A large proportion of women aged 60 and over experience stress (SUI) and mixed urinary incontinence (MUI) and the ensuing negative consequences on their quality of life.

However, to date, the pathophysiology of these disorders is not entirely understood.

### Aim of the study

We hypothesized that deficiencies in the morphology of the pelvic floor muscles (PFM), bladder neck and urethral sphincter, in addition to pelvic floor contractile dysfunction, are partially responsible for SUI and MUI symptoms.

Thus, the study’s aim was to compare women with SUI or MUI and continent women in terms of:

- PFM, bladder neck and urethral sphincter morphology using magnetic resonance imaging (MRI) under 3 conditions (rest, PFM maximum voluntary contraction [PFM MVC] and straining)
- PFM contractile function using digital palpation with the PERFECT scheme.

### Study design and Population

This report is an observational cohort study nested within a larger quasi-experimental cohort study to determine the effects of PFM exercises on strength and muscle activation:

- **Population**
  - Women aged 60 and over were recruited from five continence clinics and from the general community.
  - Subjects included if they:
    - Were 60 or older
    - Were ambulatory
    - Were either continent or had symptoms of SUI or MUI per the Urogenital Distress Inventory (UDI) with leakage at least once a week
    - Understood French or English instructions
  - Subjects were excluded if they:
    - Present other types of incontinence
    - Present contraindications to MRI scanning
    - Present risk factors known to interfere with the study

- **Results**
  - Sixty-six women, mean age 67.0 ± 7.24, participated in the study: 22 per group. There were no differences among the groups in age (p = 0.43), weight (p = 0.31), BMI (p = 0.37), age at delivery (p = 0.19), parity (p = 0.16), or age at first delivery (p = 0.20). For these parameters, all subjects were matched across the groups based on the length of their pelvic inlet. Significantly different morphological and functional parameters are presented in Table 1.

### Methodology

#### MRI imaging

- MRI imaging was performed with a Siemens 3.0T Magnetom Trio, using an IPAT torso/pelvis coil centered on the symphysis pubis. Twenty high-resolution slices were performed at rest in the sagittal plane with T2-weighted fast spin echo (FSE) sequences (field of view 24 x 24 cm, matrix 512 x 256, 5mm thickness, gap 0-1.0 cm, TE 134ms, Bandwidth 130 Hz/pixel, NEX 1, scan duration 146s).

#### Measurements

- The PFM morphological measurements at rest were taken from the mid-sagittal slice presenting the clearest image. The PFM MVC and straining measurements were taken from the mid-sagittal slices that demonstrated the greatest bladder neck elevation and depression, respectively.

- The bladder neck morphological measurements were taken from the mid-sagittal slice presenting the greatest bladder-neck funnelling.

- The urethral sphincter morphology was assessed using the technique described in Morgan et al. (2009).

### Interpretation of results

With respect to PFM morphological parameters, women with MUI seemed to have a lower PFM resting position and a lower pelvic organ support at rest, based on the differences in M-Line, PCLH-Line angle and UV junction height. However, women with SUI seemed to have a PFM morphology similar to that of continent women.

The SUI group seemed to present more bladder neck funnelling occurrence than the other two groups. There were no differences in funnelling width or length between the groups. The PUV angle was larger in women with SUI, compared to the other groups, supporting the greater occurrence of funnelling in those women.

The urethral sphincter morphology did not seem to be a deficit causing SUI or MUI symptoms as there were no differences in thickness, area and volume between the groups.

Functionally, both UI groups had poorer PFM strength on MVC than continent women. Additionally, the MUI group demonstrated poor PFM elevation on contraction, probably related to the lower position of their PPFMs at rest.

Conversely, women with SUI seemed to have a timing problem with PFM contractions.

### Concluding message

- Morphological and functional deficits in women with SUI and MUI appear to be very different.

- These deficits all serve the rationale for PFM exercise treatment in older women with SUI and MUI.

- However, the findings suggest the need for different rehabilitation treatments - adapted to the specific deficits of each UI type.

- MUI may be more than a simple combination of SUI and UUI symptoms with its own distinctive pathophysiology.

### References

