Rapid Communication: Phosphoglycerate Kinase 1 (PGK1) Maps to Xq1.2 in the Porcine Genome*

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Locus Name. Phosphoglycerate Kinase 1.
Species. Sus scrofa.
Locus Symbol. PGK1.
Source of Clone. A porcine yeast artificial chromosome (YAC) library (Alexander et al., 1997) was screened by PCR with primers developed from the human PGK1 sequence (GenBank nos. M20132 and J03180), and a positive clone was identified. The amplified product was verified to be PGK1 by sequence similarity to the human sequence (96% identity over 135 bp to GenBank sequence S81916).

Total yeast DNA was used to physically assign the locus via fluorescence in situ hybridization to porcine metaphase chromosome spreads. Purified YAC DNA was then digested with Sau3AI, subcloned, and screened for microsatellite repeats. Subclones containing microsatellites were sequenced and primers were developed to genotype the locus across the MARC porcine reference population as previously described (Rohrer et al., 1994). Two informative microsatellite markers associated with PGK1, named SY8 and SY9, were developed from this YAC clone.

PCR Conditions. Reactions were conducted as previously described (Rohrer et al., 1994). The primers used to genotype SY8 and SY9 were: SY8F, ATGGGT-CATATAGTCTTTGGC; SY8R, GGAGATTAATTC-TGTCTGGTG; SY9F, CATGGCCATTTCCAGTCAATG; and SY9R, CCCCTTCAACCAAAAAATGC, respectively. Annealing temperatures were 55°C for SY8 and 58°C for SY9.

Microsatellite Polymorphisms. The size of alleles observed and frequencies (in parentheses) of each allele in nine parents of the MARC swine reference population for SY8 were 164 (.06), 166 (.25), 168 (.19), 172 (.06), 176 (.13), and a null allele on the X chromosome (.31) and for SY9 were 186 (.75), and 190 (.25). Both markers displayed X-linked inheritance because males only possessed one allele in 86 progeny evaluated.

Chromosome Location. The results from the fluorescence in situ hybridization indicated that the YAC probe hybridized to Xq1.2 on all metaphase spreads observed. Two-point linkage analyses indicated that there was no recombination detected between SY8 and

**Figure 1.** An updated ideogram of the MARC porcine X chromosome linkage group with the physical assignment of phosphoglycerate kinase 1 at Xq1.2 indicated on a G-banded chromosome. This map can also be viewed at the MARC Genome Web site (http://www.marc.usda.gov/).
SY9, so the markers were haplotyped for the multipoint analysis. The multipoint analysis placed SY8/SY9 at relative position 73 cM (Figure 1).

Comments. PGK1 maps to Xq13.3 in the human genome. The current results seem to indicate that gene order has been conserved between porcine and human genomes throughout the entire chromosome (Hu et al., 1997). The microsatellite markers derived reside within the confidence interval for QTL detected for fat deposition in Meishan-White composite cross pigs (Rohrer and Keele, 1998) and identify a region of the human genome to select positional candidate genes for this QTL. Unfortunately, the high incidence of the null allele on the X chromosome for SY8 and the low level of polymorphism for SY9 limit utility of both markers for genotyping resource or general swine populations.

**Literature Cited**


**Key Words:** Pigs, Maps, X Chromosome