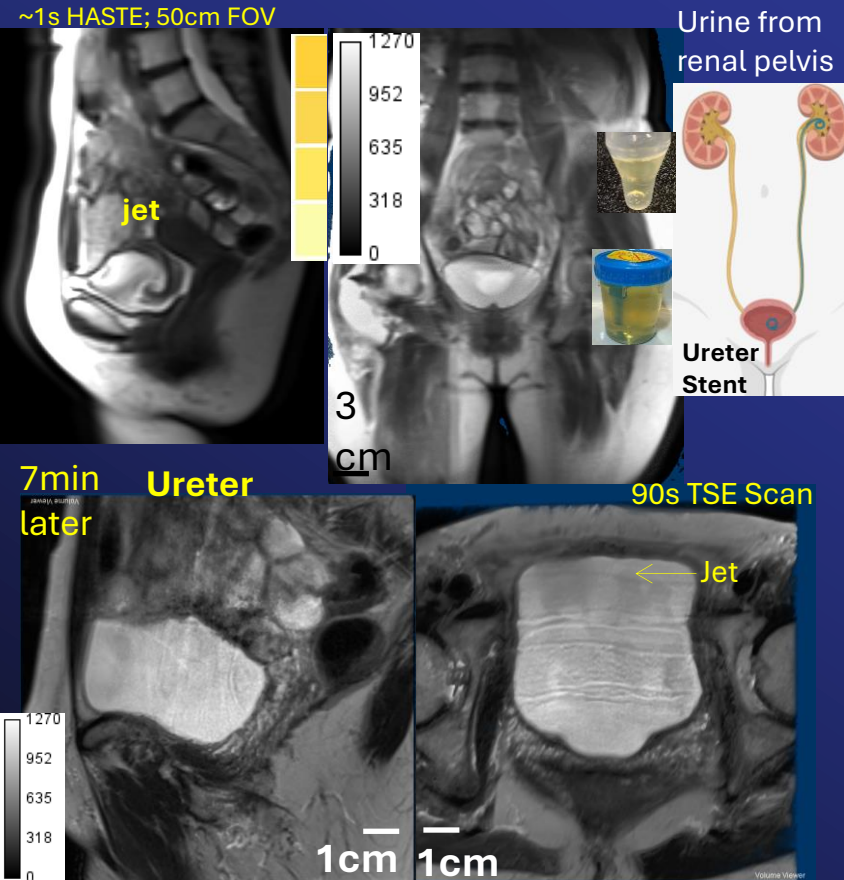


Urine Reabsorption From Bladder is Embodied by Higher Signal of Stored Urine Than of Ureteral Jets



Urine concentration from kidneys is not identical

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Aims

- Past studies measured higher osmolality of urine collected from bladder relative to urine collected from renal pelvis during stent insertion.
- Given shorter T_1 relaxation time of dilute urine, we assessed whether signal intensity of fresh dilute urine is < stored urine in HASTE and TSE scans

Results

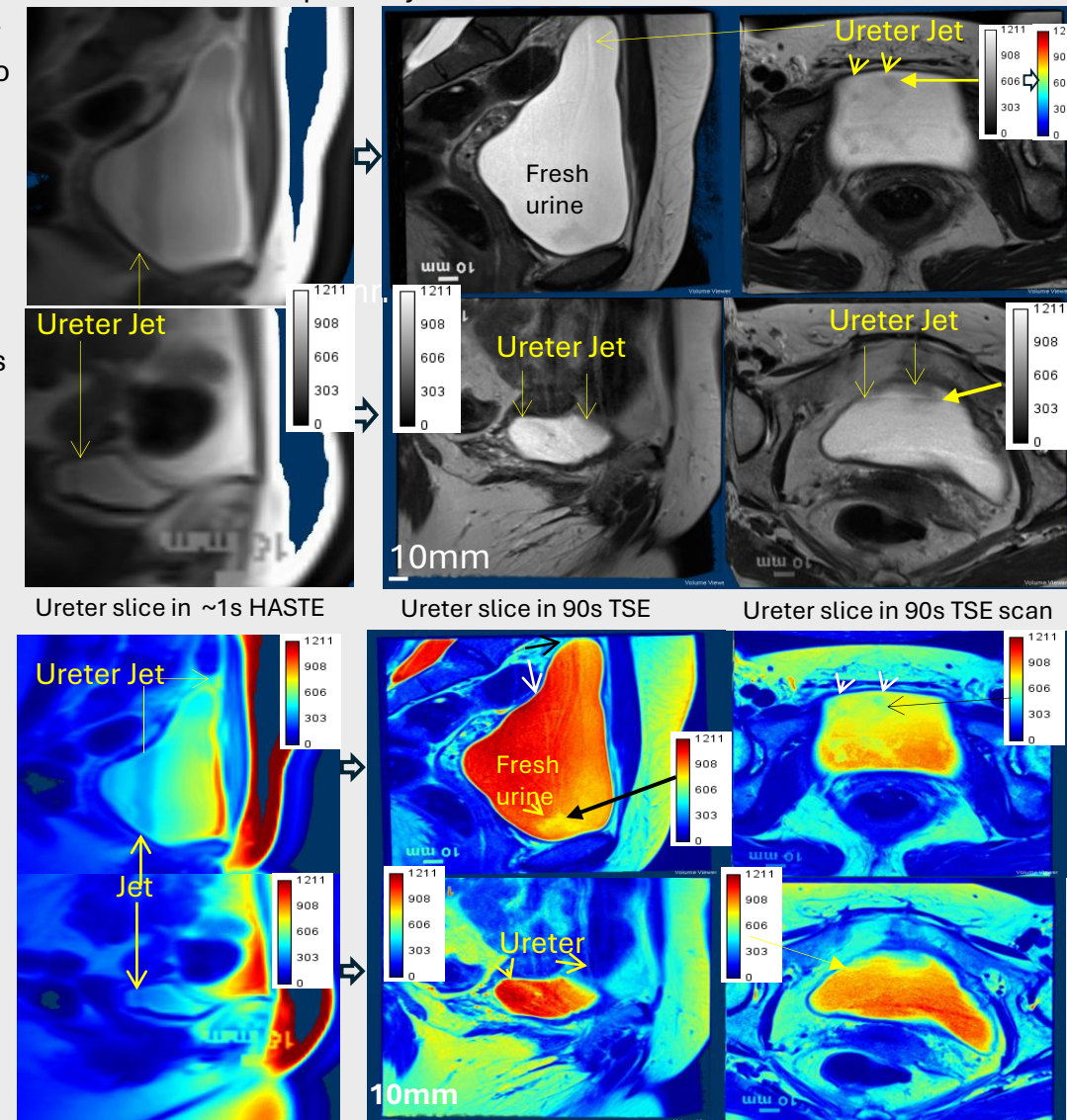
- HASTE enables fast visualizations of jets without water loading needed for cine MR urography, oral riboflavin or 50% dextrose instillation for cystoscopic visualization of jets
- ~2cm or ~6cm long spiral jets with SI < stored urine correspond to urine production of ~2mL/min and >10mL/min, respectively.

Conclusions

- Higher signal of stored urine is consistent with tritiated water reabsorption $\geq 1\text{mL/min}$ and $\geq 30\%$ reduction of voided urine volume with (dehydration) or without (void postponement) rise in osmolality
- Water reabsorption by bladder enables the average hourly urine production rate of adults to match the urine production rate of 40 weeks old fetus
- MRI is superior to ultrasound for mechanistic phenotyping of storage symptoms and establishing bladder as a critical site in the pathophysiology and treatment of nocturia and OAB

Study design, materials and methods

Ureter Slice Acquired by HASTE and TSE for Volume Rise



Eight female subjects, 26-77 years consented for prospective MRI (NCT05811377) without any water intake for <60min prior to 3T scan with 4-channel flexible receiver coil on lower abdomen. Bladder was first rapidly localized by non-contrast, multiplane, 6mm half-Fourier acquisition single-shot fast spin echo (HASTE) scan and then 30-45 T_2 -weighted Turbo spin echo (TSE) scans in axial and sagittal plane of 3mm slice thickness in 16cm FOV were acquired in 90s. Image J displayed color-coded SI differences between ureter jets and of stored urine.