# SHORT COMMUNICATION

# The Prostatic Acid Phosphatase (ACPP) Gene Is Localized to Human Chromosome 3q21–q23

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**Human prostatic acid phosphatase (ACPP) has been used as a diagnostic marker for prostate cancer. It is synthesized under androgen regulation and secreted by the epithelial cells of the prostate gland. We have confirmed the previous assignment of the ACPP gene to chromosome 3 by probing a panel of 25 human–Chinese hamster somatic cell hybrids, and we have further localized the ACPP gene to chromosome 3q21–q23 by fluorescence *in situ* hybridization.** © 1993 Academic Press, Inc.

The acid phosphatases (EC 3.1.3.2) are a group of enzymes capable of hydrolyzing phosphomonoesters under acidic conditions, and they can be differentiated according to their immunological properties, tissue distribution, subcellular location, and the chromosomal locations of their genes. The gene coding for red blood cell acid phosphatase is located on chromosome 2, and the gene coding for lysosomal acid phosphatase is on the short arm of chromosome 11 (6). Human prostatic acid phosphatase (ACPP) has been used for 5 decades as a diagnostic marker for prostate cancer (2). Human ACPP is synthesized under androgen regulation and secreted by the epithelial cells of the prostate gland. Recent reports suggest that ACPP exhibits protein tyrosine phosphatase activity (3, 4). However, the physiological function and the precise role of ACPP in tumor progression remain to be determined.

To understand the genetic mechanism(s) involved in prostate cancer and the androgen regulation of the disease (1), we have cloned full-length ACPP cDNAs and also elucidated the exon–intron organization of the ACPP gene (7, 8). In collaboration with L. L. Deaven, we have previously used chromosome spot-blot hybridization to map the ACPP gene to human chromosome 3 (7). The ACPP gene was also reported to be within the seg-

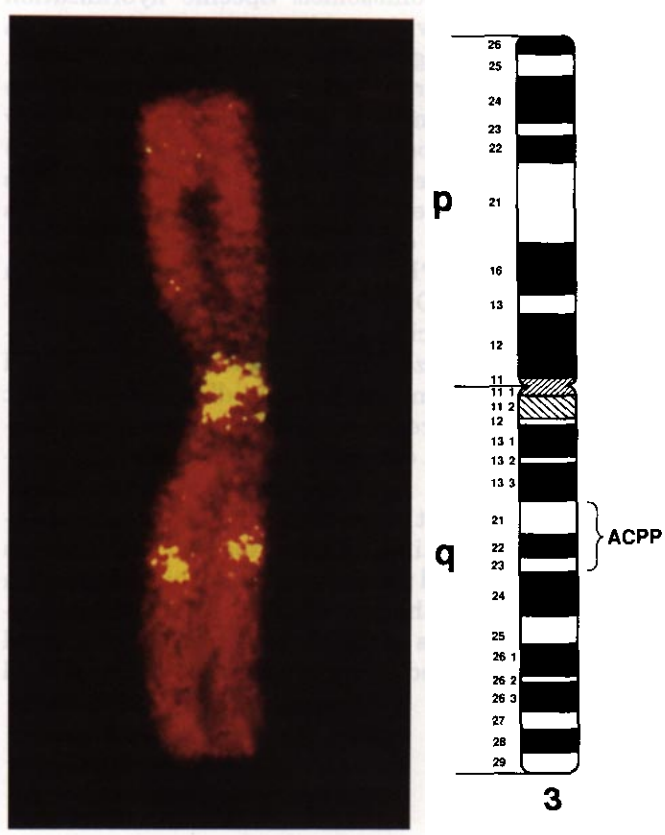


**FIG. 1.** Localization of the ACPP gene to human chromosome 3q21–q23 using the *in situ* hybridization of the ACPP genomic probes to normal human metaphase chromosomes. The localization of the ACPP gene was carried out by BIOS mapping services (New Haven, CT). Three λ phage containing different parts of the human ACPP gene (8) were combined and nick-translated with digoxigenin dUTP. These ACPP probes, as well as the chromosome 3 centromere-specific D3Z1 probe, were combined with sheared human DNA and hybridized to normal human metaphase chromosomes in a hybridization solution containing 65% formamide, 10% dextran sulfate, and 2× SSC. Hybridization signals were detected with antidigoxigenin FITC. Chromosomes were then counterstained with propidium iodide and analyzed. **(Left)** *In situ* hybridization to metaphase chromosome 3. The bracket **(right)** indicates the region 3q21–q23 in which the ACPP gene is located.

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ment q21–qter of human chromosome 3 by Southern blot analysis of panels of human and mouse somatic cell hybrids, using ACPP cDNA probes (9). In this investigation, we have confirmed the assignment of the ACPP gene to chromosome 3 by probing a panel of 25 human–Chinese hamster somatic cell hybrids (data not presented), and we have further localized the ACPP gene to chromosome 3q21–q23 by fluorescence *in situ* hybridization.

Three λ phages containing different parts of the human ACPP gene (8) were combined and nick-translated with digoxigenin dUTP. Labeled probes were combined with sheared human DNA and hybridized to normal human metaphase chromosomes. Specific hybridization signal was detected with antidigoxigenin FITC and was identified on the long arm of an A-group chromosome. The size and the morphology of this chromosome were consistent with chromosome 3. To confirm the identity of the specifically labeled chromosome, a probe (D3Z1) that is specific for the centromere of chromosome 3 was shown to cohybridize with the ACPP genomic probes (Fig. 1, left). This experiment conclusively demonstrated that the ACPP gene is localized to the long arm of chromosome 3q. Of total of 92 metaphase cells analyzed, 80 showed specific hybridization signal. Measurements of 20 hybridized chromosomes 3 demonstrated that the ACPP genomic probes hybridize to an area that is 40% of the distance from the centromere to the telomere of 3q. This area corresponds to the region of 3q21–q23 (Fig. 1, right).

It is of interest that the transferrin (TF) gene is localized to 3q21, the retinitis pigmentosa-1 (RP1) gene is within 3q21–q23, and the cellular retinol binding protein I (CRBPI) gene is within 3q21–q22 (6, 10). Further, chromosomal breakpoints at 3q21 among translocations and inversion are involved in several cases of acute myeloid leukemia (6).

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