATTGCCAC
CACCTGTCAGCTCCTTTCCGGGACTTTGCTTTCCCCCTCCCTATTGCCACGGCGGAACCTCATCGCC
GCCTGCCTTGCCCGCTGCTGGACAGGGGCTCGGCTGTTGGGCACTGACAATCCGTGGTGTGTGCG
GGGAAATCATCGTCTTTCTTGGCTGCTCGCCTGTGTTGCCACCTGGATTCTGCGCGGGACGTCCT
TCTGCTACGTCCCTTCGGCCCTCAATCCAGCGGACCTTCCTTCCCGCGGCCTGCTGCCGGCTCTGC
GGCCTCTTCCGCGTCTTCGCCTTCGCCCTCAGACGAGTCGGATCTCCCTTTGGGCCGCCTCCCCG
CAACTTGTATTATGCAGCTTATAATGGTTACAAATAAAGCAATAGCATCACAAATTCACAAATAAAGCATT
TTTTTCACTGCATTCTAGTTGTGGTTTGTCCAAACTCATCAATGTATCTTATCATGTCTGGATC

Sekwencja 3

[illegible]

GCACTGTGTTTGCTGACGCAACCCCCACTGGTTGGGGCATTGCCACCACCTGTCAGCTCCTTTCCG
GGACTTTCGCTTTCCCCCTCCCTATTGCCACGGCGGAACATCGCCGCCTGCCTTGCCCGCTGCT
GGACAGGGGGCTCGGCTGTTGGGCACTGACAATTCCGTGGTGTTCGGGGAAATCATCGTCCTTTCC
TTGGCTGCTCGCTGTGTTGCCACCTGGATTCTGCGCGGGACGTCCTTCTGCTACGTCCCTTCGGCC
CTCAATCCAGCGGACCTTCCTTCCCGCGGCCTGCTGCCGGCTCTGCGGCCTCTTCCCGGTCTTCG
CCTTCGCCCTCAGACGAGTCGGATCTCCCTTTGGGCCGCCTCCCCGCAACTTGTATTGCAGCTTAT
AATGGTTACAAATAAAGCAATAGCATCACAATTTACAAATAAAGCATTTTTTTCACTGCATTCTAGTTGT
GGTTTGTCCAACTCATCAATGTATCTTATCATGTCTGGATC

Sekwencja 4

AGGGACACAGGATGGGGCAGCTGCCTCCCCACCCCCACAGCAGGGGCAGAGGATTAGGTGACA
GTCCCCAAACCTAGCCCGGAACTAACACCCTCCTCCCCTTCACACAGGCACCTTGGCCTGTTCCCT
CAAGCTTGTCAAAGCTCAGAATAACCTGAGAACCAGACATCAGGactagtgcacgCGGCCGCGAGCT
CctcagctctagaGAATTCGTCGACTGGATCCGGTACCGAGGAGATCTGGCCGGCCCATATGGCTAGCG
cctACCGGTatcgatacgcgagccaccgcctggctgcctacgtccatggcgcccaggcctggactccgcccggccagcggggga
gacgacgcgctccccgaagacgcgagggccaaaggggagggcaggggggaggtagagagcagagtcggggaagaagagagcg
agacggaggtagacagtgcggaagaagagagcgagaccgaggaagacagtgcaggtgagagtgacgaggagagtgaagaag
acagcgaggaagagatggaggtgagcgagagagcagggcggaagaagacaaccaagaagaaggggaatcagaggcagaagg
agaaactgagggcagaagcgaatttgaccccgaatagaaatggaagcggagagagtgggcaagagggaagtgtccagaccatgg
gctggattgagcacctattgtcaggaagataggcagctcatctgtgtcctgtgtccagtcattgggggtcaccggggccaccagctgt
ccacgctggacgaagccttcgaagaactgagaagcaaacactccggtggactgaaggcagcaatgatagagttggtgaaaggtt
aaagttcacgagctcagaccctaaagtaactcgagaccagatgaagatatattatacagcaagaatttaagaaagttcagTGTATCT
TAAACTTGTATTGTCAGCTTATAATGGTTACAAATAAAGCAATAGCATCACAATTTACAAATAAAGCAT
TTTTTCACTGCATTCTAGTTGTGGTTTGTCCAACTCATCAATGTATCTTATCATGTCTGGATC



Strona 1 z 4

