Cloning and sequence of a cDNA encoding rat glucose-6-phosphate dehydrogenase

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Glucose-6-phosphate dehydrogenase (G6PD) is the rate limiting enzyme of the pentose phosphate pathway for generating NADPH and ribose 5-phosphate in cells. Screening of a Sprague-Dawley rat liver λ gt11 cDNA library (Clontech Laboratories, Inc., Palo Alto, CA) with a synthetic oligonucleotide with a sequence following the known nucleotide residues 466 to 540 of the human G6PD cDNA yielded a single positive clone (1). The amino acid sequence of the rat enzyme deduced from the cDNA contains 515 residues (Fig. 1), while the deduced sequence of the human enzyme only consists of 479 residues (1). This difference results from the fact that the first ATG triplet of the human G6PD cDNA corresponds to the second ATG codon (coded for Met-37) of the rat G6PD cDNA. The deduced amino acid sequences of the 479 residues of the rat and human enzymes are 94% homologous.

It is interesting to note that the primary structure of the human G6PD determined by peptide sequencing contains 531 amino acid residues (2). In this case, the Met-37 of the rat enzyme corresponds to the Met-53 of the human enzyme. Additionally, there is no sequence homology between the amino-terminal 36 amino acids of the rat enzyme and the amino-terminal 52 amino acids of the human enzyme. Further investigations will be required to elucidate the nature of the amino-terminal heterogeneity of this enzyme.

Figure 1. Nucleotide sequence and deduced amino acid sequence of the cDNA coding for rat glucose-6-phosphate dehydrogenase.

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References:

1. Persico, M.G., Viglietto, G., Martini, G., Toniolo, D., Paonessa, G., Moscatelli, C., Dono, R., Vulliamy, T., Luzzatto, L. and D'Urso, M. (1986) Nucl. Acids Res. 14, 2511-2522.
2. Takizawa, T., Huang, I-Y., Ikuta, T. and Yoshida, A. (1986) Proc. Natl. Acad. Sci. USA 83, 4157-4161.