

**Supplementary Figure 1: Sequences of scFvs and CAR design.****A)****4H11**L-chain-V<sub>L</sub>-chain-(G4S)<sub>4</sub>-V<sub>H</sub>-chain

METDTLLLWVLLLWVPGSTGDIELTQSPSSLAVSAGEKVTMSCKSSQSLNSRTRKNQLAWYQQKPGQ  
 SPELLIYWASTRQSGVPDRFTGSGSGTDFLTISSVQAEDLAVYYCQSYNLLTFGPGTKLEVKRGGGGG  
 GGGGSGGGGSGGGGSEVKLQESGGGFVKPGGSLKVS CAASGFTFSSYAMS WVR LSP EMRLEWVATI  
 SSAGGYIFYSDSVQGRFTISRDN AKNTLHLQMGSLRSGDTAMY YCARQGF GNYGDY YAMDYWGQG  
 TTVT VSS

**B)****K93**L-chain-V<sub>L</sub>-chain-(G4S)<sub>4</sub>-V<sub>H</sub>-chain

METDTLLLWVLLLWVPGSTGDIVMSQSPSSLAVSVGEKVTMSCKSSQSLLYSSNQKNYLAWYQQKPG  
 QSPKLLIFWASTRESGVPDRFTGSGSGTDFLTISSVKAEDLAVYYCQYYSYRTFGGGTKLEIKGGGGG  
 GGGGSGGGGSGGGGSEVQLQQSGPELVKPGASMKISCKASGYSTGYTMNWVKQSHGKNLEWIGLI  
 SPYNGGTTYNQKFKGKATLTVDKSSSTAYMELLSLTSEDSAVYYCAREGTMINYAMDYWGQGTSVTV  
 SS

**C)****K95**L-chain-V<sub>L</sub>-chain-(G4S)<sub>4</sub>-V<sub>H</sub>-chain

METDTLLLWVLLLWVPGSTGDIVLTQSPATLSVTPGDSVLS CRASQSITN NLHWYRQKSHESPRLLIKY  
 ASQSIGIPSRFSGSGSGTDFLTLSVNSVETEDFGMFFCQQTNRWPYTFGGGKLEIKGGGGSGGGSG  
 GGGSGGGGSIQLQQSGPELVKPGASVKISCKASGSSFTDYYISWLKQKPGQGLEWIGWIYPGSGNTK  
 SNEKFKGKATLTVDTSSSTAYMQLSSLTSEDAVYFCARSGDYYSWYFDVWGAGTTVTVSS

**D)****K101**L-chain-V<sub>L</sub>-chain-(G4S)<sub>4</sub>-V<sub>H</sub>-chain

METDTLLLWVLLLWVPGSTGDIVMSQSPSSLAVSVGEKVTLSCKSSQSLLYTSIQKNYLAWYQQKPGQS  
 PKLLIYWASTRESGVPDRFTGSGSGTDFLTISSVKAEDLAVYYCQYYTYPWTFGGGKLEIKGGGGG  
 GGGGSGGGGSGGGGSEVQLQQSGPELVKPGASVKMSCKASGYTFTDYYMKWVKQSHGKSLEWIGEI  
 NPNGDNFYNQKFKGKATLTVDKSSSTAYMQLNSLTSEDSAVYYCAKDGDYAMDYWGQGTSVTVS  
 S

**E)**2<sup>nd</sup> Generation CAR used in the study:

CD8 Hinge-CD8 Transmembrane-CD137 ICD-CD3ζ

SDPFVPVFLPAKPTTTPAPRPPTPAPTIASQPLSLRPEACRPAAGGAVHTRGLDFACDIYIWAPLAGTCGVL  
 LLSLVITLYCNHRNRFVVKRGRKLLYIFKQPFMRPVQTTQEEDGCSCRFPEEEEGGCELRVKFSRSADAP  
 AYQQGQNQLYNELNLGRREEYDVLDKRRGRDPEMGGKPRRKNPQEGLYNELQKDKMAEAYSEIGMKG  
 ERRRGKGDGLYQGLSTATKDTYDALHMQALPPR