

## IS HUMAN FEMALE URETHRAL RHABDOSPHINCTER COMPOSED OF SLOW-TWITCH MUSCLE FIBERS ONLY?

### Hypothesis / aims of study

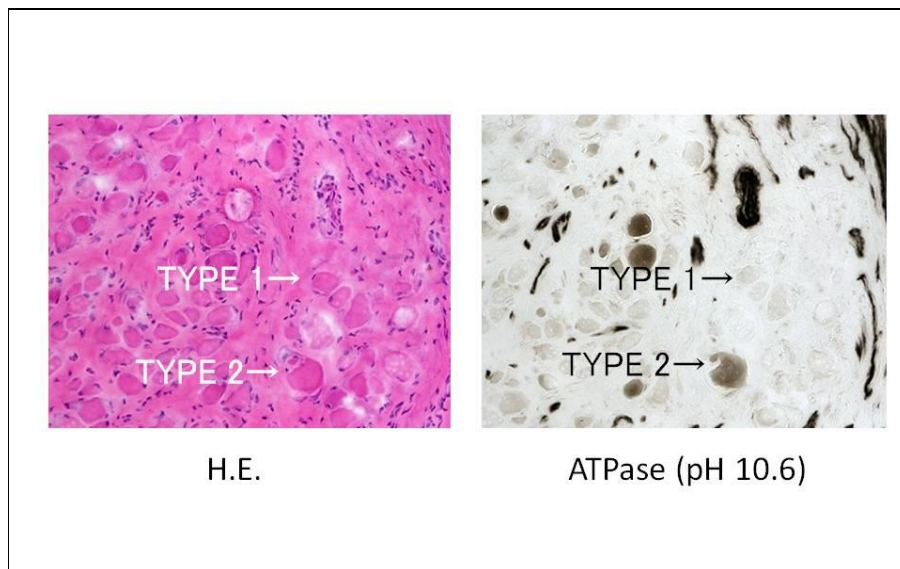
We previously clarified that approximately 70% of slow-twitch (Type 1) muscle fibers existed in human male rhabdosphincter (RS) (1). However, striated muscle fiber type of human female RS has been generally considered a single population of slow-twitch (2). In this study, we also investigated the composition of striated muscle fibers even in human female RS to clarify the contractile properties of that.

### Study design, materials and methods

Muscle specimens of RS were obtained from 6 female patients who underwent radical cystectomy, and were frozen in liquid nitrogen. 10 $\mu$ m-thick frozen sections were stained with myofibrillar ATPase at pH 10.6 and evaluated for quantitative parameters and fiber type distribution.

### Results

Of all 6 cases, 4 provided specimens that had striated muscle fibers and could be divided into the two major fiber types, Type 1 (slow-twitch) and Type 2 (fast-twitch). Type 1 muscle fibers were predominant in RS (83.2 $\pm$ 5.0 %), and mean size of the muscle fibers tended to be smaller in Type1 (mean area; 877 $\pm$ 223  $\mu$ m<sup>2</sup>) than in Type2 (mean area; 1365 $\pm$ 369  $\mu$ m<sup>2</sup>).



(Figure )

Photomicrograph of serial cryostat sections of RS, stained for hematoxylin-eosin and myofibrillar ATPase with preincubation at pH 10.6.(x 200)

### Interpretation of results

Likewise human male, it has been considered that RS mainly contributed to urinary continence mechanism by slow contraction. Moreover, the smaller mean size of Type 1 muscle fibers suggests more fatigue resistance compared with Type 2 muscle fibers in RS because small fibers have a shorter diffusion distance for metabolic substrates.

### Concluding message

Human female RS contribute to urinary continence mechanism by mostly slow contraction likewise human male. On the other hand, we confirmed a small population of fast-twitch muscle fibers even in human female RS. These results might help a more detailed understanding of human female urethral function.

### References

1. Sumino Y. et al. Striated muscle fiber compositions of human male urethral rhabdosphincter and levator ani. J Urol. 2006. 175:1417.
2. Gosling JA. et al. A comparative study of the human external sphincter and periurethral levator ani muscles. Br J Urol. 2006. 53: 35.

### Disclosures

**Funding:** None **Clinical Trial:** No **Subjects:** HUMAN **Ethics Committee:** Oita University Institutional Review Board **Helsinki:** Yes **Informed Consent:** Yes