# Supplementary Material

Peptide sequence for vector encoding mouse HIF-1ɑ and mouse HIF-2ɑ

MNPAISVALLLSVLQVSRGQKVTSLTACLVNQNLRLDCRHENNTKDNSIQHEFSLTREKRKHVLSGTLGIPEHTYRSRVTLSNQPYIKVLTLANFTTKDEGDYFCELRVSGANPMSSNKSISVYRDKLVKCGGISLLVQNTSWMLLLLLSLSLLQALDFISLRAKRGSGATNFSLLKQAGDVEENP**GP**MEGAGGENEKKKMSSERRKEKSRDAARSRRSKESEVFYELAHQLPLPHNVSSHLDKASVMRLTISYLRVRKLLDAGGLDSEDEMKAQMDCFYLKALDGFVMVLTDDGDMVYISDNVNKYMGLTQFELTGHSVFDFTHPCDHEEMREMLTHRNGPVRKGKELNTQRSFFLRMKCTLTSRGRTMNIKSATWKVLHCTGHIHVYDTNSNQPQCGYKKPPMTCLVLICEPIPHPSNIEIPLDSKTFLSRHSLDMKFSYCDERITELMGYEPEELLGRSIYEYYHALDSDHLTKTHHDMFTKGQVTTGQYRMLAKRGGYVWVETQATVIYNTKNSQPQCIVCVNYVVSGIIQHDLIFSLQQTESVLKPVESSDMKMTQLFTKVESEDTSCLFDKLKKEPDALTLLA**A**AAGDTIISLDFGSDDTETEDQQLEDVPLYNDVMFPSSNEKLNINLAMSPLPSSETPKPLRSSADPALNQEVALKLESSPESLGLSFTMPQIQDQPASPSDGSTRQSSPERLLQENVNTPNFSQPNSPSEYCFDVDSDMVNVFKLELVEKLFAEDTEAKNPFSTQDTDLDLEMLA**A**YIPMDDDFQLRSFDQLSPLESNSPSPPSMSTVTGFQQTQLQKPTITATATTTATTDESKTETKDNKEDIKILIASPSSTQVPQETTTAKASAYSGTHSRTASPDRAGKRVIEQTDKAHPRSLNLSATLNQRNTVPEEELNPKTIASQNAQRKRKMEHDGSLFQAAGIGTLLQQPGDCAPTMSLSWKRVKGFISSEQNGTEQKTIILIPSDLACRLLGQSMDESGLPQLTSYDCEV**A**APIQGSRNLLQGEELLRALDQVNRAKRGSGATNFSLLKQAGDVEENP**GP**MTADKEKKRSSSELRKEKSRDAARCRRSKETEVFYELAHELPLPHSVSSHLDKASIMRLAISFLRTHKLLSSVCSENESEAEADQQMDNLYLKALEGFIAVVTQDGDMIFLSENISKFMGLTQVELTGHSIFDFTHPCDHEEIRENLTLKNGSGFGKKSKDVSTERDFFMRMKCTVTNRGRTVNLKSATWKVLHCTGQVRVYNNCPPHSSLCGSKEPLLSCLIIMCEPIQHPSHMDIPLDSKTFLSRHSMDMKFTYCDDRILELIGYHPEELLGRSAYEFYHALDSENMTKSHQNLCTKGQVVSGQYRMLAKHGGYVWLETQGTVIYNPRNLQPQCIMCVNYVLSEIEKNDVVFSMDQTESLFKPHLMAMNSIFDSSDDVAVTEKSNYLFTKLKEEPEELAQLA**A**TPGDAIISLDFGSQNFDEPSAYGKAILPPGQPWVSGLRSHSAQSESGSLPAFTVPQADTPGNTTPSASSSSSCSTPSSPEDYYSSLENPLKIEVIEKLFAMDTEPRDPGSTQTDFSELDLETLA**A**YIPMDGEDFQLSPICPEEPLMPESPQPTPQHCFSTMTSIFQPLTPGATHGPFFLDKYPQQLESRKTESEHWPMSSIFFDAGSKGSLSPCCGQASTPLSSMGGRSNTQWPPDPPLHFGPTKWPVGDQSAESLGALPVGSSQLEPPSAPPHVSMFKMRSAKDFGARGPYMMSPAMIALSNKLKLKRQLEYEEQAFQDTSGGDPPGTSSSHLMWKRMKSLMGGTCPLMPDKTISANMAPDEFTQKSMRGLGQPLRHLPPPQPPSTRSSGENAKTGFPPQCYASQFQDYGPPGAQKVSGVASRLLGPSFEPYLLPELTRYDCEV**A**VPVPGSSTLLQGRDLLRALDQAT

Key:

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| **Protein Name** | **NCBI Reference Sequence** |
| Thy-1.1 | [**AAR17087.1**](https://www.ncbi.nlm.nih.gov/protein/38325830) |
| Furin cleavage site | RAK**R** (cleavage after **R**) |
| Picornavirus 2A self-cleaving sequence | GSGATNFSLLKQAGDVEENP**GP**  (cleavage occurs between **G** and **P**) |
| Mouse HIF-1⍺ | [**NP\_034561.2**](https://www.ncbi.nlm.nih.gov/protein/NP_034561.2) |
| Mouse HIF-2⍺ | [**NP\_034267.3**](https://www.ncbi.nlm.nih.gov/protein/NP_034267.3) |
| **A** Proline residue converted to Alanine |  |
| **A** Asparagine residue converted to Alanine |  |

Peptide sequence for vector encoding chicken ovalbumin (OVA)

MGSIGAASMEFCFDVFKELKVHHANENIFYCPIAIMSALAMVYLGAKDSTRTQINKVVRFDKLPGFGDSIEAQCGTSVNVHSSLRDILNQITKPNDVYSFSLASRLYAEERYPILPEYLQCVKELYRGGLEPINFQTAADQARELINSWVESQTNGIIRNVLQPSSVDSQTAMVLVNAIVFKGLWEKAFKDEDTQAMPFRVTEQESKPVQMMYQIGLFRVASMASEKMKILELPFASGTMSMLVLLPDEVSGLEQLE**SIINFEKL**TEWTSSNVMEERKIKVYLPRMKMEEKYNLTSVLMAMGITDVFSSSANLSGISSAESLKISQAVHAAHAEINEAGREVVGSAEAGVDAASVSEEFRADHPFLFCIKHIATNAVLFFGRCVSPGSGATNFSLLKQAGDVEENPGPMVSKGEELFTGVVPILVELDGDVNGHKFSVSGEGEGDATYGKLTLKFICTTGKLPVPWPTLVTTLTYGVQCFSRYPDHMKQHDFFKSAMPEGYVQERTIFFKDDGNYKTRAEVKFEGDTLVNRIELKGIDFKEDGNILGHKLEYNYNSHNVYIMADKQKNGIKVNFKIRHNIEDGSVQLADHYQQNTPIGDGPVLLPDNHYLSTQSALSKDPNEKRDHMVLLEFVTAAGITLGMDELYKGSGEGRGSLLTCGDVEENPGPMIEQDGLHAGSPAAWVERLFGYDWAQQTIGCSDAAVFRLSAQGRPVLFVKTDLSGALNELQDEAARLSWLATTGVPCAAVLDVVTEAGRDWLLLGEVPGQDLLSSHLAPAEKVSIMADAMRRLHTLDPATCPFDHQAKHRIERARTRMEAGLVDQDDLDEEHQGLAPAELFARLKARMPDGEDLVVTHGDACLPNIMVENGRFSGFIDCGRLGVADRYQDIALATRDIAEELGGEWADRFLVLYGIAAPDSQRIAFYRLLDEFF

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| **Protein Name** | **NCBI Reference Sequence** |
| Chicken ovalbumin | [**AUD54526.1**](https://www.ncbi.nlm.nih.gov/protein/AUD54526.1?report=genbank&log$=protalign&blast_rank=3&RID=DW0HB5K7014) H2K-b-restricted OVA peptide (SIINFEKL) marked in bold. |
| Picornavirus 2A self-cleaving sequence | GSGATNFSLLKQAGDVEENP**GP**  (cleavage occurs between **G** and **P**) |
| eGFP | [**ADQ43426.1**](https://www.ncbi.nlm.nih.gov/protein/ADQ43426.1) |
| Neomycin phosphotransferase | [**CAD21956.1**](https://www.ncbi.nlm.nih.gov/protein/21727886) |

Peptide sequence for vector encoding CAR and human HIF-2ɑ

MVSKGEELFTGVVPILVELDGDVNGHKFSVSGEGEGDATYGKLTLKFICTTGKLPVPWPTLVTTLTYGVQCFSRYPDHMKQHDFFKSAMPEGYVQERTIFFKDDGNYKTRAEVKFEGDTLVNRIELKGIDFKEDGNILGHKLEYNYNSHNVYIMADKQKNGIKVNFKIRHNIEDGSVQLADHYQQNTPIGDGPVLLPDNHYLSTQSALSKDPNEKRDHMVLLEFVTAAGITLGMDELYKRAKRGSGSGATNFSLLKQAGDVEENPGPMALPVTALLLPLALLLHAARPDIQMTQTTSSLSASLGDRVTISCRASQDISKYLNWYQQKPDGTVKLLIYHTSRLHSGVPSRFSGSGSGTDYSLTISNLEQEDIATYFCQQGNTLPYTFGGGTKLEITGGGGSGGGGSGGGGSEVKLQESGPGLVAPSQSLSVTCTVSGVSLPDYGVSWIRQPPRKGLEWLGVIWGSETTYYNSALKSRLTIIKDNSKSQVFLKMNSLQTDDTAIYYCAKHYYYGGSYAMDYWGQGTSVTVSSTTTPAPRPPTPAPTIASQPLSLRPEACRPAAGGAVHTRGLDFACDIYIWAPLAGTCGVLLLSLVITLYCKRGRKKLLYIFKQPFMRPVQTTQEEDGCSCRFPEEEEGGCELRVKFSRSADAPAYKQGQNQLYNELNLGRREEYDVLDKRRGRDPEMGGKPRRKNPQEGLYNELQKDKMAEAYSEIGMKGERRRGKGHDGLYQGLSTATKDTYDALHMQALPPRRAKRRSGSGATNFSLLKQAGDVEENPGPMTADKEKKRSSSERRKEKSRDAARCRRSKETEVFYELAHELPLPHSVSSHLDKASIMRLAISFLRTHKLLSSVCSENESEAEADQQMDNLYLKALEGFIAVVTQDGDMIFLSENISKFMGLTQVELTGHSIFDFTHPCDHEEIRENLSLKNGSGFGKKSKDMSTERDFFMRMKCTVTNRGRTVNLKSATWKVLHCTGQVKVYNNCPPHNSLCGYKEPLLSCLIIMCEPIQHPSHMDIPLDSKTFLSRHSMDMKFTYCDDRITELIGYHPEELLGRSAYEFYHALDSENMTKSHQNLCTKGQVVSGQYRMLAKHGGYVWLETQGTVIYNPRNLQPQCIMCVNYVLSEIEKNDVVFSMDQTESLFKPHLMAMNSIFDSSGKGAVSEKSNFLFTKLKEEPEELAQLAPTPGDAIISLDFGNQNFEESSAYGKAILPPSQPWATELRSHSTQSEAGSLPAFTVPQAAAPGSTTPSATSSSSSCSTPNSPEDYYTSLDNDLKIEVIEKLFAMDTEAKDQCSTQTDFNELDLETLAPYIPMDGEDFQLSPICPEERLLAENPQSTPQHCFSAMTNIFQPLAPVAPHSPFLLDKFQQQLESKKTEPEHRPMSSIFFDAGSKASLPPCCGQASTPLSSMGGRSNTQWPPDPPLHFGPTKWAVGDQRTEFLGAAPLGPPVSPPHVSTFKTRSAKGFGARGPDVLSPAMVALSNKLKLKRQLEYEEQAFQDLSGGDPPGGSTSHLMWKRMKNLRGGSCPLMPDKPLSANVPNDKFTQNPMRGLGHPLRHLPLPQPPSAISPGENSKSRFPPQCYATQYQDYSLSSAHKVSGMASRLLGPSFESYLLPELTRYDCEV**A**VPVLGSSTLLQGGDLLRALDQAT

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| **Protein Name** | | **NCBI Reference Sequence** |
| eGFP | | [**ADQ43426.1**](https://www.ncbi.nlm.nih.gov/protein/ADQ43426.1) |
| Furin cleavage site | | RAK**R** (cleavage after **R**) |
| Picornavirus 2A self-cleaving sequence | | GSGATNFSLLKQAGDVEENP**GP**  (cleavage occurs between **G** and **P**) |
| hCD19 CAR | CD8a signal peptide | [**NP\_001139345.1**](https://www.ncbi.nlm.nih.gov/protein/NP_001139345) |
| hCD19-scFv |  |
| CD8a hinge | [**NP\_001139345.1**](https://www.ncbi.nlm.nih.gov/protein/NP_001139345) |
| CD8a TMD | [**NP\_001139345.1**](https://www.ncbi.nlm.nih.gov/protein/NP_001139345) |
| 4-1BB | [**NP\_001552.2**](https://www.ncbi.nlm.nih.gov/protein/NP_001552) |
| CD3z | [**NP\_000725.1**](https://www.ncbi.nlm.nih.gov/protein/NP_000725.1) |
| Human HIF-2⍺ | | [**NP\_001421.2**](https://www.ncbi.nlm.nih.gov/protein/NP_001421.2?report=genbank&log$=protalign&blast_rank=1&RID=DWDKZPVU01R) |
| **A** Asparagine residue converted to Alanine | | N847A |