

Nucleotide sequence of a cDNA for the chick *yes* proto-oncogene: comparison with the viral *yes* gene

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We present the nucleotide sequence of a 1.8 kb cDNA clone (p6A) isolated from chicken muscle cDNA library, in λ gt10, using a fragment of the viral *yes* DNA (1,2) as a probe. The longest open reading frame encodes a protein product with canonical features of a tyrosine-protein kinase (3) and with 99% homology to the viral *yes* protein. What could be inferred about the protein from the deduced amino acid sequence (size, activity, myristylation site) confirms what is known about the chicken cellular *yes* protein, pp62^{-*yes*} (2,4). The chicken cellular and viral *yes* gene products differ by 6 amino acids substitutions and carboxy-terminal peptides.

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CGAGCTGGAATCCCCCTCCCTCCCGGGCTCCGCGGGCTCCGGGAGGAGCGGGGGGGCCCGGCTTCTCTCCCTCCCTCCCTCCCTCCCGCCCGGCGGAGGAGG 114
GCAGAGCAACCATGGGCTGCATATAAAGCAAGAAGATAAAGGTCAGGCGATGAATACAGGACTGATAACACTCCAGAACCTATTAGTCCCACTCAGCCATTAAGGGTGA 228
      MGC I K S K E D K G P A M K Y R T D N T P E P I S S H V S H Y G S 34
GACTCCAGCCAGGCAACAGCACTCACCGGCAATAAAGGGATCAGCAGTAAATTTAAACAGTCATCCATGACTCCTTTTGGAGGCGCCCTCAGGAATGACACCCCTTTGGAGGAGCA 342
D S S Q A T Q S P A I K G S A V N F N S H S M T P F G G P S G M T P F G G A 72
TGCTTTCATTTTCAGCTGTGCCAAGTCCCATATCCTAGTACTTTAACAGGTGGTGTACTGTATTTCTGGCCCTTATAAGATTATGAAGCTAGAATACAGATGACCTTTCAATT 456
S S S F S A V P S P Y P S T L T G G V T V F V A L Y D Y E A R T T D D L S F 110
AAGAAAGGTGAACGGTTCAGATAATAAACCAACGGAAGCGACTGTGGGAGCAGATCCATTGCTACGGGAAAAACAGGCTACATCCCAAGCAATATCTAGCTCTCCCA 570
K K G E R F Q I I N N T E G D W W E A R S I A T G K T G Y I P S N Y V A P A 148
GACTCCATTCGAAGCGAAGAGTGTACTTTGCTAAATGGCGAGGAGGATCCAGAAAGACTACTTTAAATCTCGGAACGAGGTGCTATTTCTTACTAGTAGAGAGGCGAA 684
D S I Q A E E W Y F G K M G R K D A E R L L L N P G N Q R G I F L V R E S E 186
ACCAATAAGGTGCTTACTCCCTTCCATACGTGACTGGGATGAGGTCAGAGGTGATAATGTGAAGCACTACAAAATCAGAAAATCGAATGGTGATACTATATCAACAAC 798
T T K G A Y S L S I R D W D E V R G D N V K H Y K I R K L D N G G Y Y I T T 224
AGAGCACAATTTGAATCTCTACAGAAGTGGTGAAGCACTCAAGAGCAATGCTGATGGACTGTGTCATAAGCTAACACTGTATGTCCCAAGCTGAACACAGCAACAGAGGGA 912
R A Q F E S L Q K L V K H S R E H A D G L C H K L T T V C P T V K P Q T Q G 262
CTAGAAAAGATGCTGGGAAATCTTAGGAGTCTTTGAGCTGGAGTAAAGTGGGCCAAGGATCTTTGGTGAAGTATGGAACTGGAACTGGAACTGGAACTGGAACTGGAACT 1026
L A K D A W E I R E S I R L R L E V K L G Q G C F G E V W M G T V N G T T K V 300
GCCATCAGACACTTAAACCTGTGCAATGATCCGCGAAGCTTTCCTTCAGGAGGCTCAGATCATGAAGAAATAGCAGATCAAGCTTTTCCACTGTATCCGCTGTGTTTCT 1140
A I K T L K P G T M M P E A F L Q E A Q I M K K L R H D K L V P L Y A V V S 338
CAGGAACCAATCTACATAGTCAACGAATTCATGACAAAGGCAGCTTACTAGACTTCTGAAAGGAGGAGAAGGAACTCTTAAACTCCCAAGCTGCTGGAGATGGCTGCT 1254
E E P I Y I V T E F M T K G S L L D F L K E G E G K F L K L P Q L V D M A A 376
CAGATGCTGATGGCAGCTTACATTTGAAGAATCACTACATCCACAGGATCTCCGGGCGCCCAAGCTTTGTAGAGAGACAATCTCTGTCTAAAATAGCAGACTGGT 1368
Q I A D G M A Y I E R M N Y I H R D L R A A N I L V G D N L V C K I A D F G 414
CTGGGAAGTGAATAGAGGACAATGACTCACTCGGAGGCAAGGAGCTAAATTTCCAAATTAATGACTGCTCCGAGAAGCAGCATTTGATGGTGGTTTACAATCAAGTCAGAT 1482
L A R L I E D N E Y T A R Q G A K F P I K W T A P E A A L Y G R T I K S D 452
GTGTGTGTGTTGGAAATTTACTGCAGAGGCTGTAACAAGGAGGAGTCCATATCCAGGAATGGTGAATGGGAAAGTCTGGAAACAAAGTGGAAAGCTGGATATAGGATGGCT 1596
V W S F G I L T E L V T K G R V P Y P G M V N R E V L E Q V E R G Y R M P 490
TGCCCTCAGGCTCCCGGAATCTCTCCACGAGTTAATGAACTATGTGGAAAGGAGCCCTGATGAGAGACCAACATTTGAATATATACAGTCTTCTGGAGGACTACTTT 1710
C P Q G C P E S L H E L M K L C W K K D P D E R P T F E Y I Q S F L E D Y F 528
ACTGCTACAGAACCCAGTACCAGCTGGGCAAAATTTAAGCCCAACAGTCTATATAACATCGCAAAATCGCCAAATGTAAGAACTGCAAGAAATGGAGCTGGTACCC 1824
T A T E P Q Y Q P G D N L * * * 541
GGGATGCTCTAGAGTGGACCTGCAGG 1851
    
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References: (1) Kitamura, N., Kitamura, A., Toyoshima, K., Hirayama, Y., and Yoshida, M. (1982) *Nature* 297, 205-8. (2) Sudol, M., and Hanafusa, H. (1986) *Mol. Cell. Biol.*, 6, 2839-46. (3) Hanks, S. K., Quinn, A. M., and Hunter, T. (1988) *Science* 241, 42-52. (4) Sudol, M., Alvarez-Buylla, A., and Hanafusa, H. (1988) *Oncogene Res.*, 2, 345-55.