A

Osmsh4-2 Osmsh4-1 Osmsh4-3   **Osmsh4-4**

ATG   TAG

B

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H.sapiens     MLRPEISSTSPSPAVSPSSGETRSPQGPRYNFGLQETPQSRPSVQVVSASTCPGTSGAAGDRSSSSSSLPCPAPNSRPAQGSYFGNKRAYAENTVASNF   100
M.musculus    MLRQEAASLSS...............SPRWTPSRRDAPCGGP.........WPRVQAEYGRRHGRQSSSSSSSPAPASAPGSSFGNKRSYAIHRAASSF    75
S.cerevisiae  ...........................................MSESNLSSFISTNYFNLRSAANSSNSISKPSTKKSIRNQKSPTNISGW          48
A.thaliana    ....................................................................................................     0
B.distachyon  ....................................................................................................     0
O.sativa      ....................................................................................................     0

H.sapiens     TFGASSSSARDTNYPQTLKTPLSTGNPQRSGYKSWTP.QVGYSASSSSAISAHSPSVIVAVVEGRGLARGEIGMASIDLKNPQIILSQFADN.TTYAKVI   198
M.musculus    PIGTSSSSARDTTYPHTFRTPLSAGNPQRSGHKSWTP.QVGYSATSS.AVSAHAPSVIVAVVEGRGLARGEIGMASIDLKSPQIMLSQFADN.TTYAKVI   172
S.cerevisiae  ALKKKTLQIAETTWENNEKDSTHSHYLVTGSMASRTATSLSRYSTNASLLGPSIDCVLCCIYEVPRDISTRIGLCIINCNTGQMYLSDFMDS.QIYIRVV   147
A.thaliana    ........................................MEDDGGERSSFVAGLIENR...AKEVGMAAFDLRSASLHLSQYIETSSSYQNTK           51
B.distachyon  ....................................................................................................     0
O.sativa      ........................................MEGDAAGAGGGDRSSVIGLIENR...AKEVGVAAFDLRSASLHLSQYIETSCSYHNTK       56

H.sapiens     TKLKILSPLEIIVSNTACAVGNSTKLFTLITENFKNVNFTTIQRKYFNETKGLEYIEQLCIAEFSTVLMEVQSK..YYCLAAVAALLKYVEFIQN....S   292
M.musculus    TKLQVLSPLEIIVSNTACAVGNSTKLFTLITENFKNVNFTTVQRKYFNETKGLEYIEQLCIAEFSSVLMEVQSR..YYCLAAAAALLKYVEFIQN....S   266
S.cerevisiae  HKLQIYQPTEILIPSSSLAPTVSKLATMIKFNVAETVKIEEGSRKCFNSQDGLAAITKYLVDDTKKDLKIEEIIDKTFALCAASAAISYMEEIISKSSRN   247
A.thaliana    TLLRFYDPSVIIVPPNKLAADGMGVSELVDRCYSTVRKVVFARGCFDDTKGAVLIQNLAAEEPLALGLDTYYKQHYLSLAAAAATIKWIEAEKG....V   147
B.distachyon  ................MVGVSELVDKNYPANKKVTVARGCFDDTKGAVMVKNLSARDPSALGLDTYCKQYYLCLAAASATIKWIESEKG....V          74
O.sativa      TLLHFYDPMVAIVPPNKTAADGMGVSELVGKHLPTNKKITMARGCFDDTKGAVMVKNLSARDPSALGLDTYCKQYYLCLAAASATIKWIESERG....V   152

H.sapiens     VYAPKSLKICFQGSEQTAMDSSSAQNLELLINNQ.....DYRNNHTLFGVLNYTKTPGGSRRLRSNILEPLVDIETINMRLDCVQELLQDEELFFGLQS   387
M.musculus    VYAPKSLKIYFQGSEQTAMDSSSAQNLELLVNNQ.....DYRSNHTLFGVLNYTKTAGGSRTVRSNILEPLVDVETISMRLDCVQELLQDEELFFGLQS   361
S.cerevisiae  LNAFRKLRIQFEGTENTMLIDSKTVRGLELVENKLD......KNGISLVKFLDTTKMGQRSLRNSILQPLTDRGSIEMRLEALEELKANDDLLQKLRL   341
A.thaliana    IVTNHSLTVTFNGSFDHMNIDATSVENLELIDPFHNALLGTSNKKRSLFQMFKTTKTAGGTRLLRANLLQPLKDIETINTRLDCLDELMSNEQLFFGLSQ   247
B.distachyon  IITSHSLSVTFNGSFDHMNIDSTSVQTLEIIDPLHTELWGTSNKKKSLFQMLKTTKTTGGCRLLRANLLQPLKDIQTINTRLDCLDELMSNEELFFGLTQ   174
O.sativa      IITNHSLSVTFNGSFDHMNIDSTSVQTLEIIDPLHTELWGTSNKKKSLFQMLKTTKTTGGTRLLRANLLQPLKDIQTINTRLDCLDELMSNEELFFGLTQ   252

H.sapiens     VISRFLD.TEQLLSVLVQIPKQ........DTVNAAESKITNLIYLKHTLELVDPLKIAMKN.CNTPLLRAYYGSLEDK.RFGIILEKIKTVINDDARYM   476
M.musculus    VISRFLD.TEQLLSVLVQIPKQ........DTVNAAESKITNLIYLKHTLELVEPLKVTLKN.CSTPLLRAYYGSLEDH.RFGIILDKIKTVINDDARYM   450
S.cerevisiae  EMKSLPD.LDKLFSRLLCINHS..........AIKPDQRINYVLLLKETLQSVKSLKDALNDQFFQSRLISETKKIFNNDAIMEIEKLINSCINEDCVWA   430
A.thaliana    VLRKFPEETDRVLCHFCFKPKKVTEAVIGFENTRKSQNMISSIILLKTALDALPILAKVLKD.AKCFLLANVYKSVCENDRYASIRKKIGEVIDDDVLHA   346
B.distachyon  GLRKFPKESDKVLCHFCFKPKKDITDEIPKPANGRKSQLLISDIIVLKTALDAIPFLSKVLRG.AKSFLLQNIYQTVCENPKYARMRKRIGDVIDEDAVHS   273
O.sativa      GLRKFPKESDKVLCHFCFKPKKDTDEVLKPANGRKSQGLISDIIVLKTALDAIPFLSKVLRG.AKSFLLRNIYQTICENPKYASMRKRIGDVIDEDVVHS   351

H.sapiens     KGCLNMRTQKCYAVRSNINEFLDIARRTYTEIVDDIAGMISQLGEKYSLP.LRTSFSSARGFFIQMTTDCIALPSDQLPSEFIKISKVKNSYSFTSADLI   575
M.musculus    KGCLNMRTQKCYAVRSNISEFLDIARRTYTEIVDDIAGMIAQLAEKYSLP.LRTSFSSSRGFFIQMTTDCAALSSDQLPSEFIKISKVKNSYSFTSADLI   549
S.cerevisiae  SSAIQLLNQRSYAVKSDSNGLLDVSRQIYKEVKEEFFREVEDLTAKNKIN.LDHNYDSARGFYLRIKRQEFTDDVATLPDVFISRTIKKNYIECTTLNII   529
A.thaliana    RVPFVARTQCQCFAIKAGIDGFLDIARRTFCDTSEAIHNLASKYREEFNLPNLKLPFNNRQGFFFRIPQKEVQG...KLPNKFTQVVKHGKNIHCSSLELA   443
B.distachyon  RAPFAACTQQCFAIKAGIDGLLDVARRSFCDTSEAIHNLATKYREECQLPNLKIPYNNRLGFYFIIPQKDITG..KLPSKFIQVVRHGKNVHCSSFELA   370
O.sativa      RAPFVTCTQQCFAIKAGIDGLLDVARRSFCDTSEAIHNLANKYREDFKLPNLKIPYNNRLGFYFIVPQKDITE...RLPNKFIQVVRHGKNVHCSSLELA   448

H.sapiens     KMNERCQESLREIYHMTYMVCKLLSEIYEHIHCLYKLSDTVSMLDMLLS.FAHACT...LSDYVRPEFTDT..LAIKQGWHPILEKISAEKPIANNTYV   669
M.musculus    KMNERCQESLREIYHMTYMVCKLLSEIYEHIHCLYKLSDTVSMLDMLLS.FAHACT...LSDYVRPEFTDT..LAIKQGWHPILEKISAEKPVANNTYI   643
S.cerevisiae  KKNARLKEVMEEILLLSEETVDELLDKIATHISELFMAEAVAILDLVCS.FTYNLK...ENNYTIPIFTNN..LLIRDSRHPLLEKVLKNFVPNTISST   623
A.thaliana    SLNVRNKSAAGECFIRTETCEALMDAIREDISALTLLAEVLCLLDMIVNSFAHTISTKPVDRYSRPELTDSGPLAIDAGRHPILESIHNDF.VSNSIFM   542
B.distachyon  SLNARNKSAAAECFLRTELCLEGLISEIREDIGILTLLAEVLCLLDMIVNSFANTISTKPVDRYTRPEFTDDGPMAINAGRHPILEGLHTDF.VPNNIFL   469
O.sativa      SLNARNKSAAAECFLRTELCLEGLINEIREDIGILTLLAEVLCLLDMIVNSFAFTISTKPVDRYTRPEFTDDGPMAINAGRHPILESLHNDF.VPNNLFL   547

H.sapiens     TEGSNFLIITGPNMSGKSTYLKQIALCQIMAQIGSYVPAEYSSFRIAKQIFTRISTDDDIETNSSTFMKEMKEIAYILHNANDKSLIILIDELGRGTNTEE   769
M.musculus    TEGSNVLIITGPNMSGKSTYLKQIALCQIMAQIGSYVPAEYASFRIAAQIFTRISTDDDIETNSSTFMKEMKEIAYILHNANDKSLIILIDELGRGTNTEE   743
S.cerevisiae  KHSSSLQIITGCNMSGKSVYLKQVALICIMAQMGSGIPALYGSFPVFKRLHARVCN.DSMELTSSNFGFEMKEMAYFLDDINTETLLILDELGRGSSIAD   722
A.thaliana    SEATNMLVVMGPNMSGKSTYLQQVCLVVILAQIGCYVPARFATIRVVDRIFTRMGTMDNLESNSSTFMTEMRETAFIMQNVTNRSLIVMDELGRATSSSD   642
B.distachyon  SEASNMVLVMGPNMSGKSTYLQQICLIVILAQVGCYVPAQFASLRVVDRIFTRIGTGDNVENNSSTFMTEMKETAFIMQNVSSKSLIVVDELGRATSSSD   569
O.sativa      SEASNMVLVMGPNMSGKSTYLQQICLIVILAQIGCYVPAQFASLRVVDRVFTRIGTGDNVENNSSTFMTEMKETAFIMQNVSSKSLIVVDELGRATSSSD   647

H.sapiens     GIGICYAVCEYLLSLKAFTLFATHFLELCHIDALYPNVENMHFEVQHVKNTSRNKEAILYTYKLSKGLTEEKNYGLKAAEVSSLPPSIVLDAKEITTQIT   869
M.musculus    GIGISYAVCEHLLSIKAFTLFTTHFLELCHLDALYLNVENMHFEVQHVKNTSRNKDAILYTYKLSRGLTEEKNYGLKAAEASSLPSSIVLDARDITTQIT   843
S.cerevisiae  GFCVSLAVTEHLLRTEATVFLSTHFQDIPKIMSKKPAVSHLHVDAVLLNDNS.....VKMNYQLTQKSVAIENSGIKVVKKNIQPG...YYCRSVQYPFA   814
A.thaliana    GLANAWSCCLSLKAYTVFATHMDSLAELATIYPNVKVLHFYVDINRNNR......LDFKFQLRDGTLHVPHYGLLLAEVAGLPSTVIDTARIITKRIT   736
B.distachyon  GLAIAWSCCEHLLSLKAYTVFATHMEGLSELATIMYPNVKTLHFEVNLRNNR......LDFKFQLKDGLRRVPHYGLLLARVAGLPASVVDTATNITSRIT   663
O.sativa      GLAIAWSCCEYLLSTKAYTVFATHMESLSELATIYPNVKILHFEVDLRNDR......LDFKFRLKDGVRKVPHYGLLLAKVAGLPSSVIDTAASITSRIT   741

H.sapiens     .RQILQNQRSTPEMERQRAVYHLATRLVQTARNSQLDPDSLRIYLSNLKKKYKEDFPRTEQVPEKTEE                                   936
M.musculus    .RQILQNQRSSPEMDRQRAVYHLATRLVQAARNSQLEPDRLRTYLSNLKKKYAGDFPRAVGLPEKTEE                                   910
S.cerevisiae  FENCKSKD.                                                                                            822
A.thaliana    DKENKRIELNCGKHHEIHRIYRVAQRLICLKYSRQTE.DSIRQALQNLNESFTEERL...........                                  792
B.distachyon  EQEMVRMDANCEQYRPLQMAYQAAQRLICLKYSNQGD.EYIREALQDLKESYAAGKLTRKKEMR...                                   726
O.sativa      EQEMVRKDDNCEQYRSLQMAYQVTQRLICLKQSNQGD.DYIREALQNLKDGYAAGRLT.........                                   798
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Figure S2 Organization of the *OsMSH4* gene and the protein alignment of MSH4 homologues.

A, Schematic representation of the *OsMSH4* gene and mutation sites in *Osmsh4* alleles. Translated regions are shown as black boxes and untranslated regions are shown as lines. The arrows indicate different mutation sites of *Osmsh4* mutants. B, Protein alignment of MSH4 homologs. Identical amino acids are shaded in gray, while similar amino acids are shaded in silver gray.