Nucleotide sequence of the rat protamine 2 gene

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Protamines are small basic proteins which replace histones and transition proteins during spermatogenesis. They serve to tightly compact the nuclear DNA in the sperm head. Despite an apparently essential function, however, there is a diversity of protamine expression throughout the mammalian order. P1 protamine is the predominant form, present in all mammalian spermatozoa analyzed to date. A second protamine variant has been detected only in spermatozoa of the mouse (1), hamster (Balhorn, personal comm.), human (2,3), and stallion (4,5,6). The rat does possess a protamine 2 gene however, and low levels of transcript are present in the rat testis (7). Here we present the nucleotide sequence of the rat protamine 2 gene and the amino acid sequence predicted from the nucleotide sequence. Despite dramatically different levels of protamine expression between the mouse and rat testes, there is 92.3% nucleotide similarity between the rat P2 gene sequence and that recently published for mouse (8), and 90.7% similarity between the predicted amino acid sequences.

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-461  GCCAGTCTGAGGGCTGACAGCAGAGCTGGGCTAAGAGTTGGTAGAGTGCTTCCTCGAATGCCAACCAACGATGGCTGGTAGCAACGTCGAATTCGA
-361  GGCCTTGGAGGTGAAGAGACCAAGGGTTAGAAGTTCAAGGCTGTCTCACATTAAATAAGTCAGCATGCTACAGGACCTCAAGGCAAGACGAGTAATCTGGA
-261  CCTACTGCCAACTGCCACCGAGTCTGCAAACTCTGTGTTGCCCTCACAGAGGAGACTGGGCAAGGTTGGGAACAACTCAATCAGGGGTGGGCGCAGAGG
-161  TCACAGTGGGGTTACCTTTATATATAGAGCCCTTGAGAGGCCCGCCACACACACACAGCAACATCATCACCACCAAGAGCAGGTGGGCGAGGCTACCGTCC
-61  CTCCTCTTCCAATCCAGGTGAGCTGCAGCTCAACCCAGAACTCCTGACCTCTGGCACTATGGTTCGCTACCGAATGAGGAGCCCGCAGTGGGGTTCAG
                                     M V R Y R M R S P S E G Q
40  CACCAGGGGCTGGGCAAGACCATGAGCGCGAGGAGCAGGGGCAAGAGCTGAGGCCAGAGCGCGTGGAGGAATATGGGAGGACAGAAAGGGGCG
H Q G P G Q D H E R E E Q G Q G Q E L S P E R V E D Y G R T E R G H
140  ACCACCACAGACACAGGCGCTGCAAGAGCTTCACAGGATCCACAAGAGGCGCGGTGTCACAGAGGCGGAGGAGACACTCTGCGGCCACAGGAGCGG
H H R H R R C K R L H R I H K R R R S C R R R R R H S C R R R R R
240  GCATGCGCAGAG TAAGCACCAGTAGCCAAAGTCCCCGCTACCTCTGCTGCTGCCACGAAGGCGAGGTCGCCCTCTCAAAACCTGTTGCTTCGCGGGC
H R R G
339  AGCCTGCAAACTGAACTTTTCTCTACCCAG GCTGCAAGAATCCCGAAGGAGGAGGCTGCAAGTGCAGGAAATGCAAGGTGGCACTATTATTAAGC
C R R S R R R S C R C R K C R W H Y Y *
438  CTCGCCAGGTGCATTCATTCTGCTGGAGCTAAGGAAGTCACCTGCGCTCAGGAAGTCACTGCGCCAGCAAAAGTCATGTAAGGCCACACACCATTCAT
538  GTTGATATCTGAGCCCTGAGCTGCCAAGGAGCCAGAAATCTAAGTAATGAGCAAGCCACCTGCTAAATAAAGCTT

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REFERENCES

- Balhorn, R., Weston, S., Thomas, C. and Wyrobek, A. (1984) *Exp. Cell Res.* 150:298-308.
- Ammer, H., Henschen, A., and Lee, C. (1986) *Biol. Chem. Hoppe-Seyler* 367:515-522.
- McKay, D.J., Renaux, B.S. and Dixon, G.H. (1986) *Eur. J. Biochem.* 156:5-8.
- Ammer, H. and Henschen, A. (1987) *Biol. Chem. Hoppe-Seyler* 368:1619-1626.
- Belaiche, D., Loir, M., Krugle, W. and Sautière, P. (1987) *Biochim. et Biophys. Acta* 913:145-149.
- Pirhonen, A., Linnala-Kankkunen, A. and Mäenpää, P.H. (1989) *Febs Letters* 244:199-202.
- Bower, P.A., Yelick, P.C. and Hecht, N.B. (1987) *Biol. of Reprod.* 37:479-488.
- Johnson, P.A., Peschon, P.J., Yelick, P.C., Palmiter, R.D. and Hecht, N.B. (1988) *Biochim. et Biophys. Acta* 950:45-53.