



# In patients treated for gynecologic cancer

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# Gynecological cancer treatment

## ❖ Affect daily functioning and HRQOL

- Low level of physical activity
- Physical and functional impairment
- Fatigue
- Psychological distress
- Pelvic floor symptoms

# Contents

- The importance of exercise
- Guideline of exercise prescription
- Exercise in patients with lower limb lymphedema
- Pelvic floor exercise

The importance of exercise

# Physical activity on antitumorigenic potential

- Modulation of the inflammation, immune response, hormonal alterations
- Total decreased adiposity and weight loss
  - -> Lower estrogen production, decreased insulin resistance
- Decreased of obesity(low grade inflammation)
  - -> decreased chronic inflammation -> reduces cancer risk and mortality

(Katherine 2019)

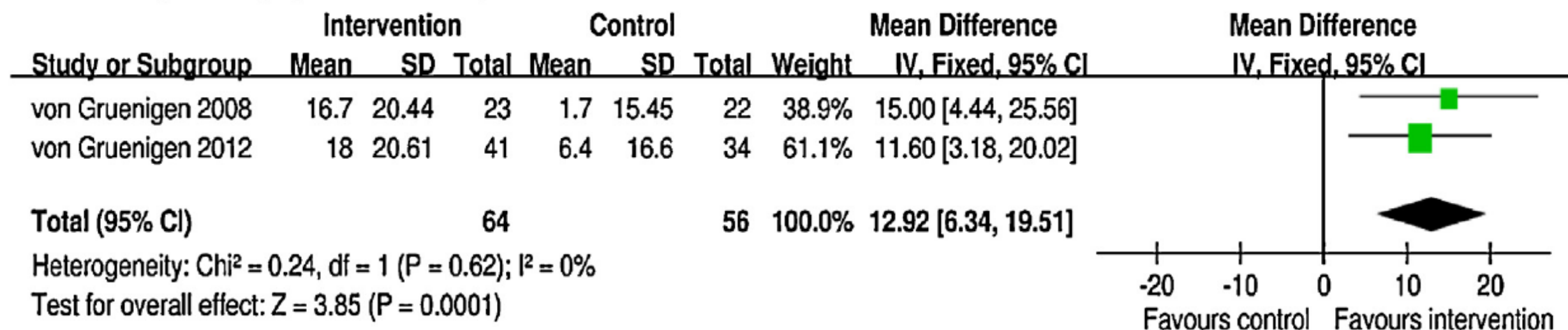
# Exercise interventions for patients with gynecologic cancer: a systemic review and meta analysis

*Lin (2016)*

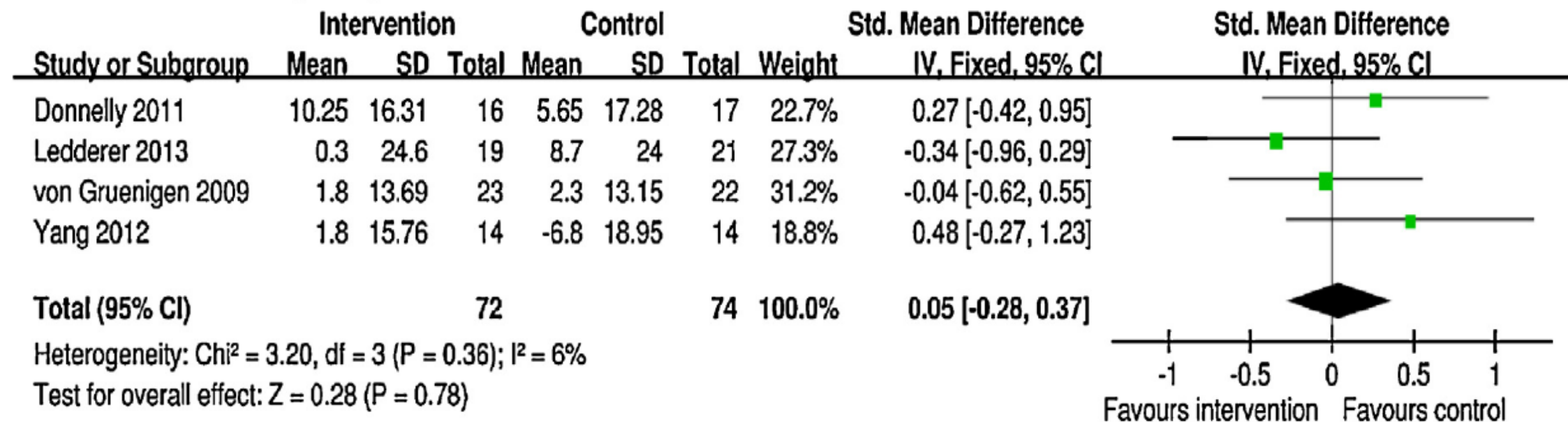
| Author and year   | Comparison: control group | Intervention programme   | Exercise components  | Supervision  | Intensity             |
|---|---------------------------|--|--|--------------|-----------------------|
| Ledderer 2013 [34]  | Usual care                | Psychosocial cancer rehabilitation intervention including supportive talks and a residential rehabilitation course       | Education regarding exercise: physical activity (including walking, dancing and massage)   | Unsupervised | NR                    |
| Yang 2012 [33]  | Usual care                | Pelvic floor muscle training programme comprising intensive pelvic floor muscle training incorporated with core exercise | Core exercise: strengthening exercises for the pelvic floor muscles and transverse abdominis muscles, stretching exercises for muscles attached to the pelvic girdle, and diaphragmatic breathing techniques   | Supervised   | NR                    |
| von Gruenigen 2012 [30], McCarroll 2014 [29] <sup>a</sup> | Usual care                | Lifestyle intervention programme including nutrition, exercise and behavioural modification counselling                  | Education regarding exercise: physical activity goals were 150 minutes/week (five times per week for 30 minutes) for months 1 to 2, 225 minutes/week (five times per week for 45 minutes) for months 3 to 4 and 300 minutes/week (five times per week for 60 minutes) for months 5 to 6. Pedometers were given to provide immediate feedback and reinforcement. Three-pound hand and adjustable ankle weights were given for performing resistance exercises | Unsupervised | Moderate <sup>b</sup> |

|  |            |   |  |              |                       |                 |
|--|------------|---|--|--------------|-----------------------|-----------------|
| Donnelly 2011<br>[28]                            | Usual care | Moderate intensity, home-based physical activity intervention   | Education regarding exercise: home-based physical activity intervention which included walking and strengthening exercises. The aim was to meet physical activity guidelines of 30 minutes of physical activity on at least 5 days per week. Participants were provided with exercise diary, pedometer and information booklet | Unsupervised | Moderate <sup>b</sup> | 30 <sup>b</sup> |
| von Gruenigen 2009, 2008<br>[32,31] <sup>a</sup> | Usual care | Lifestyle intervention programme consisting of exercise and nutritional counselling with cognitive-behavioural modification | Education regarding exercise: physical activity. Intervention group was coached to gradually increase walking or other aerobic activity to 5 days per week for 45 minutes or more, if able. Pedometers were provided for patient feedback  | Unsupervised | NR                    | 45 <sup>b</sup> |

### (a) Self-reported physical activity levels

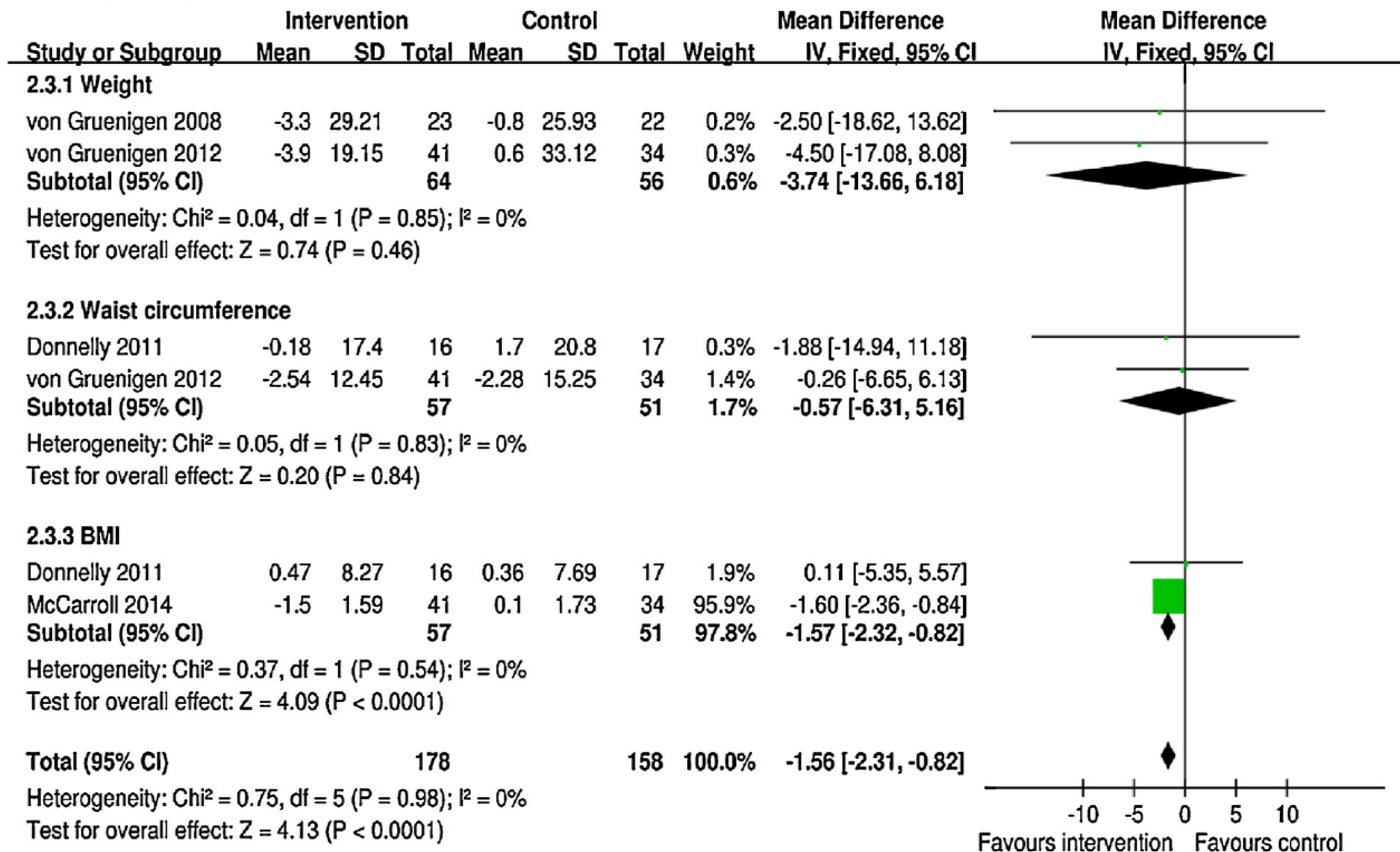


### (b) Health-related quality of life





### (c) Body composition



- Positive effects : BMI, physical activity
- Limitation
  - Exercise training – only one trial
  - Using self reported measures
    - No evaluation : muscle strength and functional exercise capacity
  - Limited number of RCTs, heterogeneous intervention programs and various time point, only obese endometrial cancer patients
  - Limited supervision exercise

# Guideline of exercise prescription

# Physical activity guidelines for adults and older adults

US Department of Health and Human Service's Physical Activity Guidelines for Adults and Older Adults<sup>5</sup>

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Adults should move more and sit less throughout the day. Some physical activity is better than none. Adults who sit less and do any amount of moderate to vigorous physical activity gain some health benefits. Be as physically active as conditions and abilities allow.

- For substantial health benefits, adults should do at least 150 min (2 h and 30 min) to 300 min (5 h) a week of moderate-intensity, or 75 min (1 hour and 15 min) to 150 min (2 h and 30 min) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. Preferably, aerobic activity should be spread throughout the week.
  - Additional health benefits are gained by engaging in physical activity beyond the equivalent of 300 min (5 h) of moderate-intensity physical activity a week.
  - Adults should also do muscle-strengthening activities of moderate or greater intensity and that involve all major muscle groups on  $\geq 2$  d a week, as these activities provide additional health benefits.
-

# Physical activity recommendation of cancer survivors

- The general physical activity guidelines for healthy adults were considered appropriate for cancer survivors
  - Flexibility with regards to chronic conditions and health status
  - Be modified based on individual fitness level, health status, type and stage of cancer, treatments received and their adverse effects, and anticipated disease course
  - Evaluate PPN, Osteoporosis, hormonal therapy use, bony metastasis, cardiac condition, obese

## Considerations and Possible Contraindications to Physical Activity Among Gynecologic Cancer Patients

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| Symptom                               | Contraindications to and Considerations for Participation in Physical Activity (PA)   |
|---------------------------------------|---|
| Treatment                             |   |
| • Surgery                             | <ul style="list-style-type: none"><li>• May be up to 8 wk postsurgery prior to clearance to start PA program</li><li>• Obtain clearance from physician, especially if abdominal, groin, or lower extremity edema/inflammation</li></ul> |
| • Intravenous chemotherapy (IV C)     | <ul style="list-style-type: none"><li>• No PA on day of IV C or for 24 h after</li><li>• Monitor closely for signs of infection, take extra infectious precautions at public fitness facilities</li></ul>                               |
| • Intraperitoneal chemotherapy (IP C) | <ul style="list-style-type: none"><li>• No PA on day of IP C, avoid aquatic activities due to catheter</li><li>• Monitor closely for signs of infection, take extra infectious precautions at public fitness facilities</li></ul>       |
| • Radiation therapy                   | <ul style="list-style-type: none"><li>• Aquatic activities may cause or increase the risk of skin irritation</li><li>• Monitor closely for signs of infection, take extra infectious precautions at public fitness facilities</li></ul> |

## Adverse effects from treatment/disease process

- Fatigue
  - Anemia
  - Lymphedema
  - Acute infections
  - Gastrointestinal symptoms (nausea, emesis, diarrhea)
  - Musculoskeletal symptoms
  - Neurologic symptoms
- No PA if experiencing extreme fatigue
  - PA may aide with mild-moderate fatigue
  - No PA if platelets <50,000 mcL, white blood cells <3000 mcL, hemoglobin <10 g/dL
  - Wear well-fitting compression garments during PA
  - Often require medical evaluation if lower extremity edema prior to starting PA program
  - No PA if temperature >100°C
  - Asymptomatic for at least 48 h prior to PA
  - No PA within 24–36 h of severe symptoms
  - Ensure proper hydration
  - Consider consultation with a dietician
  - No PA if recent bone pain, unusual muscle weakness, severe cachexia, or poor performance status
  - Consider altering PA if osteoporosis or bone metastases present, especially if receiving hormone replacement therapy
  - No PA if experiencing significant cognitive decline, dizziness, light-headedness, ataxia, disorientation, or blurred vision
  - Given possible compromised balance, consider PA with body support (such as a stationary bike) if neuropathy present
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*Olsen and Schmitz (2007, 2010)*

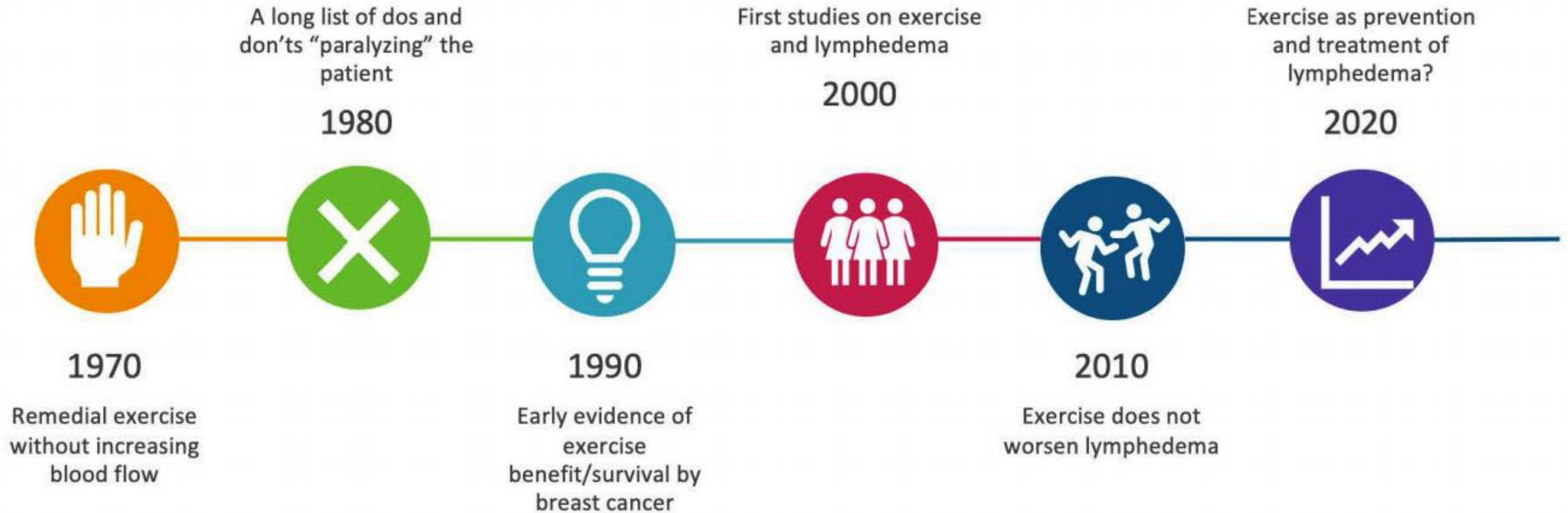
# Exercise on Lower limb lymphedema





Avoidance of  
activities

# Evolution of exercise advice for patients



# Low load vs high load exercise

*Fukushima(2017)*

- 23 women with LLL (randomized controlled crossover trial)
- Bicycle ergometer with short stretch bandages
- Incentivity
  - High load AECT(active exercise with compression therapy)
  - Low load AECT
  - Compression only therapy(CT)
- *Lower limb volume was significantly reduced after high-load AECT compared to that after CT*
- *General symptoms and skin symptoms were similar across the three interventions*

# Postural differences in the immediate effects of active exercise with compression therapy on LLL

*(kiriko 2021)*

- Seated AECT(Active exercise compression therapy), supine AECT, compression – only therapy (randomized, controlled, crossover trial)
- Bicycle ergometer with wearing elastic compression bandage for 15min



a)



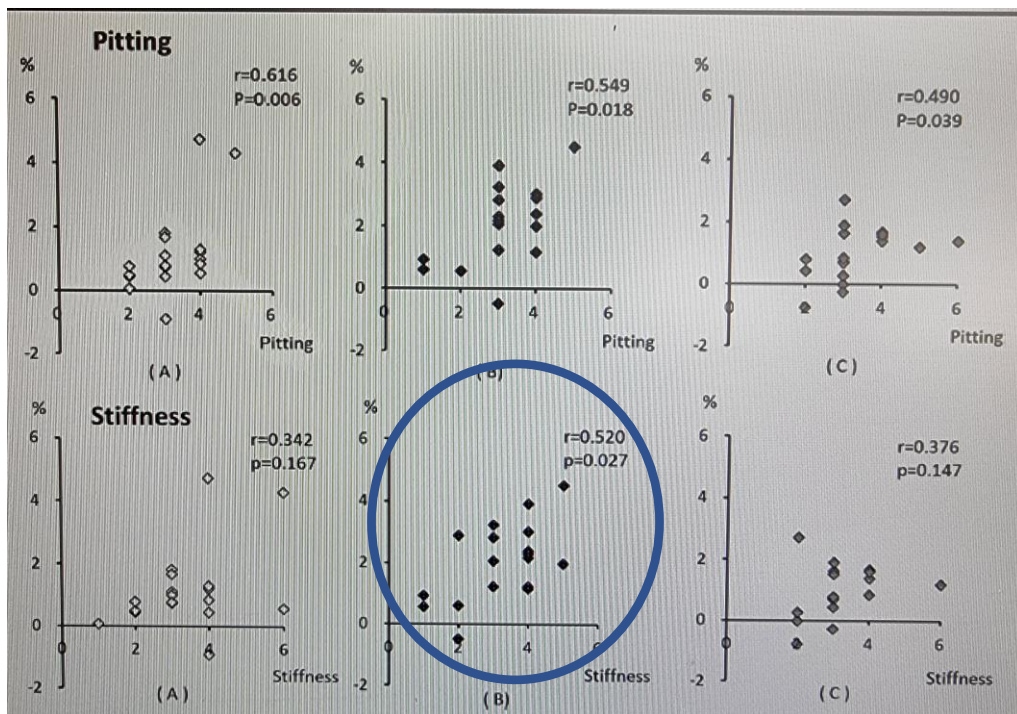
b)



c)

**Table 1** Pre- to post-intervention changes in lower-limb volume and symptoms in patients with secondary lymphedema

| Outcomes          | Mean percentage change (95% CI) |                                 |                                 | P    |      |      |                 |
|-------------------|---------------------------------|---------------------------------|---------------------------------|------|------|------|-----------------|
|                   | Seated AECT                     | Supine AECT                     | CT                              | P1   | P2   | P3   | Overall P value |
| Lower-limb volume | 1.19% ± 1.32%<br>(0.62–1.76%)   | 2.03% ± 1.24%<br>(1.46–2.60%)   | 0.99% ± 0.83%<br>(0.42–1.56%)   | 1.00 | 0.01 | 0.06 | 0.01            |
| Pain              | 27.9% ± 53.2%<br>(8.95–46.87%)  | 71.0% ± 22.4%<br>(52.08–89.99%) | 45.4% ± 28.8%<br>(26.44–64.35%) | 0.41 | 0.10 | 0.02 | 0.03            |
| Heaviness         | 27.5% ± 63.6%<br>(6.34–48.69%)  | 62.3% ± 26.2%<br>(41.16–83.51%) | 57.6% ± 27.6%<br>(36.47–78.82%) | 0.07 | 1.00 | 0.03 | 0.02            |

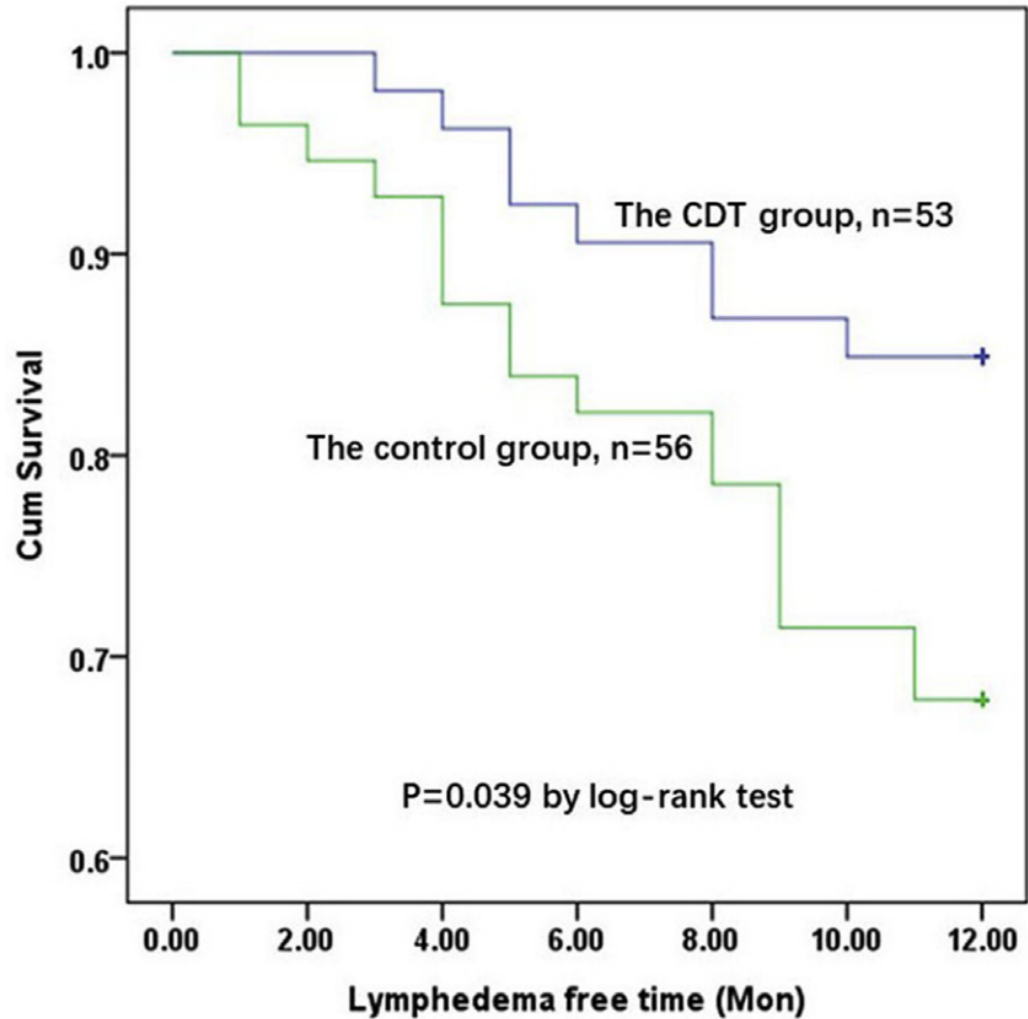


- More volume reduction on supine AECT
- Pre intervention pitting significantly correlation with change volume on all supine, seated, CT
- Pre intervention stiffness correlation with change volume on only supine AECT

# Early prevention of CDT and rehabilitation exercise for prevention of LLL after operation of gynecologic cancer

*(Xiaoli 2021)*

- N=109 female
- CDT with exercise group (n=56) vs education control group (n=57)
- Within 24 h after the surgery
- CDT : massage + elastic band (for 40 days)
- Exercise : supine position
  - ankle flexion, dorsiflexion, varus and valgus
  - knee joint, straight leg raising
  - hip exercise
  - repeated for 15-20 times once, twice one day, for 40 days



Quality of life and cancer related fatigue.

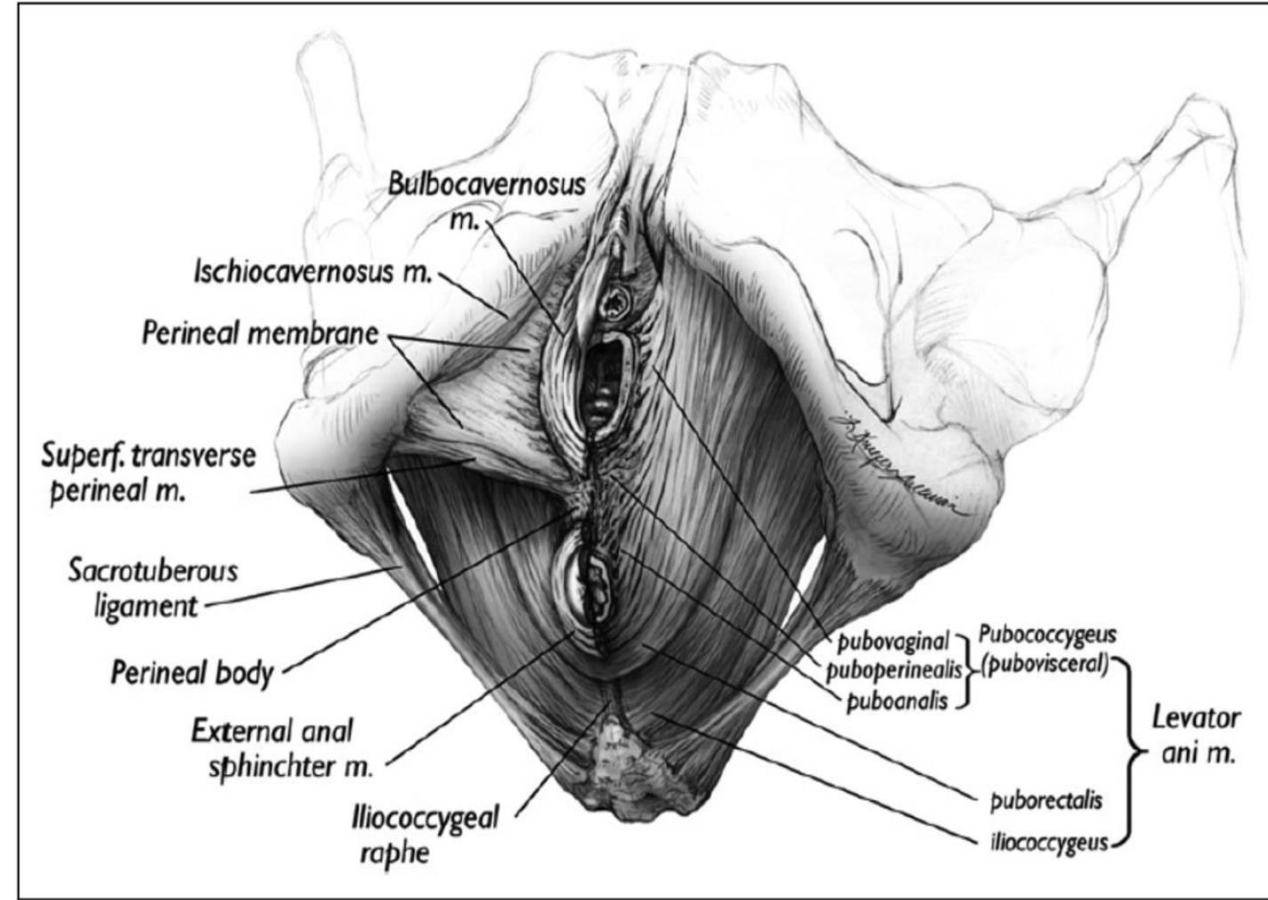
| Variables         | CDT group, n = 53 | Control group, n = 56 | P     |
|-------------------|-------------------|-----------------------|-------|
| EORTC QLQ-C30-GHS |                   |                       |       |
| 3 mon             | 69.71 ± 7.79      | 66.82 ± 6.70          | 0.022 |
| 1 y               | 69.24 ± 7.30      | 66.0 ± 6.46           | 0.016 |
| ORTC QLQ-C30-FS   |                   |                       |       |
| 3 mon             | 19.22 ± 5.05      | 21.83 ± 4.96          | 0.008 |
| 1 y               | 19.58 ± 4.49      | 23.67 ± 3.50          | 0.000 |
| EORTC QLQ-C30-SS  |                   |                       |       |
| 3 mon             | 64.18 ± 6.41      | 61.19 ± 6.27          | 0.015 |
| 1 y               | 65.43 ± 6.8       | 61.58 ± 5.82          | 0.002 |
| BFI               |                   |                       |       |
| 3 mon             | 2.33 ± 1.09       | 2.80 ± 1.18           | 0.036 |
| 1 y               | 2.18 ± 1.07       | 2.87 ± 1.16           | 0.002 |

Pelvic floor exercise



# Pelvic floor dysfunction

- Pelvic organ prolapse
- Urinary incontinence
- Fecal incontinence
- Sexual dysfunction



# Treatment for cancer affect the pelvic floor

- Surgical procedures
  - Scar tissue restriction and swelling
  - Hormonal changes associated with removal of ovaries
- Adjuvant therapy (chemotherapy, radiation)
  - Radiotherapy -> fibrosis -> narrowing and shortening in the vaginal canal
  - Fibrosis in the vaginal wall and pelvic floor
    - Incontinence and urgency of bowel and bladder, pelvic pain, and sexual dysfunction
- Lower libido, altered sexual response, change in body image, distress related to changes in sexual health
- Genitalia lymphedema
  - Impact bladder function

# *Pelvic floor disorders and sexual function*

*Rutledge(2017)*

- Control(n=150) : general gynecologic clinic who were >30 ys
- Study(n=100) : survivors of gynecologic cancer

## Pelvic floor disorder statistics

| Variable   | Gynecologic patients (n = 108), n (%) | Survivors of gynecologic cancer (n = 260), n (%) | P value <sup>a</sup> |
|--|---------------------------------------|--|----------------------|
| Any urinary incontinence: Incontinence Severity Index Score > 0                  | 56 (56)                               | 176 (70)   | NS                   |
| Moderate/ Severity urinary incontinence  | 26 (26)                               | 105 (42)   | NS                   |
| Prolapse   | 14 (13)                               | 20 (8)   | NS                   |
| Fecal incontinence   | 34 (32)                               | 106 (43)   | .02                  |
| Mean fecal incontinence severity score   | 1.0                                   | 2.8  | .003                 |
| Mean Pelvic Organ Prolapse/Urinary Incontinence Sexual questionnaire total score | 37 ± 6                                | 32 ± 7   | <.001                |

- Survivors : less sexual desire, less ability to climax, less intensity of the climaxes achieved, less sexual excitement and satisfaction with the variety of sexual activities, more negative emotional reactions to sexual activity
- No difference : *dyspareunia(radical surgery or radiation)*, impact of pelvic floor disorders, partner functioning
- Multifactorial causes : Physical, social, psychological factors
  - Body image, hormone function
- Asked about urinary/fecal incontinence or sexual function by their oncologist
  - Only 40% of survivors
  - 23% of the women

- Factors that affect rates of PFD
  - Timing
    - Highest in the early post operative period
    - UI rate : 55% (1mo after surgery) (Ceccaroni et al), 48% (1.5 mo) and 17%(12 mo) (Naik et al)
  - Treatment modality
    - Nerve sparing surgical technique : lower rates
    - Radiation alone or combination : higher rates
    - Radical surgical intervention : immediate symptom
    - Radiation : late effects over many months

*Systematic review (2018)*  
*Ramaseshan(2020)*

# Effect of a pelvic floor muscle training program on gynecologic cancer survivors with pelvic floor dysfunction: *Ynag EJ (2012)*

- PFRP (pelvic floor rehabilitation program) and QOL, prospective, randomized, controlled trial
- PFRP group (n=17), non PFRP group (n=17) in 4weeks
  - Pelvic floor strength (perineometer, 2 channel EMG)
  - Pelvic floor dysfunction questionnaire
  - MEP of sacral nerve
  - HRQOL

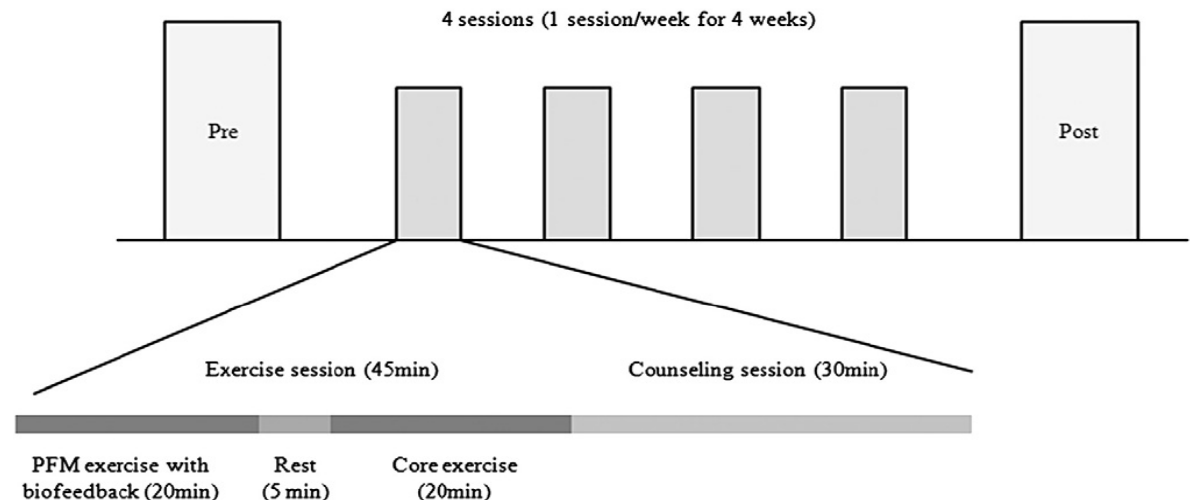


Fig. 3. Flow chart of participants through the randomized controlled trial of the exercise program and analysis.

Effects of PFRP within-group and between-group differences.

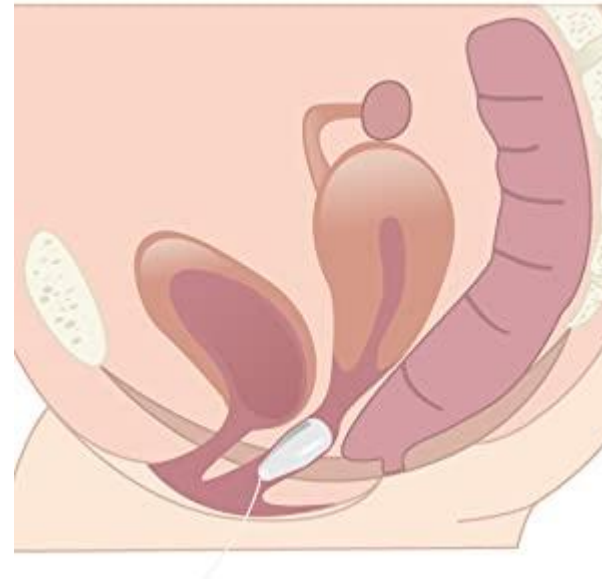
| Variables  | Within group (T1-T0)                       |                         |         | Between group (intervention vs. control) |                        |         |    |          |
|--|--|-------------------------|---------|--|------------------------|---------|----|----------|
|  | Mean difference from baseline <sup>a</sup> |                         |         | Mean difference between groups           | Regression statistics  |         |    |          |
|  | PFRP group (n = 12)                        | Non-PFRP group (n = 12) | P-value |  | β coefficient (95% CI) | t-Value | df | P-values |
| <i>Pelvic floor questionnaire</i>                  |  |                         |         |  |                        |         |    |          |
| Bladder function score <sup>b</sup>                | -0.83 ± 1.08                               | -0.83 ± 1.25            | 0.710   | 0.00                                     | 0.15 (-0.57-1.23)      | 0.771   | 17 | 0.452    |
| Bowel function score <sup>b</sup>                  | -0.67 ± 0.65                               | -0.51 ± 1.47            | 0.412   | -0.16                                    | -0.15 (-0.66-1.31)     | 0.69    | 17 | 0.497    |
| Sexual function score <sup>b</sup>                 | -5.62 ± 2.27                               | -2.42 ± 3.47            | 0.047   | -0.38                                    | -0.55 (-0.86--0.01)    | -2.292  | 9  | 0.048    |
| Pelvic floor muscle strength (cm/H <sub>2</sub> O) | 21.78 ± 7.64                               | 7.56 ± 8.65             | 0.004   | 14.22                                    | 2.15 (1.17-3.57)       | 2.389   | 9  | 0.036    |
| <i>Motor evoked potential</i>                      |  |                         |         |  |                        |         |    |          |
| Sacral stimulation                                 |  |                         |         |  |                        |         |    |          |
| Latency  | -0.41 ± 0.88                               | -0.03 ± 0.27            | 0.283   | 1.90                                     | 0.19 (-4.19-6.79)      | 0.610   | 5  | 0.569    |
| Amplitude  | 0.30 ± 0.27                                | 0.05 ± 0.20             | 0.142   | 0.25                                     | 0.38 (-0.21-0.65)      | 1.166   | 9  | 0.273    |
| Threshold  | -32.00 ± 9.75                              | -11.71 ± 14.24          | 0.010   | -20.29                                   | -0.49 (-1.08--0.15)    | -2.835  | 13 | 0.014    |
| Cranial stimulation at rest                        |  |                         |         |  |                        |         |    |          |
| Latency  | -0.15 ± 0.02                               | 3.93 ± 1.72             | 0.731   | -4.08                                    | -0.27 (-3.40-1.43)     | -0.908  | 10 | 0.385    |
| Amplitude  | -0.08 ± 0.20                               | 0.00 ± 0.29             | 0.295   | -0.08                                    | -0.05 (-0.17-0.15)     | -0.155  | 10 | 0.880    |
| Threshold  | -19.40 ± 14.29                             | -9.40 ± 19.67           | 0.548   | -10.00                                   | -0.43 (-34.48-10.04)   | 1.206   | 7  | 0.235    |
| Cranial stimulation with facilitation              |  |                         |         |  |                        |         |    |          |
| Latency  | 0.15 ± 1.58                                | -1.06 ± 4.57            | 0.731   | 1.21                                     | -0.10 (-3.36-2.47)     | -0.341  | 10 | 0.740    |
| Amplitude  | -0.20 ± 0.42                               | -0.22 ± 0.83            | 0.445   | 0.02                                     | -0.05 (-0.33-0.28)     | -0.175  | 10 | 0.865    |
| Threshold  | -12.50 ± 21.79                             | -9.67 ± 11.69           | 0.914   | -2.83                                    | -0.14 (-26.70-19.30)   | -0.380  | 7  | 0.715    |

# Pelvic floor exercise

- Restore **normal pelvic muscle strength**, endurance, power, resting tone, reverse damage to the muscles and connective tissue
  - Electrical stimulation
  - Biofeedback
  - Vaginal weighted cone
- Regimens
  - 4-8 hour long sessions/week
  - Depending on the severity and complexity of symptoms, some women may need to continue exercise for several months



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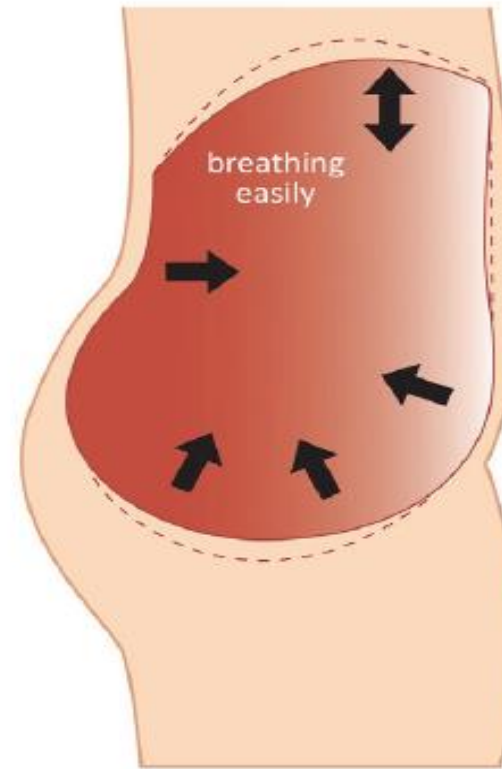


# How to exercise?

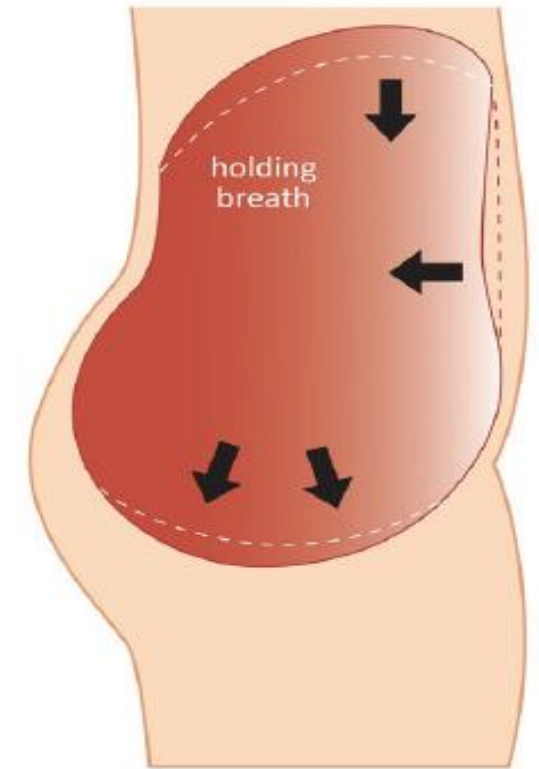
- Identify the correct muscle
  - Stop or slow the flow of urine midway thorough emptying the bladder
  - Stopping the flow of urine repeatedly on the toilet is not an exercise
- Kegel
  - Sit in a comfortable position
  - Tighten these muscles as much as possible.
  - Hold this position for 3–5 seconds. It should feel as though the muscles are lifting up as a result of the squeezing.
  - Release the muscles and rest for several seconds.
  - Repeat this up to 10 times.
  - People can vary this exercise by doing it while standing, lying down, or crouching on all fours.

- In ideal situation
  - Increased abdomen pressure(during exercise)
    - Pelvic floor muscle lift, abdominal and back muscles draw in to support the spine and breathing is easy
- In weakened of core muscle
  - During exercise
    - Potential to overload the pelvic floor, causing downward pressure

## PELVIC FLOOR MUSCLE CONTRACTION



**Correct action**  
The pelvic floor lifts, the deep abdominals draw in and there is no change in breathing



**Incorrect action**  
Bracing the abdominals strongly without focusing on lifting the pelvic floor first, can result in downwards pressure on the pelvic floor

- No strong abdominal exercise
- Avoid breath holding by exhaling with effort
- Lift your pelvic floor first and hold it during the exercise, then relax after
- Reduced repetition before pelvic floor muscle fitness improves

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## Pelvic floor safe core exercises

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### Lower intensity abdominal challenge

- Single leg extension with one leg supported by a hand on stationary knee or moving foot on ball
- Knees side to side with feet on ball
- Modified plank on hands or knees with a slight bend at the hips
- Wall push ups
- Ball bridge (feet on ball or back on ball, +/- single leg lift)
- Arm and leg lift on all fours
- Leg lift sitting on the ball
- Shoulder rotations with back on the ball
- Standing balance work on the bosu or balance disc

## Core exercises to avoid

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### Higher intensity abdominal exercises

- Sit ups, curl ups, crunches
- Abdominal exercises with medicine ball
- V-sit
- Hundreds
- Double-leg lowers
- Plank position on hands and feet (e.g. hovers, full push ups)

pelvic floor first

The pelvic floor and  
**core exercises**

감사합니다.