Involuntary reflexive pelvic floor muscle training in addition to standard training versus standard training alone for women with stress urinary incontinence: a randomized controlled trial. Luginbuehl H, Lehmann C, Koenig I, et al. Int Urogynecol J. 2021 Feb 10. Doi:10.1007/s00192-021-04701-5.

Background:
- Stress urinary incontinence most common subtype in women with a prevalence of 24.8%
- Strong rapid PFM contractions are required to maintain continence during rapid increases in intra-abdominal pressures during activities such as sneezing and jumping
- Definition: Involuntary contraction: PFM contraction that occurs reflexively or automatically without volition or conscious control
  - More research needed to determine if this is an involuntary or reflex activation of pelvic floor muscle spindles resulting in a contraction

Introduction: Standard treatment for stress incontinence thus far includes voluntary pelvic floor muscle contractions. Involuntary PFM contractions occur prior to increases in intra-abdominal pressure. During a jump or increase in intra-abdominal pressure a reflex may occur from the rapid stretching of the tendon, muscle, and connective tissue resulting in elastic energy being stored and a quick high force that is generated. Voluntary PFM exercises are concentric contractions that resist against the load of the internal organs and intra-abdominal pressures. This article compares two pelvic floor muscle protocols on women with SUI: voluntary PFM training vs. voluntary and involuntary reflexive PFM training regarding the effect on stress urinary incontinence and impact of incontinence on QoL.

Study Design: Prospective, triple-blinded, randomized controlled trial, 2 physical therapy intervention groups with 6m follow-up

Methods:
- Participants: 96 (48 in control group, 48 in experimental group)
- Outcomes
  - Incontinence Modular Questionnaire Urinary Incontinence short form (ICIQ-UIsf)
  - Modified 20-min Pad Test
  - International Consultation on Incontinence Modular Questionnaire Urinary Incontinence Symptoms Quality of Life (ICIQ-LUTS_qol)
  - PFM strength assessed via Oxford Grading Scale

Interventions:
Duration: 16 weeks
- 9 physical therapy consultations throughout 16 weeks teaching and educating participants on: anatomy and function of pelvic floor muscles, how to isolate a PFM contraction, micturition protocol
  - Refer to article for further information
- Total of: 78 home training sessions- 15 minutes duration
  - weeks 1–5: 3x/week, 3x/day
  - weeks 6–16: 3x/week, 1x/day
  - After 16 weeks: continue HEP 3x a week until 6-month follow up

The schedule and progression phases of training for motor learning, strength, hypertrophy and power for experimental and control group:

| Week  | Experimental Group          | Control Group             | Training Frequency                                      |
|-------|-----------------------------|---------------------------|--------------------------------------------------------|
| 1-5   | Motor learning + power      | Motor learning            | 15 (+ 3 individual PT consultations)                   |
| 6-9   | Strength + hypertrophy + power | Strength + hypertrophy    | 12 (+ 2 individual PT consultations)                   |
| 10-16 | power                       | Strength + hypertrophy + power | 21 (+ 4 individual PT consultations)                   |

- Control group:
  - Type and speed of muscle action:
    - isometric, concentric voluntary PFM contractions
    - voluntary slow to moderate to fast speed
- Experimental group:
  - Type and speed of muscle action:
    - voluntary isometric and concentric PFM contractions performed explosively
    - involuntary PFM contractions caused by exercises: running on the spot, counter-movement jumps, and drop jumps
  - See additional file for more detailed information about interventions

Results:
- Significant decrease in average total score of ICIQ-UIsf between Time=1:pre and Time=10:post by 3 points for both groups
- Significant improvement for pre/post within group comparisons for: 20-minute pad test, muscle strength test, and ICIQ-LUTSqol part B
- No statistically significant differences between groups, EXCEPT PFM muscle strength pre intervention (p=0.007), experimental group weaker and ICIQ-LUTSqol part A with control group showing significant improvement
- The ICIQ-UIsf score decreased significantly over time for both with no group differences at any point in time

Discussion:
• ICIQ-UIsf score improvement reached floor effect after the first 4 intervention weeks that provided education on PFM anatomy, physiological aspects of SUI, education on function of PFM and interaction between diaphragm and PFM
• Training time may not have been adequate for biological adaptation, suggesting future study of intervention lasting 6 months for sensorimotor components, inter- and intramuscular coordination and hypertrophy.
• More research needed to define when to start and terminate specific training methods

**Strengths:**
• Statistical power, few drop outs
• Detailed intervention and PT protocol
• First to investigate PFMT protocol testing involuntary PFM reactivity

**Limitations:**
• Reflex activity and neural components not initially assessed
• Broad inclusion criteria
• A few participants of the experimental group for a short period of time were not able to perform involuntary reflexive PFMT such as running or jumping due to knee or low back complaints
• The experimental group had a significantly lower PFM strength at the beginning of the study in comparison with the control group
• No way to assess if involuntary PFM contraction is occurring in exercises performed by experimental group
• Not clear as to how they instructed and standardized participants to perform a slow to moderate to explosive PFM contraction
• More information needed as to how well participants with an initial maximum strength of Oxford grade 3 or lower can be trained

**Conclusions:**
• No additional benefits for SUI reduction to adding involuntary PFM training vs. standard PFM training
• Participants in both groups showed clinically relevant effect on SUI, however continued to have moderate incontinence according to the ICIQ-UIsf (score: ~7) at end of study

**Discussion Questions:**
1. Are you incorporating involuntary PFM exercises in your interventions when treating for SUI? If so, how are you cueing patients?
2. What have you done to increase the load placed on the PFM when strengthening for SUI?
3. Both the experimental and control groups demonstrated moderate reduction of incontinence at the end of the study. Have you found anything else besides PFM strengthening to be beneficial to abolish SUI?

**Other Resources:**
1. An International Continence Society (ICS) report on the terminology for pelvic floor muscle assessment. Frawley H, Shelly B, Morin M et al. Neurourol 2021; April 12, pp 1-44. Doi:10.1002/nau.24658.

2. Luginbuehl, H., Lehmann, C., Baeyens, JP. et al. Involuntary reflexive pelvic floor muscle training in addition to standard training versus standard training alone for women with stress urinary incontinence: study protocol for a randomized controlled trial. Trials 16, 524 (2015). https://doi.org/10.1186/s13063-015-1051-0