

**Amino acid sequence of microABE I744, SaCas9-miniABEMax (V82G), SaCas9-ABEMax, microAIDx I744**

- Pink**=Kozak sequence
- Grey**=SaCas9 (D10A)
- Blue**=nuclear localization sequence
- Orange**=44-amino-acid linker
- Green**=evolved ecTadA monomer
- Red**=V82G amino acid substitution
- Yellow**=wildtype ecTadA monomer
- Dark green**=hAIDx
- Light magenta**=UGI
- Cyan**=20-amino-acid glycine-serine linker
- Cornflower blue**=32 amino-acid linker
- Berry**=P2A
- Purple**=Blasticidin-S-deaminase

SaCas9-ABEMax

-gccacc-MKRTADGSEFES **PKKKRKY** SEVEFSHEYWMRHALTLAKRAWDEREVPVGAVLVHNNRVIGEGWNRPIGRHDPT  
AHAEIMALRQGGLVMQNYRLIDATLYVTLEPCVMCAGAMIHSRIGRVVFGARDAKTGAAGSLMDVLHHPGMNHRVEIT  
EGILADECAALLSDFRMRQEIKAKKKAQSSTD **SGGSSGGSSGSETPGTSESATPESGGSSGGSS** SEVEFSHEYWMRHALT  
LAKRARDEREVPVGAVLVHNNRVIGEGWNRALGLHDPTAHAEIMALRQGGLVMQNYRLIDATLYVTLEPCVMCAGAMIH  
SRIGRVVFGVRNAKTGAAGSLMDVLHYPGMNHRVEITEGILADECAALLCYFRMPRQVFNAQKKAQSSTD **SGGSSGGSS**  
GSETPGTSESATPESGGSSGGSSGRNYILGLAIGITSVGYGIIDYETRDVIDAGVRLFKEANVENNEGRRSKRGARRLKRERR  
HRIQRVKLLFDYNNLLTDHSELGINPYEARVKGLSQKLEEFSAALLHLAKRRGVHNVNEVEEDTGNELSTKEQISRNSKAL  
EEKYVAELQLERLKKDGEVRSINRFKTSYVKEAKQLLVQKAYHQLDQSFIDTYIDLLETRRYYEGPGEKSPFGWKDIKE  
WYEMLMGHCTYFPEELRSVKYAYNADLYNALNDLNNLVITRDENEKLEYEKFQIENVFQKQKPTLKQIAKEILVNEEDIK  
GYRVTSTGKPEFTNLKVYHDIKDITARKEIENAELLDQIAKILTIYQSSEDIQEELTNLNSLTQEEIEQISNLKGYTGTHNLSLKA  
INLILDELWHTNDNQIAIFNRLKLVPKKVDLSQKQEIPTTLVDDFILSPVVKRSFIQSIKVINAIKKYGLPNDIIIELAREKNSKDA  
QKMINEMQKRNRQTNERIEEII RTTGKENAKYLIEKIKLHDMQEGKCLYSLEAIPLEDLLNPFNYEVDHII PRSVSFDNSFNN  
KVLVKQEENS KKGNRTPFQYLSSSDSKISYETFKKHILNLA KGGRISKTKKEYLLEERDINRFSVQKDFINRNLVDTRYATRGL  
MNLRSYFRVNNLDVKVKSINGGFTSFLRRKWKFKKERNKGYKHAEDALI ANADFIKWKLDKAKKVMENQMFE EK  
QAESMPEIETE QEYKEIFITPHQIKHIKDFKDYKYSHRVDKKNRELINDTYSTRKDDKGN TLIVNNLNGLYDKDNDKLLKLI  
NKSPEKLLMYHHPQTYQKLKIMEQY GDEKNPLYKYYEETGN YLTKYSKKN DNGPVIKKIKYYGNKLNALHDITDDYPNSRN  
KVVKLSLKP YRFDVYLDNGVYKFVTVK NLDVIKENYEVNSKCYEEAKLKKISNQA EFIASFYNNDLIKINGEL YRVIGVNN  
DLLNRIEVMIDITYREYLENMNDKRPPRIIKTIASKTQSIKKYSTDILGNLYEVKSKKHPQI I KKGSSGS **PKKKRKY** SGGSKRPA  
**ATKKAGQAKKKK** DYKDDDDKSGG **ATNFSLLKQAGDVEENPGP** MAKPLSQEESTLIERATATINSIPISSEDYSVASAALSSDG  
RIFTGVNVYHFTGGPCAELVVLGTAAAAAAGNLTCIVAIGNENRGILSPCGRCRQVLLDLHPGIKAIVKDSDGQPTAVGIREL  
LPSGYVWEG\*

miniABEmax (V82G)-SaCas9

-gccacc-MKRTADGSEFESPKKKRKVSEVEFSHEYWMRHALTLAKRARDEREVPVGAVLVNLRVIGEGWNRAIGLHDPTA  
HAEIMALRQGGLVMQNYRLIDATLYGTFEPCVMCAGAMIHSRIGRVVFGVRNAKTGAAGSLMDVLHYPGMNHRVEITE  
GILADECAALLCYFFRMPROVFNAQKAQSSTDGGSSGGSSGSETPGTSESATPESSGGSSGGSGKRNILGLAIGITSVGY  
GIIDYETRDVIDAGVRLFKEANVENNEGRRSKRGARRLKRHHRIQRVKKLLFDYNLLTDHSELGINPYEARVKGLSQKLSE  
EEFSAALLHLAKRRGVHNVNEVEEDTGNELSTKEQISRNSKALEEKYVAELQLERLKKDGEVRGSINRFKTSYVKEAKQLLK  
VQKAYHQLDQSFIDTYIDLLETRRYYEGPGEKSPFGWKDIKEWYMLMGHCTYFPEELRSVKYAYNADLYNALNDLNNLV  
ITRDENEKLEYEKFQIENVFKQKKKPTLKQIAKEILVNEEDIKGYRVTSTGKPEFTNLKVYHDIKDITARKEIENAELLDQIAKI  
LTIYQSSEDIQEELTNLSELTQEEIEQISNLKGYTGTHNLSLKAINLILDELWHTNDNQIAIFNRLKLVPKKVDLSQQKEIPTTL  
VDDFILSPVVKRSFIQSIKVINAIKKYGLPNDIIEELAREKNSKDAQKMINEMQKRNRQTNERIEEIIRTTGKENAKYLIEKIKLH  
DMQEGKCLYSLEAIPLEDLLNPNFNYEVDHIIIPRSVSFDNSFNKVLVKQEENSCKGNRTPFQYLSSSDSKISYETFKKHILNLA  
KGGKGRISKTKEYLLEERDINRFSVQKDFINRNLVDTRYATRGLMNLRSYFRVNNLDVKVKSINGGFTSFLRRKWKFKKERN  
KGYKHAEDALIANADFIKFEWKKLDKAKVMENQMFEKQAESMPEIETEYKEIFITPHQIKHIKDFKDYKYSRVDKK  
PNRELINDTLYSTRKDDKGNTLIVNNLNGLYDKDNDKLLKLINKSPEKLLMYHHDHPQTYQKLKIMEQYGDEKNPLYKYYEET  
GNYLTKYSKKNPVIKKIKYYGNKLNALHDITDDYPNSRNKVVKLSLKPFRFDVYLDNGVYKFVTVKNLDVIKKENYYEVNS  
KCYEEAKLKKISNQAEIFASFYNNDLIKINGELYRVIGVNNLLNRIEVMIDITYREYLENMNDKRPPRIIKTIASKTQSIKKYS  
TDILGNLYEVKSKKHPQIIKKGGSSPKKKRKVSGGSKRPAATKKAGQAKKKDYKDDDDKGSATNFSLLKQAGDVEENP  
GPMAPKLSQEESTLIERATATINSIPESDYSVASAALSSDGRIFTGVNVYHFTGGPCAELVVLGTAAAAAAGNLTCIVAIGNE  
NRGILSPCGRCRQVLLDLHPGIKAIKSDSGQPTAVGIRELLPSGYVWEG\*

MicroABE I744

-gccacc-MKRNILGLAIGITSVGYGIIDYETRDVIDAGVRLFKEANVENNEGRRSKRGARRLKRHHRIQRVKKLLFDYNLLT  
DHSELGINPYEARVKGLSQKLSEEFSAALLHLAKRRGVHNVNEVEEDTGNELSTKEQISRNSKALEEKYVAELQLERLKKD  
GEVRGSINRFKTSYVKEAKQLLKVQKAYHQLDQSFIDTYIDLLETRRYYEGPGEKSPFGWKDIKEWYMLMGHCTYFPEE  
LSVKYAYNADLYNALNDLNNLVITRDENEKLEYEKFQIENVFKQKKKPTLKQIAKEILVNEEDIKGYRVTSTGKPEFTNLKV  
YHDIKDITARKEIENAELLDQIAKILTIIYQSSEDIQEELTNLSELTQEEIEQISNLKGYTGTHNLSLKAINLILDELWHTNDNQIA  
IFNRLKLVPKKVDLSQQKEIPTTLVDDFILSPVVKRSFIQSIKVINAIKKYGLPNDIIEELAREKNSKDAQKMINEMQKRNRQTN  
ERIEEIIRTTGKENAKYLIEKIKLHDMQEGKCLYSLEAIPLEDLLNPNFNYEVDHIIIPRSVSFDNSFNKVLVKQEENSCKGNRTP  
FQYLSSSDSKISYETFKKHILNLAQKGGKGRISKTKEYLLEERDINRFSVQKDFINRNLVDTRYATRGLMNLRSYFRVNNLDVKV  
KSINGGFTSFLRRKWKFKKERNKGYKHAEDALIANADFIKFEWKKLDKAKVMENQMFEKQAESMPEIPKKRKVGS  
GSPKKRKVGS DALDDFDLMLGSDALDDFGGSSSEVEFSHEYWMRHALTLAKRARDEREVPVGAVLVNLRVIGEGW  
NRAIGLHDPTAHAEIMALRQGGLVMQNYRLIDATLYGTFEPCVMCAGAMIHSRIGRVVFGVRNAKTGAAGSLMDVLHYP  
GMNHRVEITEGILADECAALLCYFFRMPROVFNAQKAQSSTDGGSSGGSSGSGSSGGSSGGIETEYKEIFITPHQIK  
HIKDFKDYKYSRVDKKPNRELINDTLYSTRKDDKGNTLIVNNLNGLYDKDNDKLLKLINKSPEKLLMYHHDHPQTYQKLKIM  
EQYGDEKNPLYKYYEETGNYLTKYSKKNPVIKKIKYYGNKLNALHDITDDYPNSRNKVVKLSLKPFRFDVYLDNGVYKFVTV  
KNLDVIKKENYYEVNSKCYEEAKLKKISNQAEIFASFYNNDLIKINGELYRVIGVNNLLNRIEVMIDITYREYLENMNDK  
RPPRIIKTIASKTQSIKKYSTDILGNLYEVKSKKHPQIIKKGGSSKRPAATKKAGQAKKKDYKDDDDKGSATNFSLLKQAG  
DVEENPGPMAPKLSQEESTLIERATATINSIPESDYSVASAALSSDGRIFTGVNVYHFTGGPCAELVVLGTAAAAAAGNLTCI  
VAIGNENRGILSPCGRCRQVLLDLHPGIKAIKSDSGQPTAVGIRELLPSGYVWEG\*

MicroAIDx 1744

-gccacc-MKRNYILGLAIGITSVGYIIDYETRDVIDAGVRLFKEANVENNEGRRSKRGARRLKRRRRHRIQRVKLLFDYNLLT  
DHSELGINPYEARVKGLS QKLSEEEFSAALLHLAKRRGVHNVNEVEEDTGNELSTKEQISRNSKALEEKYVAELQLERLKKD  
GEVRGSINRFKTS DYVKEAKQLLKVQKAYHQLDQSFIDTYIDLLETRRYYEGPGE GSPFGWKDIKEWYEMLMGHCTYFPEE  
LRSVKYAYNADLYNALNDLNNLVITRDENEKLEYEKFQIIENVFKQKKKPTLKQIAKEILVNEEDIKGYRVTSTGKPEFTNLKV  
YHDIKDITARKEIENAELLDQIAKILTIYQSSEDIQEELTNLSEL TQEIEIQISNLKGYTGTHNLSLKAINLILDELWHTNDNQIA  
IFNRLKLVPKKVDLSQQKEIPTTLVDDFILSPVVKRSFIQSIKVINAIKKYGLPNDIIEELAREKNSKDAQKMINEMQKRNRQTN  
ERIEEII RTTGKENAKYLIEKIKLHDMQEGKCLYSLEAIPLEDLLNPNFNYEVDHII PRSVSFDNSFNKVLVKQEENSKKGNRTP  
FQYLSSSDSKISYETFKKHILN LAKGKGRISKTKKEYLLEERDINRFSVQKDFINRNLVDTRYATRGLMNLLRSYFRVNNLDVKV  
KSINGGFTSFLRRKWKFKERNKGYKHAEDALI ANADFIKFWKKL DKAKKVMENQMFE EKQAESMPEI P K K K R K V G S S  
G S P K K K R K V G S D A L D D F D L D M L G S D A L D D F G G G S M D S L L M N R R K F L Y Q F K N V R W A K G R R E T Y L C Y V V K R R D S A T S F S L D  
F G Y L R N K N G C H V E L L F L R Y I S D W D L P G R C Y R V T W F T S W S P C Y D C A R H V A D F L R G N P N L S R I F T A R L Y F C E D R K A E P E G L R  
R L H R A G V Q I A I M T F K D Y F Y C W N T F V E N H E R T F K A W E G L H E N S V R L S R Q L R R I L L P G G S G G S G G S G G S G G S G G I E T E Q  
EYKEIFITPHQIKHIKDFKDYKYSHRVDKKPNRELINDTLYSTRKDDKGN TLIVNNLNGLYDKDNDKLLKLINKSPEKLLMYHH  
DPQTYQKLK LIMEQYGDEKNPLYKYEETGN YLTKYSKKN GNPVIKIKIYYGNKLNALHDITDDYPNSRNKVVKLSLKP YRFD  
VYLDNGVYKFVTVKNLDVIKENYYEVNSKCYEEAKLKKISNQA EFIASFYNNDLIKINGEL YRVIGVNNDLLNRIE VNMIDIT  
YREYLENMNDKRPPIIKTIASKTQSIKKYSTDILGNLYEVKSKHPQIIKKGSGGS TNLSDIIEKETGKQLVIQESILMLPEEVEE  
VIGNKPESDILVHTAYDESTDENVMLLTSDAPEYKPWALVIQDSNGENKIKMLSGGS KRPAATKKAGQAKKKKDYKDDDD  
KGS G A T N F S L L K O A G D V E E N P G P M A K P L S Q E E S T L I E R A T A T I N S I P E D Y S V A S A A L S S D G R I F T G V N V Y H F T G G P C A E L V V  
L G T A A A A A A G N L T C I V A I G N E N R G I L S P C G R C R Q V L L D L H P G I K A I V K D S D G Q P T A V G I R E L L P S G Y V W E G \*