

# IMMUNOHISTOCHEMICAL IDENTIFICATION OF PROSTATIC ACID PHOSPHATASE AND PROSTATE SPECIFIC ANTIGEN IN FEMALE PERIURETHRAL GLANDS

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**ABSTRACT**—*Periurethral glands were found in 7 of 10 female urethras harvested at autopsy. In all 7 cases, immunoperoxidase staining showed the presence of prostatic acid phosphatase in glandular acini. By similar techniques, prostate specific antigen was demonstrated in acini of 4 of 7 urethras with periurethral glands. The findings support a female homologue of the male prostate.*

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A labyrinth of branching ducts and glands surrounds the female urethra.<sup>1</sup> The periurethral glands are homologous to the male prostate.<sup>2</sup> To ratify further the origin of glands, we studied the female urethra by immunohistochemistry, looking for the presence of prostatic acid phosphatase and prostate specific antigen.

## Material and Methods

The urethras from each of 10 unselected female cadavers were recovered at autopsy. By sharp dissection, the urethra was removed intact from the level of the external meatus to the bladder neck. Specimens included periurethral tissue and an attached strip of anterior vaginal mucosa. The formalin-fixed material was embedded, sectioned, and stained. Two specimens (Cases 1 and 2) were split ventrally and sectioned longitudinally. Eight urethras (Cases 3 to 10) were sliced serially in transverse sections. Subjects ranged in age from thirteen to seventy years and died of various diseases.

Triplicate slides were stained with hematoxylin and eosin and for immunohistochemical identification of prostatic acid phosphatase<sup>3,4</sup> and prostate specific antigen.<sup>5</sup> A standard immunoperoxidase technique using both

Dako\* and Immulok† kits were used to stain prostatic acid phosphatase. The Dako kit was used to identify prostate specific antigen.

Parallel control studies were performed using benign prostate as a positive control. For negative controls representative sections of urethra were stained omitting the primary antibody.

## Results

The findings are summarized in Table I. Periurethral glands were present in 7 of the 10 urethras. Positive staining for prostatic acid phosphatase was identified in all 7 cases with glands present (Fig. 1A). Prostate specific antigen was identified in 4 of the 7 cases with glands (Fig. 1B).

Acini seen almost exclusively in the posterior wall of the urethra were concentrated posterolaterally. Glands were present along the entire length of the urethra but were very sparse in the midline. The acini showed no infolding and tended to be flattened anteroposteriorly. While some glands were noted in a submucosal location, large groups of acini were deeply

\*Dako Corporation, Santa Barbara, California.

†Immulok, Inc., Carpinteria, California.

TABLE I. Results of immunoperoxidase study of female urethra

Case No.	Glands Present	PAP	PSA
1	No	..	..
2	No	..	..
3	Yes	Pos	Pos
4	Yes	Pos	Pos
5	Yes	Pos	Pos
6	No	..	..
7	Yes	Pos	Pos
8	Yes	Pos	Neg
9	Yes	Pos	Neg
10	Yes	Pos	Neg
TOTALS	7	7	4

KEY: PAP = prostatic acid phosphatase; PSA = prostate specific antigen.

embedded near the periphery of the muscular urethra.

Positive staining for prostatic acid phosphatase was striking (Fig. 1A). Nevertheless, staining was patchy, showing up in groups of cells in one or several acini. A variable proportion of glands remained unstained for acid phosphatase. As in the case of the male prostate, acid phosphatase was heavily concentrated near the luminal border of the cuboidal cells.

Prostate specific antigen was discovered in 4 of 10 female urethras. Staining was less dramatic than for acid phosphatase (Fig. 1B). Fewer glands in each specimen stained positive. In some instances, acini positive for prostate specific antigen coincided with those positive for prostatic acid phosphatase; however, this finding was not universal. There was a somewhat increased concentration of prostate specific antigen near the luminal border of the cells, yet the antigen was scattered throughout the cytoplasm.

#### Comment

Embryologically, the periurethral glands of the female, like the male prostate, originate from the urethral portion of the vesicourethral canal, the posterior urethral wall which is of wolffian duct origin,<sup>2</sup> and perhaps to a greater extent from the urogenital sinus. Small concentrations of acid phosphatase have been located in female urethral tissue by enzyme substrate analysis.<sup>6</sup> Immunoperoxidase staining of tissue for prostatic acid phosphatase has been advocated to prove the prostatic origin of cells. Positive staining is found in normal, hyperplastic, and neoplastic prostatic epithelium.<sup>3,4</sup> Prostate specific antigen is distinct from prostatic acid

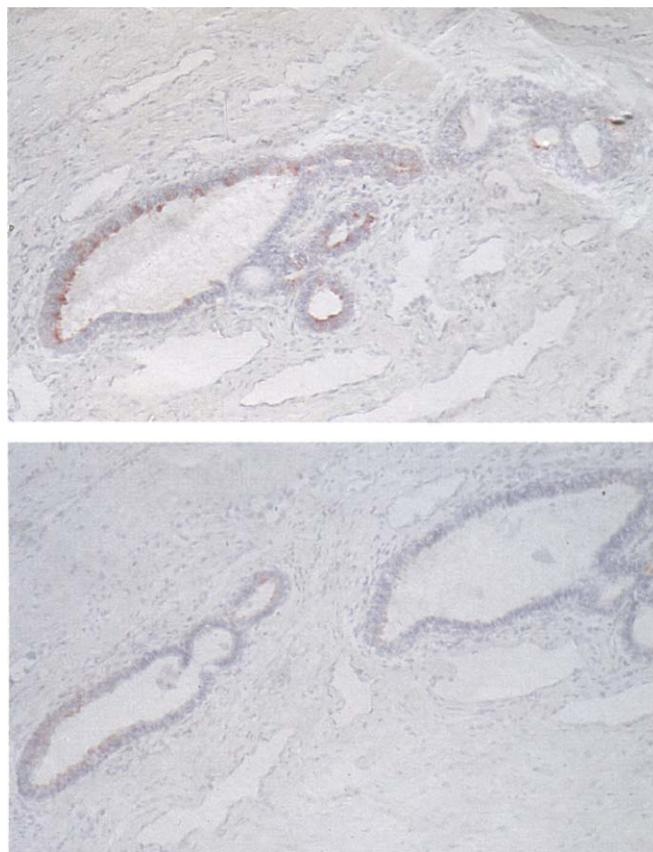


FIGURE 1. Female periurethral glandular tissue: (A) immunoperoxidase stain for prostatic acid phosphatase shows positive on luminal border of cuboidal epithelium, and (B) section adjacent to (A), immunoperoxidase stain for prostate specific antigen positive-positive in similar distribution.

phosphatase and is also a useful marker of epithelium derived from the prostate.<sup>5</sup>

The presence of prostatic acid phosphatase and prostate specific antigen in periurethral glands of the female urethra supports the concept of a female homologue of the male prostate. Possibly, the female urethra may contribute in part to the normal serum level of prostatic acid phosphatase in females as measured by radioimmunoassay.

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