

**An amino acid sequence of the AP-TGF $\alpha$ .**

The signal-sequence peptide and the cleaved fragment of human TGFA are highlighted in red.

The alkaline phosphatase sequence derived from human ALPP is highlighted in blue.

The mature, ectodomain-shed fragment of human TGFA is highlighted in purple.

MVPSAGQLALFALGIVLAACQALENSTSPLSADPPVAAA VVSRSGIIPVEEENPDFWNREAAEALGAAKKLQPAQT  
AAKNLIIFLDGDMGVSTVTAARILKGQKKDKLGPEIPLAMDRFPYVALSKTYNVDKHVPDSGATATAYLCGVKGNF  
QTIGLSAAARFNQCNTTRGNEVISVMNRAKKAGKSVGVTTRVQHASPAGTYAHTVNRNWYSADVPASARQE  
GCQDIATQLISNMDIDVILGGGRKYMFRMGTPDPEYPDDYSQGGTRLDGKNLVQEWLAKRQGARYVWNRTELMQ  
ASLDPSVTHLMGLFEPGDMKYEIHRDSTLDPSLMEMTEAALRLLSRNPRGFFLFVEGGRIDHGHESRAYRALTETI  
MFDDAIERAGQLTSEEDTSLVTDHSHVFSFGGYPLRGSSIFGLAPGKARDRKAYTVLLYGNGPGYVLKDGARPD  
VTESESGSPEYRQSAVPLDEETHAGEDVAVFARGPQAHLVHGVQEQTFAHVMAFAACLEPYTACDLAPPAGTTD  
AAHPGYHDCPDSHTQFCFHGTCRFLVQEDKPACVCHSGYVGARCEHADLLAVVAASQKKQAITALVVVSIVALAV  
LIITCVLIHCCQVRKHCEWCRALICRHEKPSALLKGRACCHSETVV

**A nucleotide sequence of the AP-TGF $\alpha$ .**

ATGGTCCCTTCCGCCGGGCAGCTGGCACTGTTTCGCTCTGGGCATTGTCCTGGCCGCTTGTGTCAGGCTCTGGAGAA  
TAGCACTTCACCTCTGTCCGCCGACCCCCCTGTGGCCGCTGCAGTGGTCTCTCGGAGTGGCATCATTCCAGTGG  
AGGAAGAGAACCCCGATTTCTGGAATAGAGAAGCCGCTGAGGCTCTGGGGCAGCCAAGAACTGCAGCCTG  
CCCAGACCGCTGCAAAGAACCTGATCATTCTGGGCGACGGGATGGGAGTCAGCACAGTGAAGTACTGCCGCTAG  
AATCCTGAAGGGGCAGAAGAAAGACAACTGGGACCCGAGATTCTCTGGCCATGGATAGGTTCCCATACGTG  
GCTCTGTCAAAGACATATAACGTGCACAAACACGTGCCGATAGCGGCGCTACCGCAACAGCCTACCTGTGCG  
GCGTGAAGGGGAATTTCCAGACCATCGGGCTGTCCGCAGCCGCTAGGTTTAAACCAGTGTAAATACCACACGCGG  
AAACGAGGTCATTTCTGTGATGAATCGCGCAAAGAAAGCCGGGAAAAGTGTGCGGAGTGGTCACTACCACACG  
AGTGCAGCACGCTTCTCCCGCAGGAACATACGCTCATACTGTCAACCGAAATTGGTATAGCGACGCAGATGTGC  
CTGCTTCCGCACGACAGGAGGGATGCCAGGACATCGCAACCCAGCTGATTTCTAATATGGACATCGACGTGATT  
CTGGGCGGGGGACGCAAGTATAATGTTCCGAATGGGCACCCCTGACCCAGAATAACCCGACGATTATAGTCAGGG  
CGGGACAAGACTGGATGGCAAGAACCTGGTGCAGGAGTGGCTGGCTAAAAGACAGGGGGCAAGATACGTGTG  
GAATAGGACAGAAGTATGATGCAGGCCTCTCTGGACCCTAGTGTGACTCACCTGATGGGACTGTTTGAACCAGGC  
GATATGAAATATGAGATCCATAGGGACTCCACCCTGGACCCCTCTCTGATGGAAATGACCGAGGCAGCCCTGCG  
CCTGCTGAGTAGGAACCCACGCGGATTCTTTCTGTTCGTGGAGGGAGGCCGAATTGACCACGGCCACCATGAA  
TCACGAGCCTACCGGGCTCTGACTGAGACCATCATGTTTGACGATGCAATTGAACGCGCCGGGCAGCTGACCA  
GTGAAGAGGACACACTGTCACTGGTCACTGCCGATCACTCACATGTGTTTCACTTTGGAGGCTACCCCTGCG  
AGGCAGCTCCATCTTCGGACTGGCTCCTGGGAAGGCACGGGATAGAAAAGCCTACACCGTGTCTGTATGGC  
AATGGGCCAGGATACGTCCTGAAGGACGGGGCCAGACCCGATGTGACAGAATCAGAGAGCGGCAGCCCCGAG  
TATAGGCAGCAGAGCGCAGTGCCTCTGGACGAAGAGACTCACGCCGGCGAAGATGTCGCAGTGTGTTGCCAGA  
GGCCACAGGCACACCTGGTCCATGGAGTGCAGGAGCAGACTTTCATCGCCCATGTGATGGCTTTTGCTGCATG  
CCTGGAACCCTACACCGCATGTGACCTGGCTCCACCAGCAGGAACTACCGATGCCGCTCACCCCTGGCTATCATG  
ACTGCCCAGATAGCCACACCCAGTTCTGCTTTCATGGCACATGTCGCTTTCTGGTGCAGGAGGACAAGCCCGCT  
TGCGTCTGTCACTCCGGATACGTGGGCGCCCGGTGTGAACATGCAGATCTGCTGGCCGTGGTTCGCAGCCTCCC  
AGAAGAAACAGGCCATCACAGCTCTGGTGGTTCGTGTCTATTGTCGCCCTGGCTGTGCTGATCATTACTTGCCTC  
CTGATCCACTGCTGTGAGGTGCGGAAACATTGCGAGTGGTGTGCGGGCCCTGATTTGTAGACACGAGAAACCAT  
CCGCACTGCTGAAAGGGGAACTGCCTGCTGTGATAGCGAAACTGTCGTGTGA

**An amino acid sequence of the Glo-22F cAMP sensor.**

MPGAVGKVVPFIEAKVVDLDTGKTLGVNQRGELCVRGPMIMSGYVNNPEATNALIDKDGWLHSGDIAYWDEDEH  
FFIVDRLKSLIKYKGYQVAPAELESILLQHPNIFDAGVAGLPDDDAGELPAAVVLEHGKTMTEKEIVDYVASQVTT  
AKKLRGGVVLVDEVKGLTGKLDARKIREILIKAKKGSNWDSGCSREGMYESFIESLPFLKSLEFSARLKVVDVIGT  
KVYNDGEQIIAQGDSADSFFIIESGEVKITMKRKGKSEVEENGAVEIARCSRGQYFGELALVTNKPRAASAHHAIGTV  
KCLAMDVQAFERLLGPCMEIMKRNIATYEEQLVALYGTNMDIVAKNIKKGPAPFYPLEDGTAGEQLHKAMKRYAL  
VPGTIAFTDAHIEVDITYAEYFEMSVRLAEAMKRYGLNTNHRIVVCSENSLQFFMPVLGALFIGVAVAPANDIYNER  
ELLNSMGISQPTVVVFVSKKGLQKILNVQKLPKIIQKIIIMDSKTDYQGFQSMYTFVTSHLPPGFNEYDFVPESFDRDK  
TIALIMNSSGSTGLPKGVALPHRTACVRFSHARDPIFGNQIIPDTAILSVPFHGFGMFTTLGYLICGFRVVLMYRFE  
EELFLRSLQDYKIQSALLVPTLFSFFAKSTLIDKYDLSNLHEIASGGAPLSKEVGEAVAKRFHLPGIRQGYGLTETTSA  
ILITPEGV

**A nucleotide sequence of the Glo-22F cAMP sensor.**

ATGCCCGGAGCCGTCGGAAAAGTCGTGCCATTCATCGAGGCCAAAGTCGTGGATCTGGATACAGGAAAAACAC  
TGGGGGTCAATCAGAGGGGAGAGCTGTGCGTGCAGGGGACCTATGATCATGTCTGGCTACGTGAACAATCCAGA  
GGCCACCAACGCCCTGATCGATAAGGACGGCTGGCTGCACAGCGGCATATCGCCTATTGGGATGAGGACGAG  
CACTTCTTTATCGTGGACCGCCTGAAGAGCCTGATCAAGTACAAGGGCTATCAGGTGGCACCCGCCGAGCTGG  
AGTCCATCCTGCTCCAGCACCCCTAATATCTTCGATGCAGGAGTGGCAGGCCTGCCAGACGATGACGCCGGCGA  
GCTGCCTGCCCGCGTGGTGGTGGTGGAGCACGGCAAGACCATGACAGAGAAGGAGATCGTGGACTACGTGGC  
CAGCCAGGTGACCACAGCCAAGAAGCTGAGGGGAGGAGTGGTGGTGGTGGATGAGGTGCCCAAGGGCCTGA  
CCGGCAAGCTGGACGCCCCGAAGATCAGAGAGATCCTGATCAAGGCCAAGAAGGGCTCCAACCTGGGATTCTG  
GCTGCTCCCGGGAGGGCATGTACGAGTCTTTTATCGAGAGCCTGCCTTTCTGAAGTCCCTGGAGTTTTCTGCC  
CGGCTGAAGGTGGTGGATGTGATCGGCACCAAGGTGTATAATGACGGCGAGCAGATCATCGCCAGGGCGATT  
CCGCCGACTCTTTCTTTATCATCGAGTCCGGCGAGGTGAAGATCACAATGAAGAGAAAGGGCAAGTCTGAGGT  
GGAGGAGAACGGAGCAGTGGAGATCGCAAGGTGTTCCCGCGGCCAGTACTTCGGAGAGCTGGCCCTGGTGAC  
CAATAAGCCTAGGGCCGCATCTGCCACGCAATCGGCACAGTGAAGTGCCTGGCCATGGACGTGCAGGCCTTT  
GAGAGACTGCTGGGCCCATGTATGGAGATCATGAAGAGGAACATCGCCACCTACGAGGAGCAGCTGGTGGCCC  
TGTATGGCACAAACATGGATATCGTGGCCAAGAATATCAAGAAGGGACCAGCACCCCTTCTACCCCTGGAGGA  
CGGCACCGCCGGCGAGCAGCTGCACAAGGCCATGAAGAGATATGCCCTGGTGCCTGGCACCATCGCCTCACA  
GATGCCACATCGAGGTGGACATCACCTACGCCGAGTATTTTGAGATGAGCGTGCCTGGCAGAGGCAATGA  
AGCGGTACGGCCTGAACACAAATCACCGCATCGTGGTGTGCAGCGAGAACAGCCTCCAGTTCTTCATGCCAGT  
GCTGGGCGCCCTGTTTCATCGGAGTGGCAGTGGCCCCCGCCAACGATATCTATAATGAGCGGGAGCTGCTGAAC  
AGCATGGGCATCTCCAGCCAACCGTGGTGTTCGTGAGCAAGAAGGGCCTCCAGAAGATCCTGAATGTGCAGA  
AGAAGCTGCCATCATCCAGAAGATCATCATCATGGATTCTAAGACAGACTACCAGGGCTTCCAGAGCATGTAT  
ACCTTTGTGACATCCACCTGCCCCCTGGCTTCAACGAGTACGACTTTGTGCCCGAGTCTTTCGATAGGGACAA  
GACCATCGCCCTGATCATGAATAGCTCCGGCAGCACAGGCCTGCCTAAGGGAGTGGCCCTGCCACACAGGACC  
GCATGCGTGAGATTACGCCACGCCGGGACCCCATCTTTGGCAACCAGATCATCCCCGACACAGCCATCCTGTC  
CGTGGTGCCATTCCACCACGGCTTCGGCATGTTTACCACACTGGGCTACCTGATCTGTGGCTTTAGAGTGGTGC  
TGATGTATAGGTTTGAGGAGGAGCTGTTCTGCGGAGCCTCCAGGACTACAAGATCCAGAGCGCCCTGCTGGT  
GCCTACCCTGTTCTCTTTCTTTGCCAAGAGCACACTGATCGATAAGTATGACCTGTCCAATCTGCACGAGATCGC  
ATCCGGAGGAGCACCTCTGTCTAAGGAAGTGGGCGAGGCCGTGGCCAAGAGGTTTCACCTGCCAGGCATCAG  
ACAGGGCTACGGGCTGACTGAGACAACATCCGCTATTCTGATTACACCAGAGGGCGTCTGA

**Amino acid sequences of the chimeric G $\alpha$  subunits used in this study.**

C-terminally substituted 6-amino acids are highlighted in blue.

G $\alpha$ q ( $\Delta$ C)

MTLESIMACCLSEEAKEARRINDEIERQLRRDKRDARRELKLLLLGTGESGKSTFIKQMRIIHGSGYSDEDKRGFTK  
LVYQNIPTAMQAMIRAMDTLKIPYKYEHNKAAHAQLVREVDVEKVSFAFENPYVDAIKSLWNDPGIQECYDRRREYQ  
LSDSTKYLLNDLDRVADPAYLPTQQDVLRRVPTTGIIYPFDLQSVIFRMVDVGGQRSERRKWIHCFENVTSIMFL  
VALSEYDQVLVESDNENRMEESKALFRTIITYPWFQNSSVILFLNKKDLLEEKIMYSHLVDYFPEYDGPQRDAQAAR  
EFILKMFVDLNPDSKIIYSHFTCATDTENIRFVFAAVKDTILQLN

G $\alpha$ q/s

MTLESIMACCLSEEAKEARRINDEIERQLRRDKRDARRELKLLLLGTGESGKSTFIKQMRIIHGSGYSDEDKRGFTK  
LVYQNIPTAMQAMIRAMDTLKIPYKYEHNKAAHAQLVREVDVEKVSFAFENPYVDAIKSLWNDPGIQECYDRRREYQ  
LSDSTKYLLNDLDRVADPAYLPTQQDVLRRVPTTGIIYPFDLQSVIFRMVDVGGQRSERRKWIHCFENVTSIMFL  
VALSEYDQVLVESDNENRMEESKALFRTIITYPWFQNSSVILFLNKKDLLEEKIMYSHLVDYFPEYDGPQRDAQAAR  
EFILKMFVDLNPDSKIIYSHFTCATDTENIRFVFAAVKDTILQLNLKQYELL

G $\alpha$ q/olf

MTLESIMACCLSEEAKEARRINDEIERQLRRDKRDARRELKLLLLGTGESGKSTFIKQMRIIHGSGYSDEDKRGFTK  
LVYQNIPTAMQAMIRAMDTLKIPYKYEHNKAAHAQLVREVDVEKVSFAFENPYVDAIKSLWNDPGIQECYDRRREYQ  
LSDSTKYLLNDLDRVADPAYLPTQQDVLRRVPTTGIIYPFDLQSVIFRMVDVGGQRSERRKWIHCFENVTSIMFL  
VALSEYDQVLVESDNENRMEESKALFRTIITYPWFQNSSVILFLNKKDLLEEKIMYSHLVDYFPEYDGPQRDAQAAR  
EFILKMFVDLNPDSKIIYSHFTCATDTENIRFVFAAVKDTILQLNLKQYELL

G $\alpha$ q/i1

MTLESIMACCLSEEAKEARRINDEIERQLRRDKRDARRELKLLLLGTGESGKSTFIKQMRIIHGSGYSDEDKRGFTK  
LVYQNIPTAMQAMIRAMDTLKIPYKYEHNKAAHAQLVREVDVEKVSFAFENPYVDAIKSLWNDPGIQECYDRRREYQ  
LSDSTKYLLNDLDRVADPAYLPTQQDVLRRVPTTGIIYPFDLQSVIFRMVDVGGQRSERRKWIHCFENVTSIMFL  
VALSEYDQVLVESDNENRMEESKALFRTIITYPWFQNSSVILFLNKKDLLEEKIMYSHLVDYFPEYDGPQRDAQAAR  
EFILKMFVDLNPDSKIIYSHFTCATDTENIRFVFAAVKDTILQLNLKDCGLF

G $\alpha$ q/i3

MTLESIMACCLSEEAKEARRINDEIERQLRRDKRDARRELKLLLLGTGESGKSTFIKQMRIIHGSGYSDEDKRGFTK

LVYQNIFTAMQAMIRAMDTLKIPYKYEHNKAAHAQLVREVDVEKVSASFENPYVDAIKSLWNDPGIQECYDRRREYQ  
LSDSTKYLLNDLDRVADPAYLPTQQDVLVRVPPTTGIIYPFDLQSVIFRMVDVGGQRSERRKWIHCFENVTSIMFL  
VALSEYDQVLVESDNENRMEESKALFRITITYPWFQNSSVILFLNKKDLLEEKIMYSHLVDYFPEYDGPQRDAQAAR  
EFILKMFVDLNPDSKIIYSHFTCATDTENIRFVFAAVKDTILQLNLKECGLY

Gaq/o

MTLESIMACCLSEEAKEARRINDEIERQLRRDKRDARRELKLLLLGTGESGKSTFIKQMRIIHGSGYSDEDKRGFTK  
LVYQNIFTAMQAMIRAMDTLKIPYKYEHNKAAHAQLVREVDVEKVSASFENPYVDAIKSLWNDPGIQECYDRRREYQ  
LSDSTKYLLNDLDRVADPAYLPTQQDVLVRVPPTTGIIYPFDLQSVIFRMVDVGGQRSERRKWIHCFENVTSIMFL  
VALSEYDQVLVESDNENRMEESKALFRITITYPWFQNSSVILFLNKKDLLEEKIMYSHLVDYFPEYDGPQRDAQAAR  
EFILKMFVDLNPDSKIIYSHFTCATDTENIRFVFAAVKDTILQLNLRGCGLY

Gaq/z

MTLESIMACCLSEEAKEARRINDEIERQLRRDKRDARRELKLLLLGTGESGKSTFIKQMRIIHGSGYSDEDKRGFTK  
LVYQNIFTAMQAMIRAMDTLKIPYKYEHNKAAHAQLVREVDVEKVSASFENPYVDAIKSLWNDPGIQECYDRRREYQ  
LSDSTKYLLNDLDRVADPAYLPTQQDVLVRVPPTTGIIYPFDLQSVIFRMVDVGGQRSERRKWIHCFENVTSIMFL  
VALSEYDQVLVESDNENRMEESKALFRITITYPWFQNSSVILFLNKKDLLEEKIMYSHLVDYFPEYDGPQRDAQAAR  
EFILKMFVDLNPDSKIIYSHFTCATDTENIRFVFAAVKDTILQLNLKYIGLC

Gaq

MTLESIMACCLSEEAKEARRINDEIERQLRRDKRDARRELKLLLLGTGESGKSTFIKQMRIIHGSGYSDEDKRGFTK  
LVYQNIFTAMQAMIRAMDTLKIPYKYEHNKAAHAQLVREVDVEKVSASFENPYVDAIKSLWNDPGIQECYDRRREYQ  
LSDSTKYLLNDLDRVADPAYLPTQQDVLVRVPPTTGIIYPFDLQSVIFRMVDVGGQRSERRKWIHCFENVTSIMFL  
VALSEYDQVLVESDNENRMEESKALFRITITYPWFQNSSVILFLNKKDLLEEKIMYSHLVDYFPEYDGPQRDAQAAR  
EFILKMFVDLNPDSKIIYSHFTCATDTENIRFVFAAVKDTILQLNLKEYNLV

Gaq/14

MTLESIMACCLSEEAKEARRINDEIERQLRRDKRDARRELKLLLLGTGESGKSTFIKQMRIIHGSGYSDEDKRGFTK  
LVYQNIFTAMQAMIRAMDTLKIPYKYEHNKAAHAQLVREVDVEKVSASFENPYVDAIKSLWNDPGIQECYDRRREYQ  
LSDSTKYLLNDLDRVADPAYLPTQQDVLVRVPPTTGIIYPFDLQSVIFRMVDVGGQRSERRKWIHCFENVTSIMFL  
VALSEYDQVLVESDNENRMEESKALFRITITYPWFQNSSVILFLNKKDLLEEKIMYSHLVDYFPEYDGPQRDAQAAR  
EFILKMFVDLNPDSKIIYSHFTCATDTENIRFVFAAVKDTILQLNLREFNLV

Gaa/16

MTLESIMACCLSEEAKEARRINDEIERQLRRDKRDARRELKLLLLGTGESGKSTFIKQMRIIHGSGYSDEDKRGFTK  
LVYQNIFTAMQAMIRAMDTLKIPYKYEHNKAAHAQLVREVDVEKVSFAFENPYVDAIKSLWNDPGIQECYDRRREYQ  
LSDSTKYLLNDLDRVADPAYLPTQQDVLVRVPTTGIIYPFDLQSVIFRMVDVGGQRSERRKWIHCFENVTSIMFL  
VALSEYDQVLVESDNENRMEESKALFRTIITYPWFQNSSVILFLNKKDLLEEKIMYSHLVDYFPEYDGPQRDAQAAR  
EFILKMFVDLNPDSKIIYSHFTCATDTENIRFVFAAVKDTILQLNLDEINLL

Gaa/12

MTLESIMACCLSEEAKEARRINDEIERQLRRDKRDARRELKLLLLGTGESGKSTFIKQMRIIHGSGYSDEDKRGFTK  
LVYQNIFTAMQAMIRAMDTLKIPYKYEHNKAAHAQLVREVDVEKVSFAFENPYVDAIKSLWNDPGIQECYDRRREYQ  
LSDSTKYLLNDLDRVADPAYLPTQQDVLVRVPTTGIIYPFDLQSVIFRMVDVGGQRSERRKWIHCFENVTSIMFL  
VALSEYDQVLVESDNENRMEESKALFRTIITYPWFQNSSVILFLNKKDLLEEKIMYSHLVDYFPEYDGPQRDAQAAR  
EFILKMFVDLNPDSKIIYSHFTCATDTENIRFVFAAVKDTILQLNLKDIMLQ

Gaa/13

MTLESIMACCLSEEAKEARRINDEIERQLRRDKRDARRELKLLLLGTGESGKSTFIKQMRIIHGSGYSDEDKRGFTK  
LVYQNIFTAMQAMIRAMDTLKIPYKYEHNKAAHAQLVREVDVEKVSFAFENPYVDAIKSLWNDPGIQECYDRRREYQ  
LSDSTKYLLNDLDRVADPAYLPTQQDVLVRVPTTGIIYPFDLQSVIFRMVDVGGQRSERRKWIHCFENVTSIMFL  
VALSEYDQVLVESDNENRMEESKALFRTIITYPWFQNSSVILFLNKKDLLEEKIMYSHLVDYFPEYDGPQRDAQAAR  
EFILKMFVDLNPDSKIIYSHFTCATDTENIRFVFAAVKDTILQLNLKQLMLQ

Gas (ΔC)

MGCLGNSKTEDQRNEEKAQREANKKIEKQLQKDKQVYRATHRLLLLGAGESGKSTIVKQMRILHVNGFNGDSEK  
ATKVQDIKNNLKEAIEIVAAMS NLVPPVELANPENQFRVDYILSVMNVPDFDFPPEFYEHAKALWEDEGVRACYE  
RSNEYQLIDCAQYFLDKIDVIKQADYVPSDQDLLRCRVLTSGIFETKFQVDKVNFMFDVGGQRDERRKWIQCFN  
DVTAIIFV VASSYNMVIREDNQTNR LQEALNLFKSIWNNRWLRTISVILFLNKQDLLAEKVLGKSKIEDYFPEFAR  
YTPEDATPEPGEDPRVTRAKYFIRDEF LRISTASGDGRHYCYPHFTCAVDTENIRRVFNDCRDIIQRMHL

Gas

MGCLGNSKTEDQRNEEKAQREANKKIEKQLQKDKQVYRATHRLLLLGAGESGKSTIVKQMRILHVNGFNGDSEK  
ATKVQDIKNNLKEAIEIVAAMS NLVPPVELANPENQFRVDYILSVMNVPDFDFPPEFYEHAKALWEDEGVRACYE  
RSNEYQLIDCAQYFLDKIDVIKQADYVPSDQDLLRCRVLTSGIFETKFQVDKVNFMFDVGGQRDERRKWIQCFN  
DVTAIIFV VASSYNMVIREDNQTNR LQEALNLFKSIWNNRWLRTISVILFLNKQDLLAEKVLGKSKIEDYFPEFAR

YTPEDATPEPGEDPRVTRAKYFIRDEFRLISTASGDGRHYCYPHFTCAVDTENIRRVFNDCRDIIQRMHLRQYELL

Gas/olf

MGCLGNSKTEDQRNEEKAQREANKKIEKQLQKDKQVYRATHRLLLLGAGESGKSTIVKQMRILHVNGFNGDSEK  
ATKVQDIKNNLKEAIE TIVAAMS NLVPPVELANPENQFRVDYILSVMNVPDFDFPPEFYEHAKALWEDEGVRACYE  
RSNEYQLIDCAQYFLDKIDVIKQADYVPSDQDLLRCRVLTSGIFETKFQVDKVNFMFDVGGQRDERRKWIQCFN  
DVTAIIFVVASSSYNMVIREDNQTNRLQEALNLFKSIWNNRWLRTISVILFLNKQDLLAEKVLGKSKIEDYFPEFAR  
YTPEDATPEPGEDPRVTRAKYFIRDEFRLISTASGDGRHYCYPHFTCAVDTENIRRVFNDCRDIIQRMHLKQYELL

Gas/i1

MGCLGNSKTEDQRNEEKAQREANKKIEKQLQKDKQVYRATHRLLLLGAGESGKSTIVKQMRILHVNGFNGDSEK  
ATKVQDIKNNLKEAIE TIVAAMS NLVPPVELANPENQFRVDYILSVMNVPDFDFPPEFYEHAKALWEDEGVRACYE  
RSNEYQLIDCAQYFLDKIDVIKQADYVPSDQDLLRCRVLTSGIFETKFQVDKVNFMFDVGGQRDERRKWIQCFN  
DVTAIIFVVASSSYNMVIREDNQTNRLQEALNLFKSIWNNRWLRTISVILFLNKQDLLAEKVLGKSKIEDYFPEFAR  
YTPEDATPEPGEDPRVTRAKYFIRDEFRLISTASGDGRHYCYPHFTCAVDTENIRRVFNDCRDIIQRMHLKDCGLF

Gas/i3

MGCLGNSKTEDQRNEEKAQREANKKIEKQLQKDKQVYRATHRLLLLGAGESGKSTIVKQMRILHVNGFNGDSEK  
ATKVQDIKNNLKEAIE TIVAAMS NLVPPVELANPENQFRVDYILSVMNVPDFDFPPEFYEHAKALWEDEGVRACYE  
RSNEYQLIDCAQYFLDKIDVIKQADYVPSDQDLLRCRVLTSGIFETKFQVDKVNFMFDVGGQRDERRKWIQCFN  
DVTAIIFVVASSSYNMVIREDNQTNRLQEALNLFKSIWNNRWLRTISVILFLNKQDLLAEKVLGKSKIEDYFPEFAR  
YTPEDATPEPGEDPRVTRAKYFIRDEFRLISTASGDGRHYCYPHFTCAVDTENIRRVFNDCRDIIQRMHLKECGLY

Gas/o

MGCLGNSKTEDQRNEEKAQREANKKIEKQLQKDKQVYRATHRLLLLGAGESGKSTIVKQMRILHVNGFNGDSEK  
ATKVQDIKNNLKEAIE TIVAAMS NLVPPVELANPENQFRVDYILSVMNVPDFDFPPEFYEHAKALWEDEGVRACYE  
RSNEYQLIDCAQYFLDKIDVIKQADYVPSDQDLLRCRVLTSGIFETKFQVDKVNFMFDVGGQRDERRKWIQCFN  
DVTAIIFVVASSSYNMVIREDNQTNRLQEALNLFKSIWNNRWLRTISVILFLNKQDLLAEKVLGKSKIEDYFPEFAR  
YTPEDATPEPGEDPRVTRAKYFIRDEFRLISTASGDGRHYCYPHFTCAVDTENIRRVFNDCRDIIQRMHLRGCGLY

Gas/z

MGCLGNSKTEDQRNEEKAQREANKKIEKQLQKDKQVYRATHRLLLLGAGESGKSTIVKQMRILHVNGFNGDSEK  
ATKVQDIKNNLKEAIE TIVAAMS NLVPPVELANPENQFRVDYILSVMNVPDFDFPPEFYEHAKALWEDEGVRACYE



RSNEYQLIDCAQYFLDKIDVIKQADYVPSDQDLLRCRVLTSGIFETKFQVDKVNFMFDVGGQRDERRKWIQCFN  
DVTAIIFVVASSYNNMVIREDNQTNRLQEALNLFKSIWNNRWLRTISVILFLNKQDLLAEKVLGKSKIETYFPEFAR  
YTPEDATPEPGEDPRVTRAKYFIRDEFRLISTASGDGRHYCYPHFTCAVDTENIRRVFNDCRDIIQRMHLKYIGLC

Gas/q

MGCLGNSKTEDQRNEEKAQREANKKIEKQLQKDKQVYRATHRLLLLGAGESGKSTIVKQMRILHVNGFNGDSEK  
ATKVQDIKNNLKEAIEITIVAAMSNLVPVELANPENQFRVDYILSVMNVPDFDFPPEFYEHAKALWEDEGVRACYE  
RSNEYQLIDCAQYFLDKIDVIKQADYVPSDQDLLRCRVLTSGIFETKFQVDKVNFMFDVGGQRDERRKWIQCFN  
DVTAIIFVVASSYNNMVIREDNQTNRLQEALNLFKSIWNNRWLRTISVILFLNKQDLLAEKVLGKSKIETYFPEFAR  
YTPEDATPEPGEDPRVTRAKYFIRDEFRLISTASGDGRHYCYPHFTCAVDTENIRRVFNDCRDIIQRMHLKEYNLV

Gas/14

MGCLGNSKTEDQRNEEKAQREANKKIEKQLQKDKQVYRATHRLLLLGAGESGKSTIVKQMRILHVNGFNGDSEK  
ATKVQDIKNNLKEAIEITIVAAMSNLVPVELANPENQFRVDYILSVMNVPDFDFPPEFYEHAKALWEDEGVRACYE  
RSNEYQLIDCAQYFLDKIDVIKQADYVPSDQDLLRCRVLTSGIFETKFQVDKVNFMFDVGGQRDERRKWIQCFN  
DVTAIIFVVASSYNNMVIREDNQTNRLQEALNLFKSIWNNRWLRTISVILFLNKQDLLAEKVLGKSKIETYFPEFAR  
YTPEDATPEPGEDPRVTRAKYFIRDEFRLISTASGDGRHYCYPHFTCAVDTENIRRVFNDCRDIIQRMHLREFNLV

Gas/16

MGCLGNSKTEDQRNEEKAQREANKKIEKQLQKDKQVYRATHRLLLLGAGESGKSTIVKQMRILHVNGFNGDSEK  
ATKVQDIKNNLKEAIEITIVAAMSNLVPVELANPENQFRVDYILSVMNVPDFDFPPEFYEHAKALWEDEGVRACYE  
RSNEYQLIDCAQYFLDKIDVIKQADYVPSDQDLLRCRVLTSGIFETKFQVDKVNFMFDVGGQRDERRKWIQCFN  
DVTAIIFVVASSYNNMVIREDNQTNRLQEALNLFKSIWNNRWLRTISVILFLNKQDLLAEKVLGKSKIETYFPEFAR  
YTPEDATPEPGEDPRVTRAKYFIRDEFRLISTASGDGRHYCYPHFTCAVDTENIRRVFNDCRDIIQRMHLDEINLL

Gas/12

MGCLGNSKTEDQRNEEKAQREANKKIEKQLQKDKQVYRATHRLLLLGAGESGKSTIVKQMRILHVNGFNGDSEK  
ATKVQDIKNNLKEAIEITIVAAMSNLVPVELANPENQFRVDYILSVMNVPDFDFPPEFYEHAKALWEDEGVRACYE  
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MGCLGNSKTEDQRNEEKAQREANKKIEKQLQKDKQVYRATHRLLLLGAGESGKSTIVKQMRILHVNGFNGDSEK  
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YTPEDATPEPGEDPRVTRAKYFIRDEF LRISTASGDGRHYCYPHFTCAVDTENIRRVFNDCRDIIQRMHL [KQLMLQ](#)

## **Nucleotide sequences of the chimeric G $\alpha$ subunits.**

### G $\alpha$ q ( $\Delta$ C)

ATGACTCTGGAGTCCATCATGGCGTGCTGCCTGAGCGAGGAGGCCAAGGAAGCCC GGCGGATCAACGACGAG  
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GGGGCTTCACCAAGCTGGTGTATCAGAACATCTTCACGGCCATGCAGGCCATGATCAGAGCCATGGACACACT  
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### G $\alpha$ q/s

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Gag

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TGGAGAATCTGGTAAAAGCACCATTGTGAAGCAGATGAGGATCCTGCATGTTAATGGGTTTAATGGAGACAGTG  
AGAAGGCAACCAAAGTGCAGGACATCAAAAACAACCTGAAAGAGGCGATTGAAACCATTGTGGCCGCCATGA  
GCAACCTGGTGCCCCCGTGGAGCTGGCCAACCCGAGAACCAGTTCAGAGTGGACTACATTCTGAGTGTGAT  
GAACGTGCCTGACTTTGACTTCCCTCCCGAATTCTATGAGCATGCCAAGGCTCTGTGGGAGGATGAAGGAGTG  
CGTGCCTGCTACGAACGCTCCAACGAGTACCAGCTGATTGACTGTGCCAGTACTTCTGGACAAGATCGACG  
TGATCAAGCAGGCTGACTATGTGCCGAGCGATCAGGACCTGCTTCGCTGCCGTGTCCTGACTTCTGGAATCTTT  
GAGACCAAGTTCCAGGTGGACAAAGTCAACTTCCACATGTTTGACGTGGGTGGCCAGCGCGATGAACGCCGC  
AAGTGGATCCAGTGCTTCAACGATGTGACTGCCATCATCTTCGTGGTGGCCAGCAGCAGCTACAACATGGTCAT  
CCGGGAGGACAACCAGACCAACCGCCTGCAGGAGGCTCTGAACCTCTTCAAGAGCATCTGGAACAACAGATG  
GCTGCGCACCATCTCTGTGATCCTGTTCTCAACAAGCAAGATCTGCTCGCTGAGAAAGTCCTTGCTGGGAAAT  
CGAAGATTGAGGACTACTTTCCAGAATTTGCTCGCTACACTACTCTGAGGATGCTACTCCCGAGCCCGGAGAG  
GACCCACGCGTGACCCGGGCCAAGTACTTCATTTCGAGATGAGTTTCTGAGGATCAGCACTGCCAGTGGAGATG  
GGCGTCACTACTGCTACCCTCATTTCACCTGCGCTGTGGACTGAGAACATCCGCCGTGTGTTCAACGACTGC  
CGTGACATCATTACGCGCATGCACCTGAAGCAGTATGAGCTCTTGTGA

Gas/i1

ATGGGATGCCTCGGGAACAGTAAGACCGAGGACCAGCGCAACGAGGAGAAGGCCGAGCGTGAGGCCAACAA  
AAAGATCGAGAAGCAGCTGCAGAAGGACAAGCAGGTCTACCGGGCCACGCACCGCCTGCTGCTGCTGGGTGC  
TGGAGAATCTGGTAAAAGCACCATTGTGAAGCAGATGAGGATCCTGCATGTTAATGGGTTTAATGGAGACAGTG

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GCAACCTGGTGCCCCCGTGGAGCTGGCCAACCCGAGAACCAGTTCAGAGTGGACTACATTCTGAGTGTGAT  
GAACGTGCCTGACTTTGACTTCCCTCCCGAATTCTATGAGCATGCCAAGGCTCTGTGGGAGGATGAAGGAGTG  
CGTGCCTGCTACGAACGCTCCAACGAGTACCAGCTGATTGACTGTGCCAGTACTTCTGGACAAGATCGACG  
TGATCAAGCAGGCTGACTATGTGCCGAGCGATCAGGACCTGCTTCGCTGCCGTGTCCTGACTTCTGGAATCTTT  
GAGACCAAGTTCCAGGTGGACAAAGTCAACTTCCACATGTTTGACGTGGGTGGCCAGCGCGATGAACGCCGC  
AAGTGGATCCAGTGCTTCAACGATGTGACTGCCATCATCTTCGTGGTGGCCAGCAGCAGCTACAACATGGTCAT  
CCGGGAGGACAACCAGACCAACCGCCTGCAGGAGGCTCTGAACCTCTTCAAGAGCATCTGGAACAACAGATG  
GCTGCGCACCATCTCTGTGATCCTGTTCCCTCAACAAGCAAGATCTGCTCGCTGAGAAAGTCCTTGCTGGGAAAT  
CGAAGATTGAGGACTACTTTCCAGAATTTGCTCGCTACACTACTCTGAGGATGCTACTCCCGAGCCCGGAGAG  
GACCCACGCGTGACCCGGGCCAAGTACTTCATTTCAGATGAGTTTCTGAGGATCAGCACTGCCAGTGGAGATG  
GGCGTCACTACTGCTACCCTCATTTCACCTGCGCTGTGGACACTGAGAACATCCGCCGTGTGTTCAACGACTGC  
CGTGACATCATTTCAGCGCATGCACCTGAAAGATTGTGGTCTCTTTTGA

Gas/i3

ATGGGATGCCTCGGGAACAGTAAGACCGAGGACCAGCGCAACGAGGAGAAGGCCGAGCGTGAGGCCAACAA  
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TGGAGAATCTGGTAAAAGCACCATTGTGAAGCAGATGAGGATCCTGCATGTTAATGGGTTTAATGGAGACAGTG  
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GCAACCTGGTGCCCCCGTGGAGCTGGCCAACCCGAGAACCAGTTCAGAGTGGACTACATTCTGAGTGTGAT  
GAACGTGCCTGACTTTGACTTCCCTCCCGAATTCTATGAGCATGCCAAGGCTCTGTGGGAGGATGAAGGAGTG  
CGTGCCTGCTACGAACGCTCCAACGAGTACCAGCTGATTGACTGTGCCAGTACTTCTGGACAAGATCGACG  
TGATCAAGCAGGCTGACTATGTGCCGAGCGATCAGGACCTGCTTCGCTGCCGTGTCCTGACTTCTGGAATCTTT  
GAGACCAAGTTCCAGGTGGACAAAGTCAACTTCCACATGTTTGACGTGGGTGGCCAGCGCGATGAACGCCGC  
AAGTGGATCCAGTGCTTCAACGATGTGACTGCCATCATCTTCGTGGTGGCCAGCAGCAGCTACAACATGGTCAT  
CCGGGAGGACAACCAGACCAACCGCCTGCAGGAGGCTCTGAACCTCTTCAAGAGCATCTGGAACAACAGATG  
GCTGCGCACCATCTCTGTGATCCTGTTCCCTCAACAAGCAAGATCTGCTCGCTGAGAAAGTCCTTGCTGGGAAAT  
CGAAGATTGAGGACTACTTTCCAGAATTTGCTCGCTACACTACTCTGAGGATGCTACTCCCGAGCCCGGAGAG  
GACCCACGCGTGACCCGGGCCAAGTACTTCATTTCAGATGAGTTTCTGAGGATCAGCACTGCCAGTGGAGATG  
GGCGTCACTACTGCTACCCTCATTTCACCTGCGCTGTGGACACTGAGAACATCCGCCGTGTGTTCAACGACTGC  
CGTGACATCATTTCAGCGCATGCACCTGAAGGAATGTGGACTTTATTGA

Gas/o

ATGGGATGCCTCGGGAACAGTAAGACCGAGGACCAGCGCAACGAGGAGAAGGCCGACGCGTGAGGCCAACAA  
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GCAACCTGGTGCCCCCGTGGAGCTGGCCAACCCGAGAACCAGTTCAGAGTGGACTACATTCTGAGTGTGAT  
GAACGTGCCTGACTTTGACTTCCCTCCCGAATTCTATGAGCATGCCAAGGCTCTGTGGGAGGATGAAGGAGTG  
CGTGCCTGCTACGAACGCTCCAACGAGTACCAGCTGATTGACTGTGCCCAGTACTTCTGGACAAGATCGACG  
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GGCGTCACTACTGCTACCCTCATTTCACCTGCGCTGTGGACACTGAGAACATCCGCCGTGTGTTCAACGACTGC  
CGTGACATCATTTCAGCGCATGCACCTGCGGGGCTGCGGCTTGTACTGA

Gas/z

ATGGGATGCCTCGGGAACAGTAAGACCGAGGACCAGCGCAACGAGGAGAAGGCCGACGCGTGAGGCCAACAA  
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GCAACCTGGTGCCCCCGTGGAGCTGGCCAACCCGAGAACCAGTTCAGAGTGGACTACATTCTGAGTGTGAT  
GAACGTGCCTGACTTTGACTTCCCTCCCGAATTCTATGAGCATGCCAAGGCTCTGTGGGAGGATGAAGGAGTG  
CGTGCCTGCTACGAACGCTCCAACGAGTACCAGCTGATTGACTGTGCCCAGTACTTCTGGACAAGATCGACG  
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GAGACCAAGTTCCAGGTGGACAAAGTCAACTTCCACATGTTTGACGTGGGTGGCCAGCGCGATGAACGCCGC  
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GCTGCGCACCATCTCTGTGATCCTGTTCCCTCAACAAGCAAGATCTGCTCGCTGAGAAAGTCCTTGCTGGGAAAT  
CGAAGATTGAGGACTACTTTCCAGAATTTGCTCGCTACACTACTCTGAGGATGCTACTCCCGAGCCCGGAGAG  
GACCCACGCGTGACCCGGGCCAAGTACTTCATTTCAGATGAGTTTCTGAGGATCAGCACTGCCAGTGGAGATG  
GGCGTCACTACTGCTACCCTCATTTCACCTGCGCTGTGGACACTGAGAACATCCGCCGTGTGTTCAACGACTGC

CGTGACATCATTAGCGCATGCACCTGAAGTACATTGGCCTTTGCTGA

Gas/q

ATGGGATGCCTCGGGAACAGTAAGACCGAGGACCAGCGCAACGAGGAGAAGGCCGACGCGTGAGGCCAACAA  
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AAGTGGATCCAGTGCTTCAACGATGTGACTGCCATCATCTTCGTGGTGGCCAGCAGCAGCTACAACATGGTCAT  
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GGCGTCACTACTGCTACCCTCATTTCACCTGCGCTGTGGACTGAGAACATCCGCCGTGTGTTCAACGACTGC  
CGTGACATCATTAGCGCATGCACCTGAAGGAGTACAATCTGGTCTGA

Gas/14

ATGGGATGCCTCGGGAACAGTAAGACCGAGGACCAGCGCAACGAGGAGAAGGCCGACGCGTGAGGCCAACAA  
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GCAACCTGGTGCCCCCGTGGAGCTGGCCAACCCGAGAACCAGTTCAGAGTGGACTACATTCTGAGTGTGAT  
GAACGTGCCTGACTTTGACTTCCCTCCCGAATTCTATGAGCATGCCAAGGCTCTGTGGGAGGATGAAGGAGTG  
CGTGCCTGCTACGAACGCTCCAACGAGTACCAGCTGATTGACTGTGCCAGTACTTCTGGACAAGATCGACG  
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GAGACCAAGTTCCAGGTGGACAAAGTCAACTTCCACATGTTTGACGTGGGTGGCCAGCGCGATGAACGCCGC  
AAGTGGATCCAGTGCTTCAACGATGTGACTGCCATCATCTTCGTGGTGGCCAGCAGCAGCTACAACATGGTCAT  
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GGCGTCACTACTGCTACCCTCATTTCACCTGCGCTGTGGACACTGAGAACATCCGCCGTGTGTTCAACGACTGC  
CGTGACATCATTAGCGCATGCACCTGAGGGAATTCAACCTTGTCTGA

Gas/16

ATGGGATGCCTCGGGAACAGTAAGACCGAGGACCAGCGCAACGAGGAGAAGGCCGACGCGTGAGGCCAACAA  
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TGGAGAATCTGGTAAAAGCACCATTGTGAAGCAGATGAGGATCCTGCATGTTAATGGGTTTAATGGAGACAGTG  
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GCAACCTGGTGCCCCCGTGAGCTGGCCAACCCGAGAACCAGTTCAGAGTGGACTACATTCTGAGTGTGAT  
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CGTGCCCTGCTACGAACGCTCCAACGAGTACCAGCTGATTGACTGTGCCAGTACTTCTGGACAAGATCGACG  
TGATCAAGCAGGCTGACTATGTGCCGAGCGATCAGGACCTGCTTCGCTGCCGTGTCTGACTTCTGGAATCTTT  
GAGACCAAGTTCCAGGTGGACAAAGTCAACTTCCACATGTTTGACGTGGGTGGCCAGCGCGATGAACGCCGC  
AAGTGGATCCAGTGCTTCAACGATGTGACTGCCATCATCTTCGTGGTGGCCAGCAGCAGCTACAACATGGTCAT  
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GCTGCGCACCATCTCTGTGATCCTGTTCCCTCAACAAGCAAGATCTGCTCGCTGAGAAAGTCCTTGCTGGGAAAT  
CGAAGATTGAGGACTACTTTCCAGAATTTGCTCGCTACACTACTCCTGAGGATGCTACTCCCGAGCCCGGAGAG  
GACCCACGCGTGACCCGGGCCAAGTACTTCATTTCGAGATGAGTTTCTGAGGATCAGCACTGCCAGTGGAGATG  
GGCGTCACTACTGCTACCCTCATTTCACCTGCGCTGTGGACACTGAGAACATCCGCCGTGTGTTCAACGACTGC  
CGTGACATCATTAGCGCATGCACCTGGACGAGATCAACCTGCTGTGA

Gas/12

ATGGGATGCCTCGGGAACAGTAAGACCGAGGACCAGCGCAACGAGGAGAAGGCCGACGCGTGAGGCCAACAA  
AAAGATCGAGAAGCAGCTGCAGAAGGACAAGCAGGTCTACCGGGCCACGCACCGCCTGCTGCTGCTGGGTGC  
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GCAACCTGGTGCCCCCGTGAGCTGGCCAACCCGAGAACCAGTTCAGAGTGGACTACATTCTGAGTGTGAT  
GAACGTGCCTGACTTTGACTTCCCTCCCGAATTCTATGAGCATGCCAAGGCTCTGTGGGAGGATGAAGGAGTG  
CGTGCCCTGCTACGAACGCTCCAACGAGTACCAGCTGATTGACTGTGCCAGTACTTCTGGACAAGATCGACG  
TGATCAAGCAGGCTGACTATGTGCCGAGCGATCAGGACCTGCTTCGCTGCCGTGTCTGACTTCTGGAATCTTT  
GAGACCAAGTTCCAGGTGGACAAAGTCAACTTCCACATGTTTGACGTGGGTGGCCAGCGCGATGAACGCCGC

AAGTGGATCCAGTGCTTCAACGATGTGACTGCCATCATCTTCGTGGTGGCCAGCAGCAGCTACAACATGGTCAT  
CCGGGAGGACAACCAGACCAACCGCCTGCAGGAGGCTCTGAACCTCTTCAAGAGCATCTGGAACAACAGATG  
GCTGCGCACCATCTCTGTGATCCTGTTCCCTCAACAAGCAAGATCTGCTCGCTGAGAAAGTCCTTGCTGGGAAAT  
CGAAGATTGAGGACTACTTTCCAGAATTTGCTCGCTACACTACTCCTGAGGATGCTACTCCCGAGCCCGGAGAG  
GACCCACGCGTGACCCGGGCCAAGTACTTCATTCGAGATGAGTTTCTGAGGATCAGCACTGCCAGTGGAGATG  
GGCGTCACTACTGCTACCCTCATTTCACCTGCGCTGTGGACACTGAGAACATCCGCCGTGTGTTCAACGACTGC  
CGTGACATCATTAGCGCATGCACCTGAAGGACATCATGCTGCAGTGA

Gas/13

ATGGGATGCCTCGGGAACAGTAAGACCGAGGACCAGCGCAACGAGGAGAAGGCCGAGCGTGAGGCCAACAA  
AAAGATCGAGAAGCAGCTGCAGAAGGACAAGCAGGTCTACCGGGCCACGCACCGCCTGCTGCTGCTGGGTGC  
TGGAGAATCTGGTAAAAGCACCATTGTGAAGCAGATGAGGATCCTGCATGTTAATGGGTTTAATGGAGACAGTG  
AGAAGGCAACCAAAGTGCAGGACATCAAAAACAACCTGAAAGAGGCGATTGAAACCATTGTGGCCGCCATGA  
GCAACCTGGTGCCCCCGTGGAGCTGGCCAACCCGAGAACCAGTTCAGAGTGGACTACATTCTGAGTGTGAT  
GAACGTGCCTGACTTTGACTTCCCTCCCGAATTCTATGAGCATGCCAAGGCTCTGTGGGAGGATGAAGGAGTG  
CGTGCCCTGCTACGAACGCTCCAACGAGTACCAGCTGATTGACTGTGCCCAGTACTTCTGGACAAGATCGACG  
TGATCAAGCAGGCTGACTATGTGCCGAGCGATCAGGACCTGCTTCGCTGCCGTGTCTGACTTCTGGAATCTTT  
GAGACCAAGTTCCAGGTGGACAAAGTCAACTTCCACATGTTTGACGTGGGTGGCCAGCGCGATGAACGCCGC  
AAGTGGATCCAGTGCTTCAACGATGTGACTGCCATCATCTTCGTGGTGGCCAGCAGCAGCTACAACATGGTCAT  
CCGGGAGGACAACCAGACCAACCGCCTGCAGGAGGCTCTGAACCTCTTCAAGAGCATCTGGAACAACAGATG  
GCTGCGCACCATCTCTGTGATCCTGTTCCCTCAACAAGCAAGATCTGCTCGCTGAGAAAGTCCTTGCTGGGAAAT  
CGAAGATTGAGGACTACTTTCCAGAATTTGCTCGCTACACTACTCCTGAGGATGCTACTCCCGAGCCCGGAGAG  
GACCCACGCGTGACCCGGGCCAAGTACTTCATTCGAGATGAGTTTCTGAGGATCAGCACTGCCAGTGGAGATG  
GGCGTCACTACTGCTACCCTCATTTCACCTGCGCTGTGGACACTGAGAACATCCGCCGTGTGTTCAACGACTGC  
CGTGACATCATTAGCGCATGCACCTGAAGCAGCTTATGCTACAGTGA

**Amino acid sequences of the NanoBiT-G protein constructs.**

The LgBiT luciferase fragment is highlighted in red.

The SmBiT luciferase fragment is highlighted in blue.

The 15-amino acid flexible linker is highlighted in purple.

Gαs-Lg (GNAS-LgBiT)

MGCLGNSKTEDQRNEEKAQREANKKIEKQLQKDKQVYRATHRLLLLGAGESGKSTIVKQMRILHVNGFN GEGGE  
EDPQAARSNSDGEKATKVQDIKNNLKEAIETIVAAMSNLGGSGGGGSGSSSSGGVFTLEDFVGDWEQTAAYNLDQ  
VLEQGGVSSLLQNLAVSVTPIQRIVRSGENALKIDIHVIIPYEGLSADQMAQIEEVFKVVYPVDDHHFKVILPYGTLV  
IDGVTPNMLNYFGRPYEGIAVFDGKKITVTGTLWNGNKIIDERLITPDGSMLFRVTINSGGSGGGGSGSSSSGGVPP  
VELANPENQFRVDYILSVMNVPDFDFPPEFYEHAKALWEDEGVRACYERSNEYQLIDCAQYFLDKIDVIKQADYVP  
SDQDLLRCRVLTSGIFETKFQVDKVNFMFDVGGQRDERRKWIQCFNDVTAIIFVASSSYNMVIREDNQTNRLQE  
ALNLFKSIWNNRRLRTISVILFLNKQDLLAEKVLGKSKIEDYFPEFARYTTPEDATPEPGEDPRVTRAKYFIRDEFL  
RISTASGDGRHYCYPHFTCAVDTENIRRVFNDCRDIIQRMHLRQYELL

Gαi1-Lg (GNAI1-LgBiT)

MGCTLSAEDKAAVERSKMIDRNLRDGEKAAREVKLLLLGAGESGKSTIVKQMKIIHEAGYSEEECKQYKAVVYS  
NTIQSIIAIRAMGRLGGSGGGGSGSSSSGGVFTLEDFVGDWEQTAAYNLDQVLEQGGVSSLLQNLAVSVTPIQRIV  
RSGENALKIDIHVIIPYEGLSADQMAQIEEVFKVVYPVDDHHFKVILPYGTLVIDGVTPNMLNYFGRPYEGIAVFDG  
KKITVTGTLWNGNKIIDERLITPDGSMLFRVTINSGGSGGGGSGSSSSGGKIDFGDSARADDARQLFVLGAAEEGF  
MTAELAGVIKRLWKDSGVQACFNRSREYQLNDSAAYLNDLDRIAQPNIPTQQDVLRTRVKTGIVETHFTFKDL  
HFKMFDVGGQRSERKKWIHCFEGVTAIIFCVALS DYDLVLAEDEEMNRMHESMKLFDSICNNKWFTDTSIILFLNK  
KDLFEKIKKSPLTICYPEYAGSNTYEEAAAYIQCFEDLNKRKDTKEIYTHFTCATDTKNVQFVFDVAVTDVHIKNNL  
KDCGLF

Gαi2-Lg (GNAI2-LgBiT)

MGCTVSAEDKAAAERSKMIDKNLRDGEKAAREVKLLLLGAGESGKSTIVKQMKIIHEDGYSEEECRQYRAVVYS  
NTIQSIMAIVKAMGNLGGSGGGGSGSSSSGGVFTLEDFVGDWEQTAAYNLDQVLEQGGVSSLLQNLAVSVTPIQRI  
VRSGENALKIDIHVIIPYEGLSADQMAQIEEVFKVVYPVDDHHFKVILPYGTLVIDGVTPNMLNYFGRPYEGIAVFD  
GKKITVTGTLWNGNKIIDERLITPDGSMLFRVTINSGGSGGGGSGSSSSGGQIDFADPSRADDARQLFALSCTAEEQG  
VLPDDL SGVIRRLWADHGVQACFGRSREYQLNDSAAYLNDLERIAQSDYIPTQQDVLRTRVKTGIVETHFTFKD  
LHFKMFDVGGQRSERKKWIHCFEGVTAIIFCVALSAYDLVLAEDEEMNRMHESMKLFDSICNNKWFTDTSIILFLN  
KKDLFEKITHSPLTICFPEYTGANKYDEAASYIQSKFEDLNKRKDTKEIYTHFTCATDTKNVQFVFDVAVTDVHIKNN



LKDCGLF

G $\alpha$ 3-Lg (GNAI3-LgBiT)

MGCTLSAEDKAAVERSKMIDRNLRDGEKAAKEVKLLLLGAGESGKSTIVKQMKIIHEDGYSEDECKQYKVVVYS  
NTIQSHAIIRAMGRLGGSGGGGGSSSSGGVFTLEDFVGDWEQTAAYNLDQVLEQGGVSSLLQNLAVSVTPIQRIV  
RSGENALKIDIHVIIPYEGLSADQMAQIEEVFKVVYPVDDHHFKVILPYGTLVIDGVTPNMLNYFGRPYEGIAVFDG  
KKITVTGTLWNGNKIIDERLITPDGSMLFRVTINSGGSGGGGGSSSSGGKIDFGAARADDARQLFVLAGSAEEGV  
MTPELAGVIKRLWRDGGVQACFSRSREYQLNDSASYLNDLDRISQSNYIPTQQDVLTRVKTGIVETHFTFKDL  
YFKMFDVGGQRSEKRWIHCFCFEGVTAIIFCVALSDYDLVLAEDEEMNRMHESMKLFDSICNNKWFTETSILFLNK  
KDLFEKIKRSPLTICYPEYTGSNTYEEAAAYIQCFEDLNRKDTKEIYTHFTCATDTKNVQFVFDVAVTDVIKNNL  
KECGLY

G $\alpha$ o-Lg (GNAO1-LgBiT)

MGCTLSAEERAALERSKAIEKNLKEDGISAADVKLLLLGAGESGKSTIVKQMKIIHEDGFSGEDVKQYKPVVYSN  
TIQSLAAIVRAMDTLGGSGGGGGSSSSGGVFTLEDFVGDWEQTAAYNLDQVLEQGGVSSLLQNLAVSVTPIQRIV  
RSGENALKIDIHVIIPYEGLSADQMAQIEEVFKVVYPVDDHHFKVILPYGTLVIDGVTPNMLNYFGRPYEGIAVFDG  
KKITVTGTLWNGNKIIDERLITPDGSMLFRVTINSGGSGGGGGSSSSGGGIEYGDKERKADAKMVCDVVSREMEDT  
EPFSAELLSAMMRLWGDGSIQECFNRSREYQLNDSAKYYLDSLDRIGAADYQPTEQDILRTRVKTGIVETHFTFK  
NLHFRLFDVGGQRSEKRWIHCFCFEDVTAIIFCVALSGYDQVLHEDETTNRMHESLMLFDSICNNKFFIDTSILFLNK  
KDLFGEKIKKSPLTICFPEYTGPNYEDAAAYIQAQFESKNRSPNKEIYCHMTCATDTNNIQVVFDAVTDIIIANNLR  
GCGLY

G $\alpha$ q-Lg (GNAQ-LgBiT)

MTLESIMACCLSEEAKEARRINDEIERQLRRDKRDARRELKLLLLGTGESGKSTFIKQMRIIHGSGYSDEDKRGFTK  
LVYQNIFTAMQAMIRAMDTLGGSGGGGGSSSSGGVFTLEDFVGDWEQTAAYNLDQVLEQGGVSSLLQNLAVSV  
TPIQRIVRSGENALKIDIHVIIPYEGLSADQMAQIEEVFKVVYPVDDHHFKVILPYGTLVIDGVTPNMLNYFGRPYEG  
IAVFDGKKITVTGTLWNGNKIIDERLITPDGSMLFRVTINSGGSGGGGGSSSSGGKIPYKYEHNKAAHAQLVREVDV  
EKVSFENPYVDAIKSLWNDPGIQECYDRRREYQLSDSTKYYLNDLDRVADPAYLPTQQDVLRRVPTTGIIYFPD  
LQSVIFRMVDVGGQRSEKRWIHCFCFENVTSIMFLVALSEYDQVLVESDNENRMEESKALFRTIITYPWFQNSSVILFL  
NKKDLLEEKIMYSHLVDFPEYDGPQRDAQAAREFILKMFVDLNPDSDKIYSHFTCATDTENIRVFVAAVKDTILQ  
LNLKEYNLV

G $\alpha$ 12-Lg (GNA12-LgBiT)

MSGVVRTLRSCLLPAEAGGARERRRAGSGARDAEREARRRSRDIDALLARERRAVRRLVKILLGAGESGKSTFLKQ  
MRIIHGREFDQKALLEFRDTIFDNILKGSRLVDARDKLGSGGGGGSGSSSSGGVFTLEDFVGDWEQTAAYNLDQV  
LEQGGVSSLLQNLAVSVTPIQRIVRSGENALKIDIHVIIPYEGLSADQMAQIEEVFKVVYPVDDHHFKVILPYGTLVI  
DGVTPNMLNYFGRPYEGIAVFDGKKITVTGTLWNGNKIIDERLITPDGSMLFRVTINSGSGGGGGSGSSSSGGGIPW  
QYSENEKHGMFLMAFENKAGLPVEPATFQLYVPALSALWRDSGIREAFSRRSEFQLGESVKYFLDNLDLDRIGQLNYF  
PSKQDILLARKATKGIVEHDFVIKKIPFKMVDVGGQRSQRQKWFQCFDGITSILFMVSSEYDQVLMEDRRTNRLVE  
SMNIFETIVNNKLFFNVSIIILFLNKMDLLVEKVKTVSIKKHFPDFRGPDRLEDVQRYLVQCFDRKRRNRSKPLFHH  
FTTAIDTENVRFVHAVKDTILQENLKDIMLQ

Gα13-Lg (GNA13-LgBiT)

MADFLPSRSVLSVCFPGCLLTSGEAEQQRKSKEIDKCLSREKTYVKRLVKILLGAGESGKSTFLKQMRIIHGQDFD  
QRAREEFRPTIYSNVIKGMRVLVDAREKLGSGGGGGSGSSSSGGVFTLEDFVGDWEQTAAYNLDQVLEQGGVSSL  
LQNLAVSVTPIQRIVRSGENALKIDIHVIIPYEGLSADQMAQIEEVFKVVYPVDDHHFKVILPYGTLVIDGVTPNMLN  
YFGRPYEGIAVFDGKKITVTGTLWNGNKIIDERLITPDGSMLFRVTINSGSGGGGGSGSSSSGGHIPWGDNSNQHG  
DKMMSFDTRAPMAAQGMVETRVFLQYLPARALWADSGIQNAYDRRREFQLGESVKYFLDNLDKLGEPDYIPSQQ  
DILLARRPTKGIHEYDFEIKNVPFKMVDVGGQRSERKRWFECFDSVTSILFLVSSSEFDQVLMEDRLTNRLTESLNIF  
ETIVNNRVFSNVSIIILFLNKTDLLEEKVQIVSIKDYFLEFEGDPHCLRDVQKFLVECFRNKRDDQQKPLYHHFTTAI  
NTENIRLVFRDVKDTILHDNLKQLMLQ

Sm-Gβ1 (SmBiT-GNB1)

MVTGYRLFEEILGGSGGGGGSGSSSSGGSELDQLRQEAQLKNQIRDARKACADATLSQITNNIDPVGRIQMRTRRT  
LRGHLAKIYAMHWGTDSSRLVLSASQDGKLIWDSYTTNKVHAIPLRSSWVMTCAAYAPSGNYVACGGLDNICSIYNL  
KTREGNVRVSRELAGHTGYLSCCRFLDDNQIVTSSGDTTCALWDIETGQQTFTTFTGHTGDVMSLSLAPDTRLFVSG  
ACDASAKLWDVREGMCRQFTFTGHESDINAICFFPNGNAFATGSDDATCRLFDLADQELMTYSHDNIICGITSVSFS  
KSGRLLLAGYDDFNCNVWDALKADRAGVLAGHDNRVSLGVTDDGMAVATGSWDSFLKIWN

Sm-Gβ3 (SmBiT-GNB3)

MVTGYRLFEEILGGSGGGGGSGSSSSGGGEMEQLRQEAQLKKQIADARKACADVTLAELVSGLEVVGRRVQMRTR  
RTLRLGHLAKIYAMHWATDSKLLVLSASQDGKLVWDSYTTNKVHAIPLRSSWVMTCAAYAPSGNFVACGGLDNMCSI  
YNLKSREGNVKVSRELSAHTGYLSCCRFLDDNNIVTSSGDTTCALWDIETGQKTVFVGHGTGDCMSLAVSPDFNL  
ISGACDASAKLWDVREGTCRQFTFTGHESDINAICFFPNGEAICTGSDDASCRLFDLADQELICFSHESIICGITSVAFS  
LSGRLLFAGYDDFNCNVWDSMKSERVILSGHDNRVSLGVTADGMAVATGSWDSFLKIWN

Sm-Gβ5 (SmBiT-GNB5)

MVTGYRLFEEILGGSGGGGGSGSSSGGCDQTFVLNVFGSCDKCFKQRALRPVFKKSQQLSYCSTCAEIMATEGLHE  
NETLASLKSEAESLKGKLEEERAKLHDVELHQVAERVEALGQFVMKTRRTLKGHGKVLKCMDWCKDKRRIVSSS  
QDGKVIVWDSFTTNKEHAVTMPCTWVMACAYAPSGCAIACGGLDNKCSVYPLTFDKNENMAAKKKSAMHTNY  
LSACSFTNSDMQILTASGDGTCALWDVESGQLLQSFHGHGADVLCLDLAPSETGNTFVSGGCDKKAMVWDMRSG  
QCVQAFETHESDINSVRYYPGDAFASGSDDATCRLYDLRADREVAIYSKESIIFGASSVDFSLSGRLLFAGYNDYTI  
NVWDVLKGSRVSILFGHENRVSTLRVSPDGTAFCSGSWDHTLRVWA

Sm-Gyt1 (SmBiT-GNGT1)

MVTGYRLFEEILGGSGGGGGSGSSSGGPVINIEDLTEKDCLKMEVDQLKKEVTLERMLVSKCCEEVRDYVEERSGE  
DPLVKGIPEDKNPFKELKGGCVIS

## **Nucleotide sequences of the NanoBiT-G protein constructs.**

### G $\alpha$ s-Lg (GNAS-LgBiT)

ATGGGATGCCTGGGAAACAGTAAAACCGAAGATCAGAGGAACGAAGAAAAAGCACAGAGGGAAGCCAACAAGAAGATTG  
AGAAACAGCTCCAGAAGGATAAGCAGGTGTACCGGGCCACACACAGACTGCTGCTGCTGGGAGCAGGAGAGTCCGGCAAG  
TCTACCATCGTGAAGCAGATGAGAATCCTGCACGTGAACGGCTTCAATGGCGAGGGAGGAGAGGAGGACCCCCAGGCAGC  
ACGCTCTAACAGCGATGGCGAGAAGGCCACAAAGGTGCAGGACATCAAGAACAATCTGAAGGAGGCCATCGAGACAATCG  
TGGCCGCCATGTCCAATCTGGGAGGCTCTGGAGGAGGAGGCAGCGGAGGCAGCTCCTCTGGCGGCGTGTTCACACTGGAG  
GACTTTGTGGGCGATTGGGAGCAGACCGCCGCTACAACCTGGACCAGGTGCTGGAGCAGGGAGGCGTGAGCAGCCTGCT  
CCAGAATCTGGCCGTGTCCGTGACCCCAATCCAGAGGATCGTGCCTCTGGCGAGAACGCCCTGAAGATCGATATCCACGTG  
ATCATCCCCTATGAGGGCCTGAGCGCCGACCAGATGGCACAGATCGAGGAGGTGTTCAAGGTGGTGTACCCTGTGGACGAT  
CACCCTTCAAAGTGATCCTGCCATATGGCACCCCTGGTCATCGATGGCGTGACCCCAAACATGCTGAATTAATTCGGCAGGC  
CCTATGAGGGCATCGCCGTGTTTGACGGCAAGAAGATCACCGTGACAGGCACCCCTGTGGAACGGCAATAAGATCATCGACG  
AGCGGCTGATCACACCCGATGGCTCCATGCTGTTCAGAGTGACCATCAATAGCGGAGGCTCCGGCGGAGGAGGCTCTGGAG  
GCTCTAGCTCCGGCGGCGTGCCCCCTGTGGAGCTGGCCAACCCCGAGAATCAGTTCCGCGTGGATTACATCCTGAGCGTGAT  
GAACGTGCCTGACTTCGATTTCCACCCGAGTTTATGAGCACGCAAAGGCCCTGTGGGAGGACGAGGGCGTGAGGGCATG  
CTACGAGCGGAGCAATGAGTATCAGCTCATCGATTGTGCCAGTACTTTCTGGACAAGATCGATGTGATCAAGCAGGCCGAC  
TATGTGCCTTCTGACCAGGATCTGCTGCGGTGCAGAGTGCTGACAAGCGGCATCTTCGAGACAAAGTTTCAGGTGGATAAG  
GTGAACTTCCACATGTTTGACGTGGGCGGCCAGAGAGATGAGCGGAGAAAGTGGATTCAAGTGTTC AACGATGTGACAGCC  
ATCATCTTTGTGGTGGCCTCTAGCTCCTACAATATGGTCATCAGGGAGGACAACCAGACCAATCGCCTCCAGGAGGCCCTGA  
ACCTGTTCAAGAGCATCTGGAACAATCGGTGGCTGAGAACAATCTCCGTGATCCTGTTTCTGAATAAGCAGGATCTGCTGGC  
CGAGAAGGTGCTGGCCGCAAGTCCAAGATCGAGGACTACTTCCCCGAGTTTGCCCGGTATACCACACCTGAGGACGCCAC  
ACCTGAGCCAGGAGAGGACCCCGGGTGACCCGCGCCAAGTATTTTCATCCGGGATGAGTTTCTGAGAATCTCTACCGCCAG  
CGGCGACGGCAGACACTACTGCTATCCACACTTCACATGTGCCGTGGACACCGAGAACATCAGGCGCGTGTTC AACGATTG  
TAGAGACATCATCCAGAGAATGCACCTGAGACAGTATGAGCTGCTGTGA

### G $\alpha$ i1-Lg (GNAI1-LgBiT)

ATGGGATGCACCCTGTCCGCCGAGGATAAAGCCGCAGTCGAGAGGAGCAAATGATTGATAGGAACCTGAGAGAGGATGGA  
GAGAAAGCCGCCAGGGAGGTGAAGCTGCTGCTGCTGGGAGCAGGAGAGTCTGGCAAGAGCACAATCGTGAAGCAGATGA  
AGATCATCCACGAGGCCGGCTACAGCGAGGAGGAGTGCAAGCAGTACAAGGCCGTGGTGTATAGCAATACCATCCAGTCCA  
TCATCGCCATCATCAGGGCAATGGGCAGACTGGGAGGCTCTGGAGGAGGAGGCAGCGGAGGCAGCTCCTCTGGCGGCGTG  
TTCACACTGGAGGACTTTGTGGGCGATTGGGAGCAGACCGCCGCTACAATCTGGACCAGGTGCTGGAGCAGGGAGGCGT  
GAGCAGCCTGCTCCAGAACCTGGCCGTGCTGTGACCCCAATCCAGCGGATCGTGAGAAGCGGCGAGAACGCCCTGAAGA

TCGACATCCACGTGATCATCCCCTATGAGGGCCTGTCCGCCGATCAGATGGCCCAGATCGAGGAGGTGTTCAAGGTGGTGTA  
CCCCGTGGACGATCACCACCTCAAAGTGATCCTGCCTTATGGCACCTGGTCATCGACGGCGTGACCCCTAACATGCTGAAT  
TACTTCGGCAGACCATATGAGGGCATCGCCGTGTTTGATGGCAAGAAGATCACCGTGACAGGCACCCTGTGGAACGGCAAT  
AAGATCATCGACGAGCGGCTGATCACACCTGATGGCTCCATGCTGTTACAGAGTGACCATCAATCCGGCGGCTCTGGCGGCG  
GCGGCAGCGGAGGCTCTAGCTCCGGAGGCAAGATCGACTTTGGCGATTCCGCCAGGGCCGACGATGCAAGGCAGCTCTTCG  
TGCTGGCAGGAGCCGCCGAGGAGGGCTTTATGACCGCCGAGCTGGCAGGCGTGATCAAGAGGCTGTGGAAGGACTCTGGC  
GTGCAGGCCTGTTTCAACCGGAGCAGAGAGTACCAGCTCAACGATTCCGCCGCCTACTATCTGAACGACCTGGATCGCATCG  
CCCAGCCAACTATATCCCTACACAGCAGGACGTGCTGAGGACCCGCGTGAAGACCACAGGCATCGTGGAGACACACTTCA  
CCTTTAAGGACCTGCACTTCAAGATGTTTGATGTGGGCGGCCAGAGGTCTGAGCGCAAGAAGTGGATTCACTGCTTCGAGG  
GCGTGACAGCCATCATCTTCTGCGTGGCCCTGAGCGACTACGATCTGGTGCTGGCCGAGGACGAGGAGATGAATCGGATGC  
ACGAGTCCATGAAGCTGTTTCGACTCTATCTGCAACAATAAGTGGTTTACAGATAACGACATCATCCTGTTTCTGAACAAGAA  
GGATCTGTTTGAGGAGAAGATCAAGAAGTCCCCACTGACAATCTGCTACCCCGAGTATGCCGGCTCTAATACCTACGAGGAG  
GCTGCCGCCTATATCCAGTGTGAGTTTCGAGGACCTGAACAAGAGAAAAGGATAACCAAGGAAATCTACACACACTTCACCTGT  
GCCACAGATAACCAAGAATGTGCAGTTTGTGTTTCGATGCTGTGACCGATGTGATTATCAAGAATAACCTGAAAGACTGCGGGC  
TGTTTTGA

Gai2-Lg (GNAI2-LgBiT)

ATGGGATGCACAGTGAGCGCAGAGGACAAAGCCGCCGCGAAAGGAGCAAAATGATTGACAAGAACCTGAGAGAGGACG  
GGGAAAAAGCAGCCCGGAGGTGAAGCTGCTGCTGCTGGGAGCAGGAGAGTCTGGCAAGAGCACAATCGTGAAGCAGAT  
GAAGATCATCCACGAGGACGGCTACAGCGAGGAGGAGTGCAGGCAGTACAGGGCAGTGGTGTATTCTAACACCATCCAGA  
GCATCATGGCCATCGTGAAGGCCATGGGCAATCTGGGAGGCTCCGGCGGAGGAGGCTCTGGAGGCAGCTCCTCTGGCGGCG  
TGTTCACTGGAGGACTTTGTGGGCGATTGGGAGCAGACCGCCGCCTATAACCTGGATCAGGTGCTGGAGCAGGGAGGCG  
TGAGCAGCCTGCTCCAGAATCTGGCCGTGCTCCGTGACCCCAATCCAGAGGATCGTGCGGAGCGGAGAGAACGCCCTGAAG  
ATCGACATCCACGTGATCATCCCTTACGAGGGCCTGTCCGCCGATCAGATGGCCCAGATCGAGGAGGTGTTCAAGGTGGTGT  
ATCCTGTGGACGATCACCACCTCAAAGTGATCCTGCCATAACGGCACCCCTGGTCATCGACGGAGTGACCCCAAACATGCTGAA  
TTACTTCGGCAGGCCCTATGAGGGCATCGCCGTGTTTGATGGCAAGAAGATCACCGTGACAGGCACCCTGTGGAACGGCAA  
TAAGATCATCGACGAGAGGCTGATCACACCTGATGGCTCTATGCTGTTCCGCGTGACCATCAATCCGGAGGCTCTGGAGGA  
GGAGGCAGCGGAGGCTCTAGCTCCGGCGGCCAGATCGACTTCGCCGATCCAAGCCGGGCCGACGATGCAAGACAGCTCTTT  
GCACTGTCTGCACAGCCGAGGAGCAGGGCGTGCTGCCAGACGATCTGTCTGGCGTGATCCGGAGACTGTGGGCAGACCA  
CGGAGTGCAGGCATGTTTCGGCCGAGCCGGGAGTATCAGCTCAACGACAGCGCCGCCTACTATCTGAATGATCTGGAGCG  
CATCGCCCAGTCCGACTACATCCCCACACAGCAGGATGTGCTGCGGACCAGAGTGAAGACCACAGGCATCGTGGAGACACA  
CTTACCTTTAAGGACCTGCACTTCAAGATGTTTGATGTGGGCGGCCAGAGGAGCGAGCGCAAGAAGTGGATTCACTGCTT  
CGAGGGCGTGACCGCCATCATCTTCTGCGTGGCCCTGTCCGCCTATGACCTGGTGCTGGCCGAGGATGAGGAGATGAACCG

GATGCACGAGAGCATGAAGCTGTTCTGACTCCATCTGCAACAATAAGTGGTTTACAGATACCTCCATCATCTGTTCTCTGAATA  
AGAAGGACCTGTTTGAGGAGAAGATCACACACTCTCCCCTGACCATCTGTTTCCCTGAGTACACAGGCGCCAACAAGTATG  
ATGAGGCCGCCAGCTACATCCAGTCCAAGTTTGAGGACCTGAATAAGAGAAAGGATACCAAGGAAATCTACACACACTTCA  
CCTGTGCCACAGACACCAAGAACGTGCAGTTTGTGTTTCGACGCTGTGACCGATGTGATTATCAAAAATAACCTGAAAGATTG  
TGGGCTGTTCTGA

G $\alpha$ 13-Lg (GNAI3-LgBiT)

ATGGGATGCACCCTGTCCGCCGAGGATAAAGCCGAGTCGAGAGGAGCAAATGATTGATAGGAACCTGAGAGAGGATGGA  
GAGAAAGCCGCCAAGGAGGTGAAGCTGCTGCTGCTGGGAGCAGGAGAGTCTGGCAAGAGCACAATCGTGAAGCAGATGA  
AGATCATCCACGAGGACGGCTACAGCGAGGATGAGTGCAAGCAGTACAAGGTGGTGGTGTATAGCAATACCATCCAGTCCAT  
CATCGCCATCATCAGGGCAATGGGCAGACTGGGAGGCTCTGGAGGAGGAGGCAGCGGAGGCAGCTCCTCTGGCGGCGTGT  
TCACACTGGAGGACTTTGTGGGCGATTGGGAGCAGACCGCCGCCTACAATCTGGACCAGGTGCTGGAGCAGGGAGGCGTG  
AGCAGCCTGCTCCAGAACCTGGCCGTGTCTGTGACCCCAATCCAGCGGATCGTGAGAAGCGGCGAGAACGCCCTGAAGATC  
GACATCCACGTGATCATCCCCTATGAGGGCCTGTCCGCCGATCAGATGGCCAGATCGAGGAGGTGTTCAAGGTGGTGTACC  
CCGTGGACGATCACCCTTCAAAGTGATCCTGCCTTATGGCACCCCTGGTCATCGACGGCGTGACCCCTAACATGCTGAATTA  
CTTCGGCAGACCATAATGAGGGCATCGCCGTGTTTGATGGCAAGAAGATCACCGTGACAGGCACCCTGTGGAACGGCAATAA  
GATCATCGACGAGCGGCTGATCACACCTGATGGCTCCATGCTGTTTCAGAGTGACCATCAATCCGGCGGCTCTGGCGGCGGC  
GGCAGCGGAGGCTCTAGCTCCGGAGGCAAGATCGACTTTGGCGAGGCAGCCAGGGCCGACGATGCAAGGCAGCTCTTCGT  
GCTGGCAGGAAGCGCCGAGGAGGGCGTGATGACCCAGAGCTGGCAGGCGTGATCAAGAGGCTGTGGAGAGACGGAGGC  
GTGCAGGCCTGTTTCTCTCGGAGCAGAGAGTACCAGCTCAACGATTCCGCCTTACTATCTGAACGACCTGGATCGCATCA  
GCCAGTCCAACTATATCCCTACACAGCAGGACGTGCTGAGGACCCGCGTGAAGACCACAGGCATCGTGGAGACACACTTCA  
CCTTTAAGGACCTGTACTTCAAGATGTTTGATGTGGGCGGCCAGAGGTCTGAGCGCAAGAAGTGGATTCACTGCTTCGAGG  
GCGTGACAGCCATCATCTTCTGCGTGGCCCTGAGCGACTACGATCTGGTGTGCTGGCCGAGGACGAGGAGATGAATCGGATGC  
ACGAGTCCATGAAGCTGTTCTGACTCTATCTGCAACAATAAGTGGTTTACAGAGACAAGCATCATCTGTTCTGAAACAAGAA  
GGATCTGTTTGAGGAGAAGATCAAGCGGTCCCCACTGACAATCTGCTACCCCGAGTATACAGGCTCTAATACCTACGAGGAG  
GCTGCCGCCTATATCCAGTGTGATTCGAGGACCTGAACCGGAGAAAGGATACCAAGGAAATCTACACACACTTACCTGT  
GCCACAGATACCAAGAATGTGCAGTTTGTGTTTGATGCTGTGACCGATGTGATTATCAAGAATAACCTGAAAGAATGCGGGC  
TGTATTGA

G $\alpha$ o-Lg (GNAO1-LgBiT)

ATGGGATGCACCCTGTCCGCCGAGGAAAGAGCAGCACTGGAAAGAAGCAAGGCTATTGAGAAGAACCTGAAAGAAGATGG  
GATTAGTGCCGCCAAGGACGTGAAGCTGCTGCTGCTGGGAGCAGGAGAGTCTGGCAAGAGCACAATCGTGAAGCAGATGA  
AGATCATCCACGAGGACGGCTTCAGCGGCGAGGATGTGAAGCAGTACAAGCCCGTGGTGTATTCTAACACAATCCAGAGCC

TGGCAGCAATCGTGC GGGCAATGGATACCCTGGGAGGCTCCGGAGGAGGAGGCTCTGGAGGCAGCTCCTCTGGCGGCGTG  
TTCACACTGGAGGACTTTGTGGGCGATTGGGAGCAGACCGCCGCCTATAACCTGGACCAGGTGCTGGAGCAGGGAGGCGTG  
AGCAGCCTGCTCCAGAATCTGGCCGTGTCTGTGACCCCCATCCAGCGGATCGTGAGAAGCGGCGAGAATGCCCTGAAGATC  
GATATCCACGTGATCATCCCTTACGAGGGCCTGTCCGCCGACCAGATGGCACAGATCGAGGAGGTGTTCAAGGTGGTGTATC  
CTGTGGACGATCACC ACTTCAAAGTGATCCTGCCATACGGCACCCCTGGTCATCGATGGCGTGACCCCAAACATGCTGAATTA  
CTTCGGCAGGCCCTATGAGGGCATCGCCGTGTTTGACGGCAAGAAGATCACCGTGACAGGCACCCTGTGGAACGGCAATAA  
GATCATCGATGAGCGGCTGATCACACCTGACGGCTCCATGCTGTTTCAGAGTGACCATCAACTCCGGAGGCTCTGGCGGCGG  
AGGCTCTGGAGGCTCTAGCTCCGGAGGAGGAATCGAGTACGGCGACAAGGAGAGGAAGGCCGATGCCAAGATGGTGTGCG  
ACGTGGTGAGCCGCATGGAGGATACAGAGCCTTTCAGCGCCGAGCTGCTGTCCGCCATGATGAGGCTGTGGGGCGATAGCG  
GCATCCAGGAGTGTTTTAACCGGTCCAGAGAGTATCAGCTCAACGACTCCGCCAAGTACTATCTGGACTCTCTGGATAGAAT  
CGGCGCCGCCGATTACCAGCCTACAGAGCAGGACATCCTGAGGACCCGCGTGAAGACCACAGGCATCGTGGAGACACACTT  
CACCTTTAAGAACCTGCACTTCAGGCTGTTTGATGTGGGCGGCCAGAGGTCTGAGCGCAAGAAGTGGATTCACTGCTTCGA  
GGACGTGACCGCCATCATCTTCTGCGTGGCCCTGTCCGGCTATGATCAGGTGCTGCACGAGGACGAGACAACAAATCGCATG  
CACGAGTCTCTGATGCTGTTTGATAGCATCTGCAACAATAAGTTCTTTATCGACACAAGCATCATCCTGTTCTGAACAAGAA  
GGATCTGTTTGGCGAGAAGATCAAGAAGTCCCCACTGACCATCTGTTTCCCCGAGTACACAGGCCCTAATACCTATGAGGAC  
GCTGCCGCCTACATCCAGGCCAGTTTGAGAGCAAGAACCGGTCCCCCAATAAGGAAATCTACTGCCACATGACCTGTGCC  
ACAGACACCAACAATATCCAGGTGGTCTTTGACGCTGTGACCGACATCATCATCGCCAATAACCTGAGAGGCTGCGGGCTGT  
ATTGA

Gαq-Lg (GNAQ-LgBiT)

ATGACCCTGGAATCAATTATGGCATGTTGTCTGAGCGAGGAAGCAAAGGAGGCAAGGAGAATCAATGACGAAATCGAGAGG  
CAACTGCGGAGAGACAAGAGAGATGCCAGGCGCGAGCTGAAGCTGCTGCTGCTGGGCACAGGAGAGAGCGGCAAGTCCA  
CCTTCATCAAGCAGATGAGAATCATCCACGGCTCTGGCTACAGCGACGAGGATAAGAGGGGCTTCACAAAGCTGGTGTATC  
AGAACATCTTTACCGCCATGCAGGCCATGATCAGGGCCATGGATACACTGGGAGGCAGCGGAGGAGGAGGCTCCGGAGGCA  
GCTCCTCTGGCGGCGTGTTACACTGGAGGACTTTGTGGGCGATTGGGAGCAGACCGCCGCCTACAACCTGGACCAGGTGC  
TGAGCAGGGAGGCGTGAGCAGCCTGCTCCAGAATCTGGCCGTGTCTGTGACCCCAATCCAGAGGATCGTGCGGAGCGGA  
GAGAATGCCCTGAAGATCGATATCCACGTGATCATCCCTTATGAGGGCCTGAGCGCCGACCAGATGGCACAGATCGAGGAGG  
TGTTCAAGGTGGTGTACCCAGTGGACGATCACC ACTTCAAAGTGATCCTGCCCTATGGCACCCCTGGTCATCGATGGCGTGAC  
CCCCAATGCTGAATTACTTCGGCCGCCCTTATGAGGGCATCGCCGTGTTGACGGCAAGAAGATCACCGTGACAGGCACC  
CTGTGGAACGGCAATAAGATCATCGACGAGCGCCTGATCACACCAGATGGCTCTATGCTGTTCCGGGTGACCATCAACTCCG  
GAGGCTCTGGCGGCGGAGGCTCCGGAGGCTCTAGCTCCGGAGGCAAGATCCCCTACAAGTATGAGCACAATAAGGCACACG  
CACAGCTCGTGGGGAGGTGGATGTGGAGAAGGTGTCCGCCCTTTGAGAACCCTTACGTGGACGCCATCAAGTCTCTGTGGA  
ATGATCCAGGCATCCAGGAGTGCTACGACCGGAGAAGGGAGTATCAGCTCTCCGACTCTACAAAGTACTATCTGAACGACCT

GGATAGGGTGGCCGATCCCGCATACCTGCCTACCCAGCAGGACGTGCTGAGAGTGAGGGTGCCTACCACAGGCATCATCGA  
GTATCCCTTCGACCTCCAGAGCGTGATCTTTCGCATGGTGGACGTGGGAGGACAGCGGTCCGAGAGGCCGGAAGTGGATTCA  
CTGTTTCGAGAATGTGACCTCCATCATGTTTCTGGTGGCCCTGTCTGAGTACGACCAGGTGCTGGTGGAGAGCGATAACGAG  
AATAGAATGGAGGAGTCCAAGGCCCTGTTTCAGGACAATCATCACCTACCCTTGGTTCCAGAACTCTAGCGTGATCCTGTTTC  
TGAATAAGAAGGATCTGCTGGAGGAGAAGATCATGTATTCCCACCTGGTGGACTACTTCCAGAGTATGACGGACCACAGAG  
AGATGCACAGGCAGCCAGGGAGTTCATCCTGAAGATGTTTGTGGATCTGAACCCCGACTCTGATAAGATCATCTACAGCCAC  
TTCACCTGCGCCACAGACACCGAGAATATCAGATTTGTGTTTGCCGCCGTGAAAGATAACAATCCTGCAACTGAACCTGAAAG  
AATACAACCTGGTGTGA

Gα12-Lg (GNA12-LgBiT)

ATGTCAGGAGTCGTGCGAACACTGTCAAGATGTCTGCTGCCCCGCTGAAGCTGGAGGAGCCCGAGAGAGGCCGAGCCGGATC  
AGGAGCCAGAGACGCAGAGAGGGAGGCACGGAGAAGGTCCAGAGACATCGATGCACTGCTGGCCAGGGAGAGGAGGGCC  
GTGAGAAGGCTGGTGAAGATCCTGCTGCTGGGAGCAGGAGAGTCTGGCAAGAGCACATTCTGAAGCAGATGCGCATCATC  
CACGGCCGGGAGTTTGATCAGAAGGCCCTGCTGGAGTTCAGAGACACCATCTTTGATAACATCCTGAAGGCCAGCCGCGTG  
CTGGTGGACGCCCCGGGATAAGCTGGGAGGCTCTGGAGGAGGAGGCAGCGGAGGCAGCTCCTCTGGCGGCGTGTTCACT  
GGAGGACTTTGTGGGCGATTGGGAGCAGACCGCCGCCTACAACCTGGACCAGGTGCTGGAGCAGGGAGGCCGTGAGCAGCC  
TGCTCCAGAATCTGGCCGTGAGCGTGACACCAATCCAGAGAATCGTGAGGTCCGGCGAGAATGCCCTGAAGATCGACATCC  
ACGTGATCATCCCCTATGAGGGCCTGTCCGCCGATCAGATGGCCCAGATCGAGGAGGTGTTCAAGGTGGTGTACCCCGTGGA  
CGATCACCCTTCAAAGTGATCCTGCCTTATGGCACCCCTGGTCATCGACGGCGTGACCCCTAACATGCTGAATTACTTCGGCA  
GGCCATATGAGGGCATCGCCGTGTTTATGGCAAGAAGATCACCGTGACAGGCACCCCTGTGGAACGGCAATAAGATCATCG  
ACGAGCGCCTGATCACACCCGATGGCAGCATGCTGTTCCGGGTGACCATCAACTCCGGCGGCTCTGGCGGAGGAGGCTCTG  
GAGGCTCTAGCTCCGGAGGAGGCATCCCTTGGCAGTACAGCGAGAACGAGAAGCACGGCATGTTCTCTGATGGCCTTTGAGA  
ATAAGGCAGGCCTGCCAGTGGAGCCTGCCACCTTCCAGCTCTATGTGCCAGCCCTGTCCGCCCTGTGGAGAGACTCTGGCAT  
CAGGGAGGCCTTCAGCCGCCGGTCCGAGTTTCAGCTCGGCGAGTCTGTGAAGTACTTCTGGACAACCTGGATAGAATCGG  
CCAGCTCAACTATTTTCTAGCAAGCAGGATATCCTGCTGGCCAGGAAGGCCACAAAGGGCATCGTGGAGCACGACTTCGT  
GATCAAGAAGATCCCCTTCAAGATGGTGGATGTGGGAGGACAGCGGAGCCAGCGGCAGAAGTGGTTCCAGTGCTTTGACG  
GCATCACCTCTATCCTGTTTATGGTGTCTAGCTCCGAGTACGACCAGGTGCTGATGGAGGATAGAAGGACAAACCGGCTGGT  
GGAGAGCATGAATATCTTCGAGACAATCGTGAACAATAAGCTGTTCTTTAACGTGTCCATCATCCTGTTTCTGAATAAGATGG  
ATCTGCTGGTGGAGAAGGTGAAGACAGTGTCCATCAAGAAGCACTTCCAGACTTTCGCGGCGATCCCCACCGGCTGGAGG  
ACGTGCAGAGATACTGGTGCAGTGTTCGATAGAAAGCGCCGGAACAGGTCTAAGCCTCTGTTCCACCACTTTACCACAG  
CCATCGACACCGAGAATGTGCGGTTTGTGTTCCACGCTGTGAAGGATACTATTCTGCAAGAAAATCTGAAAGACATTATGCT  
CCAGTGA



Gα13-Lg (GNA13-LgBiT)

ATGGCCGATTTCTGCCCTCAAGAAGCGTCCTGAGCGTGTGCTTTCCTGGATGTCTGCTGACTAGCGGAGAAGCCGAACAG  
CAGAGAAAGAGCAAGGAGATCGACAAGTGCCTGTCCAGAGAGAAGACATACGTGAAGAGGCTGGTGAAGATCCTGCTGCT  
GGGAGCAGGAGAGTCTGGCAAGAGCACCTTCTGAAGCAGATGAGAATCATCCACGGACAGGACTTCGATCAGCGCGCCC  
GGGAGGAGTTTAGGCCTACAATCTATTCCAACGTGATCAAGGGAATGCGCGTGTGGTGGACGCCCCGGGAGAAGCTGGGAG  
GCTCCGGCGGAGGAGGCTCTGGAGGCAGCTCCTCTGGCGGCGTGTTCACACTGGAGGACTTTGTGGGCGATTGGGAGCAG  
ACCGCCGCCTACAACCTGGATCAGGTGCTGGAGCAGGGAGGCGTGAGCAGCCTGCTCCAGAATCTGGCCGTGTCTGTGACC  
CCTATCCAGAGGATCGTGCAGGAGCGGAGAGAATGCCCTGAAGATCGACATCCACGTGATCATCCATATGAGGGCCTGAGCG  
CCGATCAGATGGCCCAGATCGAGGAGGTGTTCAAGGTGGTGTACCCTGTGGACGATCACCCTTCAAAGTGATCCTGCCATA  
TGGCACCCCTGGTCATCGACGGCGTGACCCCAAACATGCTGAATTACTTCGGCAGACCCTATGAGGGCATCGCCGTGTTTGAT  
GGCAAGAAGATCACCGTGACAGGCACCTGTGGAACGGCAATAAGATCATCGACGAGAGACTGATCACACCAGATGGCAG  
CATGCTGTTCAAGGTGACCATCAACTCCGGAGGCTCTGGAGGAGGAGGCTCCGGAGGCTCTAGCTCCGGCGGCCACATCCC  
CTGGGGCGACAACCTCCAATCAGCAGCACGGCGACAAGATGATGTCTTTCGATACAAGGGCCCCAATGGCAGCACAGGGAAT  
GGTGGAGACACGGGTGTTCTCCAGTACCTGCCAGCAATCCGGGCCCTGTGGGCAGACTCTGGCATCCAGAACGCCTATGA  
TCGGAGAAGGGAGTTCCAGCTCGGCGAGAGCGTGAAGTACTTTCTGGACAATCTGGATAAGCTGGGCGAGCCCCGACTATAT  
CCCTTCCCAGCAGGACATCCTGCTGGCTAGACGGCCACAAAGGGCATCCACGAGTACGACTTCGAGATCAAGAACGTGCC  
TTTTAAGATGGTGGATGTGGGAGGACAGCGGAGCGAGAGAAAGAGGTGGTTCGAGTGTTTTGACAGCGTGACCTCCATCCT  
GTTCTCTGGTGTCTAGCTCCGAGTTTGACCAGGTGCTGATGGAGGATAGACTGACAAACAGGCTGACCGAGTCCCTGAATATC  
TTCGAGACAATCGTGAACAATCGGGTGTCTCTAACGTGAGCATCATCCTGTTTCTGAATAAGACCGACCTGCTGGAGGAGA  
AGGTGCAGATCGTGAGCATCAAGGATTACTTCTGGAGTTTGAGGGCGACCCCCACTGCCTGAGGGATGTGCAGAAGTTCC  
TGGTGGAGTGTTCGGAATAAGAGAAGGGATCAGCAGCAGAAGCCTCTGTATCACCCTTTACCACAGCCATCAACACCG  
AGAATATCAGACTGGTCTTTAGGGATGTGAAGGACACCATTCTGCACGACAATCTGAAACAGCTCATGCTTCAGTGA

Sm-Gβ1 (SmBiT-GNB1)

ATGGTCACCGGCTATCGGCTGTTTGAAGAGATTCTGGGGGGGTCAGGAGGAGGAGGCTCAGGGGGCTCATCATCAGGAGGA  
AGTGAGCTTGACCAGTTACGGCAGGAGGCCGAGCAACTTAAGAACCAGATTCGAGACGCCAGGAAAGCATGTGCAGATGC  
AACTCTCTCTCAGATCACAAACAACATCGACCCAGTGGGAAGAATCCAAATGCGCACGAGGAGGACACTGCGGGGGCACC  
TGGCCAAGATCTACGCCATGCACTGGGGCACAGACTCCAGGCTTCTCGTCAGTGCTCGCAGGATGGTAAACTTATCATCTG  
GGACAGCTACACCACCAACAAGGTCCACGCCATCCCTCTGCGCTCCTCCTGGGTCATGACCTGTGCATATGCCCTTCTGGG  
AACTATGTGGCCTGCGGTGGCCTGGATAACATTTGCTCCATTTACAATCTGAAAACCTCGTGAGGGGAACGTGCGCGTGAGTC  
GTGAGCTGGCAGGACACACAGGTTACCTGTCTGCTGCCGATTCCTGGATGACAATCAGATCGTCACCAGCTCTGGAGACA  
CCACGTGTGCCCTGTGGGACATCGAGACCGGCCAGCAGACGACCACGTTTACCGGACACACTGGAGATGTCATGAGCCTTT  
CTCTTGCTCCTGACACCAGACTGTTCGTCTCTGGTGTCTGTGATGCTTCAGCCAAACTCTGGGATGTGCGAGAAGGCATGTG

CCGGCAGACCTTCACTGGCCACGAGTCTGACATCAATGCCATTTGCTTCTTTCCAAATGGCAATGCATTTGCCACTGGCTCAG  
ACGACGCCACCTGCAGGCTGTTTGACCTTCGTGCTGACCAGGAGCTCATGACTTACTCCCATGACAACATCATCTGCGGGAT  
CACCTCTGTCTCCTTCTCCAAGAGCGGGCGCCTCCTCCTTGCTGGGTACGACGACTTCAACTGCAACGTCTGGGATGCACTC  
AAAGCCGACCGGGCAGGTGTCTTGCTGGGCATGACAACCGCGTCAGCTGCCTGGGCGTGACTGACGATGGCATGGCTGTG  
GCGACAGGGTCTGGGATAGCTTCCTCAAGATCTGGAAGTGA

Sm-Gβ3 (SmBiT-GNB3)

ATGGTCACCGGCTATCGGCTGTTTGAAGAGATTCTGGGGGGGTCAGGAGGAGGAGGCTCAGGGGGCTCATCATCAGGAGGA  
GGGGAGATGGAGCAACTGCGTCAGGAAGCGGAGCAGCTCAAGAAGCAGATTGCAGATGCCAGGAAAGCCTGTGCTGACGT  
TACTCTGGCAGAGCTGGTGTCTGGCCTAGAGGTGGTGGGACGAGTCCAGATGCGGACGCGGGCGGACGTTAAGGGGACACC  
TGGCCAAGATTTACGCCATGCACTGGGCCACTGATTCTAAGCTGTGGTAAGTGCCTCGCAAGATGGGAAGCTGATCGTGTG  
GGACAGCTACACCACCAACAAGGTGCACGCCATCCCCTGCGCTCCTCCTGGGTTCATGACCTGTGCCTATGCCCCATCAGGG  
AACTTTGTGGCATGTGGGGGGGCTGGACAACATGTGTTCCATCTACAACCTCAAATCCCCTGAGGGCAATGTCAAGGTCAGCC  
GGGAGCTTTCTGCTCACACAGGTTATCTCCTGCTGCCGTTCTCTGGATGACAACAATATTGTGACCAGCTCGGGGGACAC  
CACGTGTGCCTTGTGGGACATTGAGACTGGGCAGCAGAAGACTGTATTTGTGGGACACACGGGTGACTGCATGAGCCTGGC  
TGTGCTCCTGACTTCAATCTCTTCATTTCCGGGGGCTGTGATGCCAGTGCCAAGCTCTGGGATGTGCGAGAGGGGACCTGC  
CGTCAGACTTTCACTGGCCACGAGTCGGACATCAACGCCATCTGTTTCTTCCCAATGGAGAGGCCATCTGCACGGGCTCGG  
ATGACGCTTCCTGCCGCTTGTGTTGACCTGCGGGCAGACCAGGAGCTGATCTGCTTCTCCCACGAGAGCATCATCTGCGGCAT  
CACGTCCGTGGCCTTCTCCCTCAGTGGCCGCCTACTATTCGCTGGCTACGACGACTTCAACTGCAATGTCTGGGACTCCATG  
AAGTCTGAGCGTGTGGGCATCCTCTCTGGCCACGATAACAGGGTGTGCTGCCTGGGAGTCACAGCTGACGGGATGGCTGTG  
GCCACAGGTTCTGGGACAGCTTCCTCAAATCTGGAAGTGA

Sm-Gβ5 (SmBiT-GNB5)

ATGGTCACCGGCTATCGGCTGTTTGAAGAGATTCTGGGGGGGTCAGGAGGAGGAGGCTCAGGGGGCTCATCATCAGGAGGA  
TGTGATCAGACCTTCTCGTTAATGTATTTGGCTCATGTGACAAATGTTTCAAACAACGAGCTCTGAGACCAGTTTTCAAGAA  
GTCTCAACAACCTCAGCTACTGTTCAACATGTGCAGAAATTATGGCAACCGAGGGGCTGCACGAGAACGAGACGCTGGCGTC  
GCTGAAGAGCGAGGCCGAGAGCCTCAAGGGCAAGCTGGAGGAGGAGCGAGCCAAGCTGCACGATGTGGAGCTGCACCAG  
GTGGCGGAGCGGGTGGAGGCCCTGGGGCAGTTTGTGTCATGAAGACCAGAAGGACCCTCAAAGGCCACGGGAACAAAGTCCT  
GTGATGGACTGGTCAAAGATAAGAGGAGGATCGTGAGCTCGTCACAGGATGGGAAGGTGATCGTGTGGGATTCTTCCAC  
CACAAACAAGGAGCACGCGGTCACCATGCCCTGCACGTGGGTGATGGCATGTGCTTATGCCCCATCGGGATGTGCCATTGCT  
TGTGGTGGTTTGGATAATAAGTGTCTGTGTACCCCTTGACGTTTGACAAAAATGAAAACATGGCTGCCAAAAAGAAGTCTG  
TTGCTATGCACACCAACTACCTGTGCGCCTGCAGCTTACCAACTCTGACATGCAGATCCTGACAGCGAGCGGGCATGGCAC  
ATGTGCCCTGTGGGACGTGGAGAGCGGGCAGCTGCTGCAGAGCTTCCACGGACATGGGGCTGACGTCTCTGCTTGGACCT

GGCCCCCTCAGAAACTGGAAACACCTTCGTGTCTGGGGGATGTGACAAGAAAGCCATGGTGTGGGACATGCGCTCCGGCCA  
GTGCGTGCAGGCCTTTGAAACACATGAATCTGACATCAACAGTGTCCGGTACTACCCCAGTGGAGATGCCTTTGCTTCAGGG  
TCAGATGACGCTACGTGTCGCCTCTATGACCTGCGGGCAGATAGGGAGGTTGCCATCTATTCCAAAGAAAGCATCATATTTGG  
AGCATCCAGCGTGGACTTCTCCCTCAGTGGTCGCCTGCTGTTTGCTGGATAACAATGATTACACTATCAACGTCTGGGATGTTT  
TCAAAGGGTCCCGGGTCTCCATCCTGTTTGGACATGAAAACCGCGTTAGCACTCTACGAGTTTCCCCCGATGGGACTGCTTT  
CTGCTCTGGATCATGGGATCATAACCCTCAGAGTCTGGGCCTGA

Sm-Gyt1 (SmBiT-GNGT1)

ATGGTCACCGGCTATCGGCTGTTTGAAGAGATTCTGGGGGGGTCAGGAGGAGGAGGCTCAGGGGGCTCATCATCAGGAGGA  
CCAGTAATCAATATTGAGGACCTGACAGAAAAGGACAAAATTGAAGATGGAAGTTGACCAGCTCAAGAAAGAAGTGACACT  
GGAAAGAATGCTAGTTTCCAAATGTTGTGAAGAAGTAAGAGATTACGTTGAAGAACGATCTGGCGAGGATCCACTGGTAAA  
GGGCATCCCAGAGGACAAAAATCCCTTCAAGGAGCTCAAAGGAGGCTGTGTGATTTTCATGA

**Amino acid sequences of the DREADD constructs used in this study.**

The FLAG epitope tag (DYKDDDDK) and a following linker (GS or GSG) are highlighted in green.

The orthosteric mutations (Y<sup>3.33</sup>C and A<sup>5.46</sup>G), which alter which ligand specificity from acetylcholine to clozapine-N-oxide (CNO), is highlighted in red.

The ICL3 swapped from M3D is highlighted in blue.

M3D

MDYKDDDDKGS<sup>TLHNNSTTSPLFPNISSSWIHSPSDAGLPPGTVTHFGSYNVSRAAGNFSSPDGTTDDPLGGHTVW</sup>  
QVVFIAFLTGILALVTHIGNILVIVSFKV NKQLKTVNNYFLLSLACADLIIGVISMNLF<sup>TTYIIMNRWALGNLACDLWL</sup>  
AIDCVASNASVMNLLVISFD<sup>RYFSITRPLTYRAKRTTKRAGVMIGLAWVISFVLWAPAILFWQYFVGKRTVPPGECFI</sup>  
QFLSEPTITFGTAIAGFYMPVTIMTILYWR<sup>IYKETE</sup>KELAGLQASGTEAETENFVHPTGSSRSCSSYELQQQSMK  
RSNRRKYGRCHF<sup>WFTTKSWKPSSEQMDQDHSSSDSWNNNDAAA</sup>LENSASSDEEDIGSETRAIYSIVLKLPGHSTI  
LNSTKLPSSDNLQVPEEELGMVDLERKADKLQAQKSVDDGGSPKSF<sup>SKLPIQLES</sup>AVDTAKTSDVNSSVGKSTATL  
PLSFKEATLAKRFALKTRSQITKRKRMSLVKEKAAQT

M3D-GPR183/ICL3

MDYKDDDDKGS<sup>TLHNNSTTSPLFPNISSSWIHSPSDAGLPPGTVTHFGSYNVSRAAGNFSSPDGTTDDPLGGHTVW</sup>  
QVVFIAFLTGILALVTHIGNILVIVSFKV NKQLKTVNNYFLLSLACADLIIGVISMNLF<sup>TTYIIMNRWALGNLACDLWL</sup>  
AIDCVASNASVMNLLVISFD<sup>RYFSITRPLTYRAKRTTKRAGVMIGLAWVISFVLWAPAILFWQYFVGKRTVPPGECFI</sup>  
QFLSEPTITFGTAIAGFYMPVTIMTILYWR<sup>IYKETE</sup>RTAKQNPLTEKSGVEK<sup>AAQ</sup>TL<sup>SAILLA</sup>FIITWTPYNIMVLVN  
TFCDS<sup>CI</sup>PKTFWNLGYWLCYINSTVNPVCYALCNKTFRTTFKMLLLCQCDK<sup>KKRRK</sup>Q<sup>QY</sup>Q<sup>QR</sup>Q<sup>SVIFHKRAPEQA</sup>  
L

M3D-GPR132/ICL3

MDYKDDDDKGS<sup>TLHNNSTTSPLFPNISSSWIHSPSDAGLPPGTVTHFGSYNVSRAAGNFSSPDGTTDDPLGGHTVW</sup>  
QVVFIAFLTGILALVTHIGNILVIVSFKV NKQLKTVNNYFLLSLACADLIIGVISMNLF<sup>TTYIIMNRWALGNLACDLWL</sup>  
AIDCVASNASVMNLLVISFD<sup>RYFSITRPLTYRAKRTTKRAGVMIGLAWVISFVLWAPAILFWQYFVGKRTVPPGECFI</sup>  
QFLSEPTITFGTAIAGFYMPVTIMTILYWR<sup>IYKETE</sup>QSMGLSAAQE<sup>KAAQ</sup>TL<sup>SAILLA</sup>FIITWTPYNIMVLVNTFCDS  
CIPKTFWNLGYWLCYINSTVNPVCYALCNKTFRTTFKMLLLCQCDK<sup>KKRRK</sup>Q<sup>QY</sup>Q<sup>QR</sup>Q<sup>SVIFHKRAPEQAL</sup>

M4D

MDYKDDDDKGSANFTPVNGSSGNQSVRLVTSSSHNRYETVEMVFIATVTGSLSLVTVVGNILVMSIKVNRQLQTV  
NNYFLFSLACADLIIGAFSMNLYTVYIIKGYWPLGAVVCDLWLALD<sup>CVVSNASVMNLLIISFD</sup>RYFCVTKPLTYPAR

RTTKMAGLMIAAAWVLSFVLWAPAILFWQFVVGKRTVPDNQCFIQFLSNPAVTFGTAIAGFYLPVVIMTVLYIHISLA  
SRSRVHKHRPEGPKKAKTLAFLKSPLMKQSVKKPPPGEAAREELRNGKLEEAPPPALPPPPRPVADKDTSNNESS  
GSATQNTKERPATELSTTEATTPAMPAPPLQPRALNPASRWSKIQIVTKQTGNECVTAIEIVPATPAGMRPAANVARKF  
ASIARNQVRKKRQMAARERKVTRTIFAILLAFILTWTPYNMVLVNTFCQSCIPDTVWSIGYWLCYVNSTINPACYA  
LCNATFKKTRHLLLCQYRNIGTAR

M3D-Gs

MDYKDDDDKGGSTLHSNSTTSPLFPNISSWVHSPSEAGLPLGTVTQLGSYNISQETGNFSSNDTSSDPLGGHTIWQ  
VVFIAFLTGFALVTHIGNILVIVAFKVNKQLKTVNNYFLLSLACADLIIGVISMNLFTTYIIMNRWALGNLACDLWLSI  
DCVASNASVMNLLVISFDRYFSITSPFRYQSLMTRARAGVMIGLAWVISFVLWAPAILFWQYFVGKRTVPPGECFIQF  
LSEPTITFGTAIAGFYMPVTIMTILYWRVYREAKEQIRKIDRCEGRFYGSQEQPPPLPQHQPILGNRASKRKTSR  
VMAMREHKALQTLSAILLAFIITWTPYNIMVLVNTFCDSIPKTYWNLGYWLCYINSTVNPVCYALCNKTFRTTFK  
TLLLCQCDKRKRKQYQQRQSVIFHKRVPEQAL

## **Nucleotide sequences of the DREADD constructs.**

### M3D

ATGGATTACAAGGATGACGACGATAAGGGATCCACCTTGCACAATAACAGTACAACCTCGCCTTTGTTTCCAAA  
CATCAGCTCCTCCTGGATACACAGCCCCCTCCGATGCAGGGCTGCCCCGGGAACCGTCACTCATTTTCGGCAGCT  
ACAATGTTTCTCGAGCAGCTGGCAATTTCTCCTCTCCAGACGGTACCACCGATGACCCTCTGGGAGGTCATACC  
GTCTGGCAAGTGGTCTTCATCGCTTTCTTAACGGGCATCCTGGCCTTGGTGACCATCATCGGCAACATCCTGGTA  
ATTGTGTCAATTAAGGTCAACAAGCAGCTGAAGACGGTCAACAACACTTCTCCTTAAAGCCTGGCCTGTGCCGA  
TCTGATTATCGGGGTCATTTCAATGAATCTGTTTACGACCTACATCATCATGAATCGATGGGCCTTAGGGAACTTG  
GCCTGTGACCTCTGGCTTGCCATTGACTGCGTAGCCAGCAATGCCTCTGTTATGAATCTTCTGGTCAACAGCTTT  
GACAGATACTTTTCCATCACGAGGCCGCTCACGTACCGAGCCAAACGAACAACAAGAGAGCCGGTGTGATG  
ATCGGTCTGGCTTGGGTCATCTCCTTTGTCCTTTGGGCTCCTGCCATCTTGTCTGGCAATACTTTGTTGGAAAG  
AGAAGTGTGCCTCCGGGAGAGTGCTTCATTCAGTTCCTCAGTGAGCCCACCATTACTTTTGGCACAGCCATCGC  
TGGCTTTTATATGCCTGTCACCATTATGACTATTTTATACTGGAGGATCTATAAGGAAACTGAAAAGCGTACCAA  
AGAGCTTGCTGGCCTGCAAGCCTCTGGGACAGAGGCAGAGACAGAAAACCTTTGTCCACCCACGGGCAGTTC  
TCGAAGCTGCAGCAGTTACGAACTTCAACAGCAAAGCATGAAACGCTCCAACAGGAGGAAGTATGGCCGCTG  
CCACTTCTGGTTCACAACCAAGAGCTGGAAACCCAGCTCCGAGCAGATGGACCAAGACCACAGCAGCAGTGA  
CAGTTGGAACAACAATGATGCTGCTGCCTCCCTGGAGAACTCCGCCTCCTCCGACGAGGAGGACATTGGCTCC  
GAGACGAGAGCCATCTACTCCATCGTGCTCAAGCTTCCGGGTCACAGCACCATCCTCAACTCCACCAAGTTACC  
CTCATCGGACAACCTGCAGGTGCCTGAGGAGGAGCTGGGGATGGTGGACTTGGAGAGGAAAGCCGACAAGCT  
GCAGGCCCAGAAGAGCGTGGACGATGGAGGCAGTTTTCCAAAAAGCTTCTCCAAGCTTCCCATCCAGCTAGA  
GTCAGCCGTGGACACAGCTAAGACTTCTGACGTCAACTCCTCAGTGGGTAAGAGCACGGCCACTCTACCTCTG  
TCCTTCAAGGAAGCCACTCTGGCCAAGAGGTTTGTCTGTAAGACCAGAAGTCAGATCACTAAGCGGAAAAGG  
ATGTCCCTGGTCAAGGAGAAGAAAGCGGCCAGACCCTCAGTGCGATCTTGCTTGCCTTCATCATCACTTGGAA  
CCCCATAACAACATCATGGTTCTGGTGAACACCTTTTGTGACAGCTGCATACCCAAAACCTTTTGGAAATCTGGGC  
TACTGGCTGTGCTACATCAACAGCACCGTGAACCCCGTGTGCTATGCTCTGTGCAACAAAACATTCAGAACCAC  
TTTCAAGATGCTGCTGCTGTGCCAGTGTGACAAAAAAGAGGGCGCAAGCAGCAGTACCAGCAGAGACAGTC  
GGTCATTTTTTACAAGCGCGCACCCGAGCAGGCCTTGTGA

### M3D-GPR183/ICL3

ATGGATTACAAGGATGACGACGATAAGGGATCCACCTTGCACAATAACAGTACAACCTCGCCTTTGTTTCCAAA  
CATCAGCTCCTCCTGGATACACAGCCCCCTCCGATGCAGGGCTGCCCCGGGAACCGTCACTCATTTTCGGCAGCT  
ACAATGTTTCTCGAGCAGCTGGCAATTTCTCCTCTCCAGACGGTACCACCGATGACCCTCTGGGAGGTCATACC

GTCTGGCAAGTGGTCTTCATCGCTTTCTTAACGGGCATCCTGGCCTTGGTGACCATCATCGGCAACATCCTGGTA  
ATTGTGTCAATTAAGGTCAACAAGCAGCTGAAGACGGTCAACAACACTTTCCTCTTAAGCCTGGCCTGTGCCGA  
TCTGATTATCGGGGTCATTTCAATGAATCTGTTTACGACCTACATCATCATGAATCGATGGGCCTTAGGGAACTTG  
GCCTGTGACCTCTGGCTTGCCATTGACTGCGTAGCCAGCAATGCCTCTGTTATGAATCTTCTGGTCATCAGCTTT  
GACAGATACTTTTCCATCACGAGGCCGCTCACGTACCGAGCCAAACGAACAACAAAGAGAGCCGGTGTGATG  
ATCGGTCTGGCTTGGGTCATCTCCTTTGTCTTTGGGCTCCTGCCATCTTGTCTGGCAATACTTTGTTGGAAAG  
AGAACTGTGCCTCCGGGAGAGTGCTTCATTCAGTTCCTCAGTGAGCCCACCATTACTTTTGGCACAGCCATCGC  
TGGCTTTTATATGCCTGTCACCATTATGACTATTTTATACTGGAGGATCTATAAGGAAACTGAAAGAACTGCCAA  
ACAAAACCCACTCACTGAGAAATCTGGTGTAGAGAAGAAAGCGGCCAGACCCTCAGTGCGATCTTGCTTGCC  
TTCATCATCACTTGGACCCCATACAACATCATGGTTCTGGTGAACACCTTTTGTGACAGCTGCATAACCCAAAACC  
TTTTGGAATCTGGGCTACTGGCTGTGCTACATCAACAGCACCGTGAACCCCGTGTGCTATGCTCTGTGCAACAA  
AACATTCAGAACCCTTTCAAGATGCTGCTGCTGTGCCAGTGTGACAAAAAAAAGAGGCGCAAGCAGCAGTA  
CCAGCAGAGACAGTCGGTCATTTTTCACAAGCGCGCACCCGAGCAGGCCTTGTGA

M3D-GPR132/ICL3

ATGGATTACAAGGATGACGACGATAAGGGATCCACCTTGCACAATAACAGTACAACCTCGCCTTTGTTTCCAAA  
CATCAGCTCCTCCTGGATACACAGCCCCCTCCGATGCAGGGCTGCCCCCGGAACCGTCACTCATTTTCGGCAGCT  
ACAATGTTTCTCGAGCAGCTGGCAATTTCTCCTCTCCAGACGGTACCACCGATGACCCTCTGGGAGGTCATACC  
GTCTGGCAAGTGGTCTTCATCGCTTTCTTAACGGGCATCCTGGCCTTGGTGACCATCATCGGCAACATCCTGGTA  
ATTGTGTCAATTAAGGTCAACAAGCAGCTGAAGACGGTCAACAACACTTTCCTCTTAAGCCTGGCCTGTGCCGA  
TCTGATTATCGGGGTCATTTCAATGAATCTGTTTACGACCTACATCATCATGAATCGATGGGCCTTAGGGAACTTG  
GCCTGTGACCTCTGGCTTGCCATTGACTGCGTAGCCAGCAATGCCTCTGTTATGAATCTTCTGGTCATCAGCTTT  
GACAGATACTTTTCCATCACGAGGCCGCTCACGTACCGAGCCAAACGAACAACAAAGAGAGCCGGTGTGATG  
ATCGGTCTGGCTTGGGTCATCTCCTTTGTCTTTGGGCTCCTGCCATCTTGTCTGGCAATACTTTGTTGGAAAG  
AGAACTGTGCCTCCGGGAGAGTGCTTCATTCAGTTCCTCAGTGAGCCCACCATTACTTTTGGCACAGCCATCGC  
TGGCTTTTATATGCCTGTCACCATTATGACTATTTTATACTGGAGGATCTATAAGGAAACTGAACAGAGCATGGGC  
TTAAGCGCTGCCAGGAGAAGAAAGCGGCCAGACCCTCAGTGCGATCTTGCTTGCCCTTCATCATCACTTGGAA  
CCCCATACAACATCATGGTTCTGGTGAACACCTTTTGTGACAGCTGCATAACCCAAAACCTTTTGGAACTCTGGGC  
TACTGGCTGTGCTACATCAACAGCACCGTGAACCCCGTGTGCTATGCTCTGTGCAACAAAACATTCAGAACCAC  
TTTCAAGATGCTGCTGCTGTGCCAGTGTGACAAAAAAAAGAGGCGCAAGCAGCAGTACCAGCAGAGACAGTC  
GGTCATTTTTCACAAGCGCGCACCCGAGCAGGCCTTGTGA

M4D

ATGGATTACAAGGATGACGACGATAAGGGATCCGCCAACTTCACACCTGTCAATGGCAGCTCGGGCAATCAGT  
CCGTGCGCCTGGTACGTCATCATCCCACAATCGCTATGAGACGGTGGAAATGGTCTTCATTGCCACAGTGACA  
GGCTCCCTGAGCCTGGTGACTGTCGTGGGCAACATCCTGGTGATGCTGTCCATCAAGGTCAACAGGCAGCTGC  
AGACAGTCAACAACACTACTTCTCTTCAGCCTGGCGTGTGCTGATCTCATCATAGGCGCCTTCTCCATGAACCTCT  
ACACCGTGTACATCATCAAGGGCTACTGGCCCTGGGCGCCGTGGTCTGCGACCTGTGGCTGGCCCTGGACTG  
CGTGGTGAGCAACGCCTCCGTCATGAACCTTCTCATCATCAGCTTTGACCGCTACTTCTGCGTCACCAAGCCTC  
TCACCTACCTGCCCCGGCGCACCAAGATGGCAGGCCTCATGATTGCTGCTGCCTGGGTACTGTCTTCGTG  
CTCTGGGCGCCTGCCATCTTGTTCGTCAGTTTGTGGTGGGTAAGCGGACGGTGCCCGACAACAGTGCTTCAT  
CCAGTTCCTGTCCAACCCAGCAGTGACCTTTGGCACAGCCATTGCTGGCTTCTACCTGCCTGTGGTCATCATGA  
CGGTGCTGTACATCCACATCTCCCTGGCCAGTCGCAGCCGAGTCCACAAGCACCGGCCCGAGGGCCCGAAGG  
AGAAGAAAGCCAAGACGCTGGCCTTCTCAAGAGCCACTAATGAAGCAGAGCGTCAAGAAGCCCCCGCCG  
GGGAGGCCCGCCGGGAGGAGCTGCGCAATGGCAAGCTGGAGGAGGCCCGCCAGCGCTGCCACCGCCA  
CCGCGCCCCGTGGCTGATAAGGACACTTCCAATGAGTCCAGCTCAGGCAGTGCCACCCAGAACACCAAGGAA  
CGCCAGCCACAGAGCTGTCCACCACAGAGGCCACCACGCCCGCCATGCCCGCCCTCCCCTGCAGCCGCGG  
GCCCTCAACCCAGCCTCCAGATGGTCCAAGATCCAGATTGTGACGAAGCAGACAGGCAATGAGTGTGTGACAG  
CCATTGAGATTGTGCCTGCCACGCCGGCTGGCATGCGCCCTGCGGCCAACGTGGCCCGCAAGTTCGCCAGCAT  
CGCTCGCAACCAGGTGCGCAAGAAGCGGCAGATGGCGGCCCGGGAGCGCAAAGTGACACGAACGATCTTTGC  
CATTCTGCTAGCCTTCATCCTCACCTGGACGCCCTACAACGTCATGGTCTGGTGAACACCTTCTGCCAGAGCT  
GCATCCCTGACACGGTGTGGTCCATTGGCTACTGGCTCTGCTACGTCAACAGCACCATCAACCCTGCCTGCTAT  
GCTCTGTGCAACGCCACCTTTAAAAAGACCTTCCGGCACCTGCTGCTGTGCCAGTATCGGAACATCGGCACCTG  
CCAGGTGA

M3D-Gs

ATGGACTACAAAGACGACGACGACAAAGGCTCAGGCACTCTGCATAGCAACTCAACTACTTCAACCACTGTTCC  
CAAATATCTCCTCTAGCTGGGTGCACTCCCCTTCTGAGGCAGGCCTGCCACTGGGCACCGTGACACAGCTCGG  
CTCCTATAACATCTCTCAGGAGACAGGCAACTTCAGTCCAATGACACATCTAGCGATCCCCTGGGAGGACACA  
CCATCTGGCAGGTGGTGTTCATCGCCTTTCTGACCGGCTTTCTGGCCCTGGTGACAATCATCGGCAACATCCTG  
GTCATCGTGGCCTTCAAGGTCAATAAGCAGCTCAAGACCGTGAACAATTACTTTCTGCTGTCTCTGGCCTGCGC  
CGACCTGATCATCGGCGTGATCAGCATGAATCTGTTACCACATATATCATCATGAACAGATGGGCACTGGGAA  
ATCTGGCATGCGACCTGTGGCTGTCCATCGATTGCGTGGCCAGCAACGCCTCCGTGATGAATCTGCTGGTCATC  
TCCTTCGATCGGTACTTTTCTATCACCAGCCCTTTCAGATATCAGTCTCTGATGACAAGGGCCCGCGCCGGCGTG  
ATGATCGGCCCTGGCCTGGGTGCTCTCTTTGTGCTGTGGGCCCCAGCCATCCTGTTCTGGCAGTACTTTGTGGGC  
AAGAGGACCGTGCCCCCTGGAGAGTGCTTCATCCAGTTTCTGAGCGAGCCCACCATCACATTCGGCACAGCCA



TCGCCGGCTTTTATATGCCTGTGACCATCATGACAATCCTGTACTGGCGGGTGTATAGAGAGGCCAAGGAGCAG  
ATCAGGAAGATCGACCGCTGTGAGGGCCGGTTCTACGGCTCCCAGGAGCAGCCACAGCCACCACCTCTGCCAC  
AGCACCAGCCCATCCTGGGCAACGGCAGAGCCAGCAAGAGGAAGACCTCCCGCGTGATGGCCATGCGGGAGC  
ACAAGGCCCTCCAGACCCTGTCTGCCATCCTGCTGGCCTTCATCATCACCTGGACACCATAACAACATCATGGTG  
CTGGTGAATACCTTTTGCGACTCCTGCATCCCCAAGACATATTGGAACCTGGGCTACTGGCTGTGCTATATCAAC  
TCCACCGTGAATCCCGTGTGCTACGCCCTGTGCAATAAGACCTTCAGGACCACCTTCAAGACCCTGCTGCTGTG  
CCAGTGTGATAAGCGCAAGCGGAGAAAGCAGCAGTACCAGCAGAGGCAGAGCGTGATTTTCCACAAGAGGGT  
CCCCGAACAGGCACTGTGA

**Amino acid sequences of the NanoBiT-RhoA constructs.**

The LgBiT luciferase fragment is highlighted in red.

The SmBiT luciferase fragment is highlighted in blue.

The 15-amino acid flexible linker is highlighted in purple.

Lg-RhoA (LgBiT-RHOA)

MVFTLEDFVGDWEQTAAYNLDQVLEQGGVSSLLQNLAVSVTPIQRIVRSGENALKIDIHVIIPYEGLSADQMAQIEE  
VFKVVYPVDDHHFKVILPYGTLVIDGVTPNMLNYFGRPYEGIAVFDGKKITVTGTLWNGNKIIDERLITPDGSMLFR  
VTINSGGSGGGGGSGSSSGGTAAIRKKLIVVGDGACGKTCLLIVFSKDQFPEVYVPTVFENYVADIEVDGKQVELAL  
WDTAGQEDYDRLRPLSYPTDVLVILMCFSPDSLENIPEKWTPEVKHFPCNPVPIILVGNKKDLRNDHTRRELAKM  
KQEPVKPEEGRDMANRIGAFGYMECSAKTKDGVREVFEMATRAALQARRGKKKSGCLVL

Sm-PKN1 (SmBiT-PKN1-GBD)

MVTGYRLFEEILGGSGGGGGSGSSSGGESEPRSWLLEQLGLAGADLAAPGVQQQLELERERLRREIRKELKKEG  
AENLRRATTDLGRSLGPVELLLRGSSRRDLLHQQLQELHAHVLPDPAAT

## **Nucleotide sequences of the NanoBiT-RhoA constructs.**

### Lg-RhoA (LgBiT-RHOA)

ATGGTGTTTACTCTGGAGGACTTCGTCCGAGACTGGGAACAGACTGCTGCTTACAATCTGGATCAGGTGCTGG  
AACAGGGGGGGGTCAGCTCCCTGCTCCAGAACCTGGCCGTGTCTGTGACACCTATCCAGCGGATCGTGAGAAG  
CGGCGAGAATGCCCTGAAGATCGACATCCACGTGATCATCCATACGAGGGCCTGTCCGCCGATCAGATGGCCC  
AGATCGAGGAGGTGTTCAAGGTGGTGTACCCAGTGGACGATCACCCTTCAAAGTGATCCTGCCCTATGGCAC  
CCTGGTCATCGACGGAGTGACCCCAAACATGCTGAATTACTTCGGCAGGCCTTATGAGGGCATCGCCGTGTTG  
ATGGCAAGAAGATCACCGTGACAGGCACCCTGTGGAACGGCAATAAGATCATCGACGAGCGGCTGATCACCCC  
CGATGGCTCTATGCTGTTTCAGAGTGACCATCAATAGCGGGGGGAGCGCGGGGGGGGGAGCGGGGGAAGCAG  
TAGTGGCGGTACCGCAGCAATCCGGAAGAAGCTGGTCATCGTGGGCGACGGAGCATGCGGCAAGACCTGTCT  
GCTGATCGTGTTTCAGCAAGGATCAGTTTCCCGAGGTGTACGTGCCTACAGTGTTTCGAGAACTATGTGGCCGACA  
TCGAGGTGGATGGCAAGCAGGTGGAGCTGGCCCTGTGGGACACCGCCGGCCAGGAGGACTACGATAGGCTGC  
GCCCTCTGTCCTATCCAGACACAGATGTGATCCTGATGTGCTTCAGCATCGACTCCCCTGATTCTCTGGAGAAC  
ATCCCAGAGAAGTGGACCCCCGAGGTGAAGCACTTTTGTCCCAATGTGCCTATCATCCTGGTGGGCAACAAGA  
AGGACCTGAGGAATGATGAGCACACACGGAGAGAGCTGGCCAAGATGAAGCAGGAGCCAGTGAAGCCAGAG  
GAGGGAAGGGACATGGCAAATAGAATCGGCGCCTTCGGCTACATGGAGTGCTCTGCCAAGACCAAGGATGGC  
GTGCGCGAGGTGTTTGAGATGGCAACAAGAGCCGCCCTGCAAGCAAGGAGAGGAAAGAAGAAAAGTGGATG  
TCTGGTGCTGTGA

### Sm-PKN1 (SmBiT-PKN1-GBD)

ATGGTCACTGGATATAGGCTGTTTCGAGGAGATTCTGGGGGGCTCAGGAGGAGGAGGCTCAGGAGGCTCATCAT  
CAGGGGGGGAAAGCGAGCCCAGGTCTTGAGCCTGCTGGAGCAGCTGGGCCTGGCAGGAGCAGACCTGGCA  
GCACCTGGCGTGCAGCAGCAGCTGGAGCTGGAGAGGGAGCGCCTGAGGAGAGAGATCCGGAAGGAGCTGAA  
GCTGAAGGAGGGAGCAGAGAACCCTGAGGAGGGCAACCACAGACCTGGGCCGGAGCCTGGGACCAGTGGAGC  
TGCTGCTGAGAGGCAGCTCCCGGAGACTGGATCTGCTGCACCAGCAGCTGCAAGAACTGCACGCACACGTCG  
TCCTGCCAGACCCCGCCGCAACCTGA

**An amino acid sequences of the NanoBiT-IP3 sensor construct.**

The LgBiT luciferase fragment is highlighted in red.

The SmBiT luciferase fragment is highlighted in blue.

The 15-amino acid flexible linker is highlighted in purple.

Lg-IP3R2-Sm (LgBiT-ITPR2-IBC-SmBiT)

MVFTLEDFVGDWEQTAAYNLDQVLEQGGVSSLLQNLAVSVTPIQRIVRSGENALKIDIHVIIPYEGLSADQMAQIEE  
VFKVVYPVDDHHFKVILPYGTLVIDGVTPNMLNYFGRPYEGIAVFDGKKITVTGTLWNGNKIIDERLITPDGSMLFR  
VTINSGGSGGGGGSGSSGGTKYSSYREDVLKGGDVVRLFHAEQEKFLTCDEYEKKQHIFLRITTLRQSATSATSSKA  
LWEIEVVHHDPCRGGAGQWNSLFRFKHLATGNYLAAELNPDYRDAQNEGKNVRDGVPPPTSKKKRQAGEKIMYT  
LVSVPHGNDIASL FELDATTLQRADCLVPRNSYVRLRHLCNTWVTSTSIPIIDTDEERPVMKIGTCQTKEDKEAFI  
VSVPLSEVRDLDFANDANKVLATTVKKLENGTITQNERRFVTKLLEDLIFVADVPNNGQEVLDVVITKPNRERQK  
LMREQNILAQVFGILKAPFKEKAGEGSMLRLEDLGDQRYAPYKYMLRLCYRVLRHSQQDYRKNQEYIAKNFCVM  
QSQIGYDILAEDTITALLHNNRKGGSGGGGGSGSSGGVTGYRLFEEIL

## **A nucleotide sequence of the NanoBiT-IP3 sensor construct.**

### Lg-IP3R2-Sm (LgBiT-ITPR2-IBC-SmBiT)

ATGGTGTTTACTCTGGAGGACTTCGTCGGAGACTGGGAACAGACTGCTGCTTACAATCTGGATCAGGTGCTGG  
AACAGGGGGGGGTCAGCTCCCTGCTCCAGAACCTGGCCGTGTCTGTGACACCTATCCAGCGGATCGTGAGAAG  
CGGCGAGAATGCCCTGAAGATCGACATCCACGTGATCATCCATACGAGGGCCTGTCCGCCGATCAGATGGCCC  
AGATCGAGGAGGTGTTCAAGGTGGTGTACCCAGTGGACGATCACCCTTCAAAGTGATCCTGCCCTATGGCAC  
CCTGGTCATCGACGGAGTGACCCCAAACATGCTGAATTACTTCGGCAGGCCTTATGAGGGCATCGCCGTGTTG  
ATGGCAAGAAGATCACCGTGACAGGCACCCTGTGGAACGGCAATAAGATCATCGACGAGCGGCTGATCACCCC  
CGATGGCTCTATGCTGTTTCAAGGTGGTGTACCCAGTGGACGATCACCCTTCAAAGTGATCCTGCCCTATGGCAC  
TAGTGGCGGTACCAAATACAGCTCCTACAGGGAGGACGTGCTGAAGGGAGGCGATGTGGTGAGACTGTTCCAC  
GCCGAGCAGGAGAAGTTTCTGACCTGCGATGAGTATGAGAAGAAGCAGCACATCTTCTGCGGACCACACTG  
AGACAGAGCGCCACCTCCGCCACATCTAGCAAGGCCCTGTGGGAGATCGAGGTGGTGCACCACGACCCTTGTA  
GGGGAGGAGCAGGACAGTGGAACTCTCTGTTCCGCTTTAAGCACCTGGCAACCGGAAACTACCTGGCCGCCG  
AGCTGAATCCAGACTATAGGGATGCCCAGAACGAGGGCAAGAATGTGCGCGATGGCGTGCCCCCACCAGCAA  
GAAGAAGCGGCAGGCCGGCGAGAAGATCATGTACACACTGGTGTCCGTGCCACACGGCAATGACATCGCCTCT  
CTGTTTGAAGTGGATGCAACCACCCTCCAGAGGGCAGACTGCCTGGTGCCCCGCAACAGCTATGTGAGGCTGC  
GCCACCTGTGCACCAATACATGGGTGACCTCCACATCTATCCCAATCGACACCGATGAGGAGAGGCCCGTGATG  
CTGAAGATCGGCACCTGCCAGACAAAGGAGGATAAGGAGGCCTTCGCCATCGTGTCTGTGCCCTGAGCGAG  
GTGCGGACCTGGATTTTGCCAACGACGCCAATAAGGTGCTGGCCACCACAGTGAAGAAGCTGGAGAACGGC  
ACCATCACACAGAATGAGCGGAGATTCGTGACCAAGCTGCTGGAGGACCTGATCTTCTTTGTGGCCGATGTGC  
CTAACAATGGCCAGGAGGTGCTGGACGTGGTTCATCACAAGCCAAACCGGGAGAGACAGAAGCTGATGCGGG  
AGCAGAATATCCTGGCCAGGTGTTTCGGCATCCTGAAGCCCCCTTTAAGGAGAAGGCAGGAGAGGGCTCCAT  
GCTGCGGCTGGAGGACCTGGGCGATCAGAGATACGCCCTTACAAGTATATGCTGCGGCTGTGCTATAGGGTGC  
TGCGCCACAGCCAGCAGGACTACAGAAAGAACCAGGAGTATATCGCCAAGAATTTTTGCGTGATGCAGTCCCA  
GATCGGCTACGACATCCTGGCCGAGGATAACCATCACAGCCCTGCTGCACAACAATAGAAAGGGCGGCTCTGGC  
GGCGGGGAAGCGGCGGCTCATCCTCTGGGGGCGTGACTGGCTATCGGCTGTTTGAAGAAATCCTGTGA