WOMEN IN HEALTH AND EXERCISE

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Many factors to consider when thinking about the differences between men and women and exercise:

- Heart rate
- Response to exercise
- Muscle development
- Conditions more prevalent in women:
  - Osteoarthritis
  - Osteoporosis
  - Fibromyalgia
- Pregnancy
- Post pregnancy conditions......to name a few
Focus of today

- Brief synopsis of current research on HR differences between men and women
- Brief synopsis of how OA affects women more than men
- Guidelines for working with women with Osteoporosis
- Guidelines for working with women postnatally
- Guidelines for working with women prenatally (if time)
Relationship Between Exercise Heart Rate and Age in Men vs. Women

Purpose of Study:

- Hrmax formula for men and women = 220 - age
  - Proposed by Fox and Colleagues, 1971
- Should there be a separate formula for women?

- 37,010 subjects, ages 40-89 years:
  - 24,922 men (67.3%)
  - 12,088 women (32.7%)

Relationship Between Exercise Heart Rate and Age in Men vs. Women

Findings:

- A separate formula for peak HR in women appears to be appropriate

\[ \text{PeakHR} = 210 - 0.79 \times \text{age} \]

- Show that most HR responses to exercise are significantly different in men vs. women
- Women have a higher resting HR at all ages
- Peak HR is one of the most commonly used parameters in clinical cardiovascular medicine, so correct determination is important

Arthritis

Arthritis: a chronic degenerative condition of the joints

1) **Osteoarthritis - OA**
   - More common
   - More related to physical activity – developed over time

2) **Rheumatoid Arthritis – RA**
   - Less is known about RA, particularly exercise testing, prescription, and what to expect
   - Can be very painful
Incidence of osteoarthritis

Extracted from: Skinner JS, 3rd edn. Exercise testing and exercise prescription for special populations. Chapter 10
Mechanical stresses and OA

As a result:

- Bone will grow thicker as it adapts to forces
- Will have excessive forces placed on specific points of contact
- Cartilage producing cells get damaged
- More cartilage breakdown

Extracted from: Porth CM, Essentials of pathophysiology, 3rd edn., p.1148
- Joint cartilage: Gets softer and less capable of withstanding stresses placed upon it.

- Focal and progressive hyaline cartilage loss (Cartilage gets thinner)

- Cushioning function which reduces mechanical forces in joint, are decreased.

- Bone beneath cartilage grows thicker = protective mechanism (osteosclerosis)

- Marginal outgrowths (osteophytes) develop as compensatory changes
Osteoarthritis

Healthy knee joint

Hypertrophy and spurring of bone and erosion of cartilage
Signs and symptoms of OA

- Localized tenderness
- Crepitus on motion (cracking of joint)
- Mild joint enlargement
- Synovitis
- Deformities in later stages

Radiologic changes:
- Narrowing of joint spaces
- Osteophytes
- Bone remodeling around joints
Risk factors for the development of OA

- Age – older
- Sex – women
- Reduced estrogen levels at menopause
- Bone density (high bone density increases risk of OA, but may protect against progression of existing disease)
- Obesity – more stress on joints; can speed up OA
- Repetitive jobs (involving kneeling and squatting)
- Joint injury
- Sports participation
- Muscle weakness
- Genetics
OA profile

- Low aerobic capacity
- Low muscle strength
- Poor flexibility
- Poor balance

Note: that all of these factors can be improved with exercise
Exercise in the management of OA

- No studies in humans show that exercise is detrimental by promoting cartilage breakdown (as long as the right activities are prescribed)
- Evidence for benefits of exercise are **stronger for knee than for the hip**
- Strengthening quads = slow progression of joint damage – especially knee OA
- Current knowledge about the optimal types of exercises and dose-response relationship is in progress – NEMEX is being used around the world

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Purpose of Study:

- Evaluate association between knee osteoarthritis (OA) and body composition among men and women
- Analyze and compare correlations of both obesity and lower extremity muscle mass with radiographic knee OA in relation to sex
- 4246 participants

Body Composition: Fifth Korea National Health and Nutrition Examination Survey

Findings for Women:

- Body composition is related to the presence and severity of knee OA
- High fat mass and low lower extremity muscle mass were associated with knee OA
- Muscle mass % in lower extremity with radiographic knee OA > Obesity with radiographic knee OA

Gender Prevalence of Knee OA Types in Elderly Koreans

Purpose of Study:

- Documented sex difference in the prevalence of knee OA at different disease stages
- Prevalence of 3 stages of knee OA:
  - Radiographic OA
  - Severe radiographic OA
  - Candidacy for total knee arthroplasty (TKA)
- **696** elderly (>65 years old) Korean subjects

Gender Prevalence of Knee OA Types in Elderly Koreans

- Overall prevalence of knee OA in both genders:
  - 38.1% for radiographic OA
  - 26.4% for severe radiographic OA
  - 6.5% for advanced OA (TKA)

- *Women had much higher prevalence for all 3 stages, specifically for TKA*

Findings:

- **Men**, increase in prevalence for radiographic and severe radiographic OA only between 65-74 years old.

- After 75, there was an increase in prevalence for all types of knee OA.

- **Women** with radiographic and severe radiographic OA had higher prevalence of bilateral knee OA.

- All 3 factors examined (female sex, obesity, and aging) were associated with the risks of all 3 stages of knee OA.
  - Female sex was the strongest risk factor.

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A Review of the Management of Hip and Knee OA

- OA is the most chronic condition affecting patients over the age of 70
- Adults over the age of 30:
  - Up to 6% symptomatic of knee arthritis
- Risk Factors for the Development of Lower-Limb OA:
  - Obesity
  - Previous knee injury
  - Sport activity
  - Gender

A Review of the Management of Hip and Knee OA

- Patients with varus knees:
  - Obesity affects incidence but not progression of OA in knees
  - Knees with neutral or valgus alignment affects the progression of OA

- Hip OA in men and women:
  - BMI > 28 have been found to be 1.7x more likely to have hip OA than those with BMI <24.5

A Review of the Management of Hip and Knee OA

- **Occupational habits are risk factors:**
  - 30 min per day squatting, kneeling, or climbing stairs
  - OA found in female cleaners, over 6x higher

- **Sports activity and previous injury:**
  - Retired football players, 51% who retired with injury diagnosed with lower-limb OA, compared to 25% who retired with no injury
  - Previous ACL injury, 80% having radiographic OA at knee

Nonsurgical Management of Hip/Knee Osteoarthritis:

- Control pain = Increased function and quality of life
- Physical and occupation therapy help manage patients with functional limitations
- Exercise programming = improve muscle strength, mobility and coordination
- Pharmacological treatments + non-pharmacological measures
Purpose of Study:

- Poor physical performance is associated with:
  - Disability
  - Lower quality of life
  - Higher mortality rates.

- Knee and hip OA might be expected to contribute to poor physical performance, through joint pain and restricted range of movement.

- 2942 men and women aged 65-85 from Germany, Italy, Spain, Sweden, and UK
Relationships Between Physical Performance and Knee and Hip OA (EPOSA)

Findings:

- Rates of self-reported OA were much higher than clinical OA
- People at highest risk have clinical OA at both hip and knee
- Pain, self-reported OA and clinical OA at the knee and hip increased risk of low physical performance

Low physical performance was found to be related to:

- Female sex
- Advancing age
- Greater BMI
- Abstinence from alcohol
- Lower educational attainment
- Number of chronic diseases
- Hip and knee stiffness
- Country
Future Osteoarthritis Burden in Canada

- Incidence and prevalence of OA are expected to increase due to the population aging and increased levels of obesity
- Under the base-case scenario between 2010 and 2030, OA prevalence is expected to increase:
  - 11.5% to 15.6% in men
  - 16.3% to 21.1% in women
- Due to the aging population, OA will remain a growing health issue in Canada, regardless of the obesity epidemic

Gender Differences in the Combined Effects of Cardiovascular Disease and OA in Older Mexican Americans

- 1789 subjects, 60+ Mexican Americans were followed annually for 10 years
- 4 groups were created:
  - CVD alone (myocardial infarction, angina, congestive heart failure etc)
  - Lower body OA alone
  - No comorbidity
  - Both

Gender Differences in the Combined Effects of Cardiovascular Disease and OA in Older Mexican Americans

- Tested through Instrumental Activities of Daily Living (IADL) impairments
  - Women with no comorbidity, IADL impairments:
    - CVD alone were 1.36 times greater
    - OA alone were 1.35 times greater
    - Both conditions were 1.26 times greater
  - Men with no comorbidity, IADL impairments:
    - CVD alone were 1.15 times greater
    - OA alone were 1.12 time greater
    - Both were 1.26 times greater

Gender Differences in the Combined Effects of Cardiovascular Disease and OA in Older Mexican Americans

- Women with both conditions were older and had higher BMI and WC
- IADL impairments in those with CVD, OA, or both were higher at baseline and increased over time
- Women experience higher burden of functional impairment due to comorbidity than men
- Influence of comorbidity on functional decline differs by specific combinations of comorbidity and gender

Osteoporosis guidelines

What is Osteoporosis?

- As women go through menopause, most lose bone rapidly. The decrease in the levels of the hormone estrogen causes a breakdown in bone. A person with osteoporosis has porous bones and the risk of fracture is high.
Lol!
Osteoporosis guidelines

- Osteoporosis is called the “silent thief” because it can progress without symptoms until a broken bone occurs. When bones become weakened by osteoporosis, simple movements – such as bending over to pick up a heavy bag of groceries or sneezing forcefully – can lead to broken bones. Hip, spine, and wrist fractures are most common fractures associated with osteoporosis.
Osteoporosis guidelines

Why is exercise important?

- Weight-bearing and strength training exercises can help to manage pain and improve the strength of bones and muscles. These exercises also help to prevent falls.

- Weight bearing (walking, jogging, aerobics, dancing) and resistance exercises will assist in strengthening bones. Current research shows though, that past the age of 30, bone density starts to decline even in people who do weight bearing activities.

**MYTH: WEIGHT BEARING EXERCISE INCREASES BONE DENSITY IN PEOPLE WITH OSTEOPOROSIS**
Mild Osteoporosis

Mild osteoporosis
(A. Longitudinal section B. Lateral view of the area)

- Slight enlargement of intervertebral disks
- Scanty and thin bone trabeculae
Moderate Osteoporosis

(A. Longitudinal section B. Lateral view of the area)

Increased size of intervertebral disk

Significant absence of trabeculae
Severe Osteoporosis

(A. Longitudinal section  B. Lateral view of the area)

Compression fracture
Osteoporosis Statistics

- Osteoporosis causes 70-90% of 30,000 hip fractures annually.
- At least 1 in 3 women and 1 in 5 men will suffer from an osteoporotic fracture during their lifetime.
- 28% of women, and 37% of men who suffer a hip fracture will die within the following year.
- Over 80% of all fractures in people 50+ are caused by osteoporosis.
Cost Burden

- The overall yearly cost to the Canadian healthcare system of treating osteoporosis and the fractures it causes was over $2.3 billion as of 2010 (includes acute care, outpatient care, prescription drugs and indirect costs).
- Each hip fracture costs the health care system $21,285 in the 1st year after hospitalization, and $44,156 if the patient is institutionalized.
- Fewer than 20% of fracture patients in Canada currently undergo diagnosis or adequate treatment for osteoporosis.
Where can you get all the info you need and more resources on osteoporosis?

- **Bone fit Course** (www.bonefit.ca)
  - Thorough 2 day course for kinesiologists that teaches
    - Patient assessment
    - Functional movements and Exercises
    - Osteoporosis exercises
    - Exercises for scapula Stabilizers
    - Foam roller exercises
    - Tips of Yoga, Pilates and exercising at the gym with osteoporosis

- **Osteoporosis Canada** (www.osteoporosis.ca)
  - Resources for patients and health professionals
  - Downloadable resource kits and booklets
Setting goals and prescribing exercise for osteoporotic clients

When setting goals or prescribing exercise, what key things should a healthcare provider ask, observe, screen for, or assess?

- 1. Medical history, comorbidities, exercise contraindications
- 2. Fracture risk - FRAX or CAROC, or assessment of risk factors
- 3. Fall risk – acute fall, ≥2 falls in past 12 months, gait/balance difficulties
- 4. Physical performance - impairment or pain during movements
- 5. Standing posture - look for hyperkyphosis, hyper- or hypolordosis
- 6. Barriers and facilitators to physical activity - e.g., current physical activity, self-efficacy, time, pain, access, preferences.
Quick Reference Guide

2010 Clinical Practice Guidelines for the Diagnosis and Management of Osteoporosis in Canada

This guide has been developed to provide healthcare professionals with a quick-reference summary of the most important recommendations from the 2010 Clinical Practice Guidelines for the Diagnosis and Management of Osteoporosis in Canada. For more detailed information, consult the full guideline document at www.osteoporosis.ca.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Recommended Elements of Clinical Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>History</td>
<td>• Identify risk factors for low BMD, fractures and falls:</td>
</tr>
<tr>
<td></td>
<td>• Prior fragility fractures</td>
</tr>
<tr>
<td></td>
<td>• Parental hip fracture</td>
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<tr>
<td></td>
<td>• Glucocorticoid use</td>
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<tr>
<td></td>
<td>• Current smoking</td>
</tr>
<tr>
<td></td>
<td>• High alcohol intake (≥3 units per day)</td>
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<tr>
<td></td>
<td>• Rheumatoid arthritis</td>
</tr>
<tr>
<td></td>
<td>• Inquire about falls in the previous 12 months</td>
</tr>
<tr>
<td></td>
<td>• Inquire about gait and balance</td>
</tr>
<tr>
<td>Physical</td>
<td>• Measure weight (weight loss of &gt;10% since age 25 is significant)</td>
</tr>
<tr>
<td>Examination</td>
<td>• Measure height annually (prospective loss &gt; 2cm) (historical height loss &gt; 6 cm)</td>
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<tr>
<td></td>
<td>• Measure rib to pelvis distance ≤ 2 fingers’ breadth</td>
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<tr>
<td></td>
<td>• Measure occiput-to-wall distance (for kyphosis) &gt; 5cm</td>
</tr>
<tr>
<td></td>
<td>• Assess fall risk by using Get-Up-and-Go Test (ability to get out of chair without using arms, walk several steps and return)</td>
</tr>
</tbody>
</table>

Screening for vertebral fractures
### Recommended Biochemical Tests for Patients Being Assessed for Osteoporosis

<table>
<thead>
<tr>
<th>Test</th>
<th>Additional Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium, corrected for albumin</td>
<td>Thyroid stimulating hormone (TSH)</td>
</tr>
<tr>
<td>Complete blood count</td>
<td>Serum protein electrophoresis for patients with vertebral fractures</td>
</tr>
<tr>
<td>Creatinine</td>
<td>25-hydroxy vitamin D (25-OH-D)*</td>
</tr>
<tr>
<td>Alkaline phosphatase</td>
<td></td>
</tr>
</tbody>
</table>

*Should be measured after 3-4 months of adequate supplementation and should not be repeated if an optimal level ≥ 75 nmo/L is achieved.*
### Indications for BMD Testing

#### Older Adults (age ≥ 50 years)
- All women and men age ≥ 65 years
- Menopausal women, and men aged 50-64 years with clinical risk factors for fracture:
  - Fragility fracture after age 40
  - Prolonged glucocorticoid use†
  - Other high-risk medication use*
  - Parental hip fracture
  - Vertebral fracture or osteopenia identified on X-ray
  - Current smoking
  - High alcohol intake
  - Low body weight (< 60 kg) or major weight loss (>10% of weight at age 25 years
  - Rheumatoid arthritis
  - Other disorders strongly associated with osteoporosis such as primary hyperparathyroidism, type 1 diabetes, osteogenesis imperfecta, uncontrolled hyperthyroidism, hypogonadism or premature menopause (< 45 years), Cushing’s disease, chronic malnutrition or malabsorption, chronic liver disease, COPD and chronic inflammatory conditions (e.g., inflammatory bowel disease)

#### Younger Adults (age < 50 years)
- Fragility fracture
- Prolonged use of glucocorticoids*
- Use of other high-risk medications†
- Hypogonadism or premature menopause
- Malabsorption syndrome
- Primary hyperparathyroidism
- Other disorders strongly associated with rapid bone loss and/or fracture

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*≥3 months in the prior year at a prednisone equivalent dose ≥ 7.5 mg daily; *e.g., aromatase inhibitors, androgen deprivation therapy.
Quick Reference Guide

Assessment of Basal 10-year Fracture Risk: 2010 CAROC System

**Women**

- **Femoral Neck T-score**
  - **Low Risk (<10%)**
  - **Moderate Risk**
  - **High Risk (>20%)**

**Men**

- **Femoral Neck T-score**
  - **Low Risk (<10%)**
  - **Moderate Risk**
  - **High Risk (>20%)**

**Note:**
1. Fracture risk after age 40 or recent prolonged systemic glucocorticoid use increases 2010 CAROC basal risk by one category (i.e., from low to moderate or moderate to high).
2. Using this model in a patient on therapy only reflects the theoretical risk of a hypothetical patient who is treatment naïve and does not reflect the risk reduction associated with therapy.
3. Femoral neck T-score should be derived from NHANES III Caucasian women reference database.
4. Individuals with a fragility fracture of the vertebra or hip, or with more than one fragility fracture are at high fracture risk.
Quick Reference Guide

**Integrative Management Model**

Encourage **basic bone health** for all individuals including: regular active weight bearing exercise, calcium (diet and supplements) 1200 mg daily, vitamin D: 800 - 2000 IU daily after age 50 (400 - 1000 for those < age 50 at low risk), and fall prevention strategies.

**Age <50**
- Fragility fractures
- High-risk medication use
- Hypogonadism
- Malabsorption syndromes
- Chronic inflammatory conditions
- Primary hyperparathyroidism
- Other disorders strongly associated with rapid bone loss and/or fractures

**Age 50 - 64**
- Fragility fracture after age 40
- Prolonged glucocorticoid or other high-risk medication use
- Parental hip fracture
- Vertebral fracture or osteopenia identified on X-ray
- High alcohol intake or current smoking
- Low body weight (< 60 kg) or major weight loss (> 10% of weight at age 25)
- Other disorders strongly associated with osteoporosis

**Age ≥65**
- All men and women

**Initial BMD Testing**

**Fracture Risk Assessment**
**Quick Reference Guide**

**Low Risk**
- 10-year fracture risk <10%
- Unlikely to benefit from pharmacotherapy
- Reassess risk in 5 years

**Moderate Risk**
- 10-year fracture risk 10 - 20%
- Lateral thoracolumbar x-ray (T4-L4) or vertebral fracture analysis (VFA) may aid in decision-making by identifying vertebral fractures

**High Risk**
- 10-year fracture risk > 20%
- Prior fragility fracture of hip or spine
- More than one fragility fracture

**Factors that Warrant Consideration for Pharmacological Therapy:**
- Additional vertebral fracture(s) identified on VFA or lateral spine x-ray
- Previous wrist fracture in individuals older than age 65 or those with T-score ≤ -2.5
- Lumbar spine T-score much lower than femoral neck T-score
- Rapid bone loss
- Men receiving androgen-deprivation therapy for prostate cancer
- Women receiving aromatase-inhibitor therapy for breast cancer
- Long-term or repeated systemic glucocorticoid use (oral or parenteral) that does not meet the conventional criteria for recent prolonged systemic glucocorticoid use
- Recurrent falls defined as falling 2 or more times in the past 12 months
- Other disorders strongly associated with osteoporosis, rapid bone loss or fractures

**Repeat BMD in 1-3 years and reassess risk**

**Good evidence of benefit from pharmacotherapy**

**Always consider patient preference**
# Quick Reference Guide

## First Line Therapies with Evidence for Fracture Prevention in Postmenopausal Women*

<table>
<thead>
<tr>
<th>Type of Fracture</th>
<th>Antiresorptive Therapy</th>
<th>Bone Formation Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bisphosphonates</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alendronate</td>
<td>Risedronate</td>
</tr>
<tr>
<td>Vertebral</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Hip</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Non-vertebral*</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

1. In Clinical trials, non-vertebral fractures are a composite endpoint including hip, femur, pelvis, tibia, humerus, radius, and clavicle.
2. For postmenopausal women, ✓ indicates first line therapies and Grade A recommendation. For men requiring treatment, alendronate, risedronate, and zoledronic acid can be used as first-line therapies for prevention of fractures (Grade D).
3. Hormone therapy (estrogen) can be used as first-line therapy in women with menopausal symptoms.
Setting goals and prescribing exercise for osteoporotic clients

When setting goals or prescribing exercise, what key things should a health care provider ask, observe, screen for, or assess?

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- 2. Fracture risk - FRAX or CAROC, or assessment of risk factors
- 3. Fall risk – acute fall, ≥2 falls in past 12 months, gait/balance difficulties
- 4. Physical performance - impairment or pain during movements
- 5. Standing posture - look for hyperkyphosis, hyper- or hypolordosis
- 6. Barriers and facilitators to physical activity - e.g., current physical activity, self-efficacy, time, pain, access, preferences.
Osteoporosis & Exercise

- People with osteoporosis need to engage in different forms of exercise:
  - Strength Training
  - Postural Training
  - Balance Training
  - Aerobic Training
Strength Training

- At least 2 days a week
- 2 sets of 8-12 repetitions per exercise

Benefits:
- Improved muscle and bone strength, and mobility
Posture Training

- Practice proper position and good posture everyday
- Be conscious of posture. Perform exercise targeting the muscles that extend your spine
- Attention to posture during daily activities, as well as 5-10 minutes daily of exercises to improve posture
- 5-10 min per day lie flat on firm mattress or floor - Legs straight, or if uncomfortable, bent or resting on pillow under knees - Only use a pillow if head does not reach floor or is in a hyperextended position

Benefits:

Less pressure on the spine. Reduced risk of falls and fractures, especially spine fractures
Balance Training

- **Everyday**
  - Can combine with weight bearing and strength training
- **Beginners**: standing still
- **Advanced**: Dynamic exercise
- **15-20 min everyday, or 120 min a week**

**Benefits:**
Improved mobility and balance
Aerobic Training

- Most days of the week
- Moderate to vigorous intensity
- 20-30 min or more per day. >150 min per week

Benefits:
Improved heart health and muscle strength
Sample of bone-fit exercises used with high fracture risk client

- Head press
- Shoulder press
- Elbow press
- Leg stomp
- Heel drop
- Single leg balance
- Wall slide
- Bow and arrow
- Sword
- Pull apart
- External rotation
- Leg lengthener

- Leg press
- Core engagement
- Knee drop
- Supine leg extension
- Adductor squeeze x 2
- Scapula retraction
- Bridge
- Prone Head lift
- Pelvic press
- Swan
Head Press
Shoulder Press
Elbow Press
Leg Stomp - Start
Heel Drop
Single Leg Balance
Wall Slide
Bow and Arrow - Start
Bow and Arrow - End
Sword - Start
Sword - End
Pull Apart - Start
Pull Apart - End
External Rotation - Start
External Rotation - End
Leg Lengthener
Leg Press
Core Engagement/Bracing
Knee Drop – Start
Knee Drop - End
Leg Extension – Start
Leg Extension - End
Hip Hike
Adductors - Start
Adductors - End
Ankle Squeeze – Start
Ankle Squeeze - End
Bridge - Start
Scapular Retraction
Head lift - Start
Head lift - End
Pelvic Press
Pelvic Press – Foot Position
Swan
Glutes, Hamstrings, Lower Back Stretch
Hamstring Stretch
Glutes Stretch
Osteoporosis guidelines Summary

Avoid:

- Forward bending especially from standing position
- Flexing back from sitting or lying position (no sit-ups/crunches etc)
- Compression positions (cycling)
- Rapid twisting
- Reaching above shoulders
- Yoga (? New guidelines)
- Any pain
Osteoporosis guidelines Summary

Exercises should focus on:
- Posture
- Balance and Coordination
- Strengthening core
- Increasing flexibility
- Pain free movements
- Daily back extensor training
- Spine sparing strategies
Pregnancy Guidelines
Introduction to Pregnancy

- Pregnancy generally lasts 40 weeks or approximately 9 months
- Is divided into 3 trimesters:
  - 1st trimester – weeks 1-13
  - 2nd trimester – weeks 14-27
  - 3rd trimester – weeks 28-40
First Trimester Body Changes

- Bouts of nausea
- Tender, swollen breasts
- Increased urination
- Fatigue
- Food aversions or cravings
- Dizziness
- Heartburn
- Constipation
Second Trimester Body Changes

- Growing belly
- Larger breasts
- Braxton Hicks contractions
- Skin changes
- Stretch marks
- Nasal and gum problems
- Dizziness
- Leg cramps
- Shortness of breath
Third Trimester Body Changes

- Weight gain
- Continued breast growth
- Braxton Hicks contractions
- Backaches
- Shortness of breath
- Heartburn
- Swelling
- Spider veins, varicose veins and hemorrhoids
- Frequent urination
Physiological Changes

- Increased body weight by about 12kg
  - First trimester = 1-3kg weight gain
  - Second trimester = 6-8kg
  - Third trimester = 3.5-4kg

- Fetus accounts for 3.5kg
Progesterone Adaptations to Exercise

- Opposes the glucose lowering effect on insulin
- Fat is mobilized in late gestation to meet material requirements
- This shift creates “glucose sparing” to meet demands of growing fetus
  - Exercising during pregnancy is okay because there is enough energy for mother and baby
Relaxin

- To relax the ligaments and fibrocartilage in preparation for delivery
- Also has global effect on whole body
- Increased risk of injury
  - Due to overstretching

10.1 lbs!!!
bad pregnancy posture

headaches

tension

low back pain

pubic pain
Musculoskeletal Issues

- Majority of pregnant women experience some degree of musculoskeletal discomfort — 25% have symptoms that are temporarily disabling
- Low back pain — attributed to increased biomechanical strain and altered hormonal influences
Musculoskeletal Changes

- Pectoral muscles support enlarging breasts
- Weak rhomboid muscles may lead to forward rotation of shoulders
- Weak gluteal muscles result in more pronounced waddle
- Strong hip abductors should help during labour
- Diaphragm is displaced upward due to expanding uterus
PARMED-X For Pregnancy

- Is a tool for screening women interested in participating in physical activity during pregnancy
- Includes a questionnaire for women to complete, to supply their obstetric providers with pertinent medical history and a recent patient activity profile
- Provides women with practical prescriptions for participating in aerobic and strength-conditioning activities
PARmed-X for PREGNANCY

PARmed-X for PREGNANCY is a guideline for health screening prior to participation in a prenatal fitness class or other exercise.

Healthy women with uncomplicated pregnancies can integrate physical activity into their daily living and can participate without significant risks either to themselves or to their unborn child. Postulated benefits of such programs include improved aerobic and muscular fitness, promotion of appropriate weight gain, and facilitation of labour. Regular exercise may also help to prevent gestational glucose intolerance and pregnancy-induced hypertension.

The safety of prenatal exercise programs depends on an adequate level of maternal-fetal physiological reserve. PARmed-X for PREGNANCY is a convenient checklist and prescription for use by health care providers to evaluate pregnant patients who want to enter a prenatal fitness program and for ongoing medical surveillance of exercising pregnant patients.

Instructions for use of the 4-page PARmed-X for PREGNANCY are the following:

1. The patient should fill out the section on PATIENT INFORMATION and the PRE-EXERCISE HEALTH CHECKLIST (PART 1, 2, 3, and 4 on p. 1) and give the form to the health care provider monitoring her pregnancy.
2. The health care provider should check the information provided by the patient for accuracy and fill out SECTION C on CONTRAINDICATIONS (p. 2) based on current medical information.
3. If no exercise contraindications exist, the HEALTH EVALUATION FORM (p. 3) should be completed, signed by the health care provider, and given by the patient to her prenatal fitness professional.

In addition to prudent medical care, participation in appropriate types, intensities and amounts of exercise is recommended to increase the likelihood of a beneficial pregnancy outcome. PARmed-X for PREGNANCY provides recommendations for individualized exercise prescription (p. 3) and program safety (p. 4).

NOTE: Sections A and B should be completed by the patient before the appointment with the health care provider.

### A PATIENT INFORMATION

| NAME:__________________________ | ADDRESS:__________________________ |
| TELEPHONE:____________________ | BIRTHDATE:______________________ |
| NAME OF PREGNATAL FITNESS PROFESSIONAL:____________________ | HEALTH INSURANCE No.:____________________ |
| PROFESSIONAL’S PHONE NUMBER:____________________ | ________ |

### B PRE-EXERCISE HEALTH CHECKLIST

#### PART 1: GENERAL HEALTH STATUS

In the past, have you experienced (check YES or NO):

1. Miscarriage in an earlier pregnancy? YES NO
2. Other pregnancy complications? YES NO
3. I have completed a PAR-Q within the last 30 days? YES NO

If you answered YES to question 1 or 2, please explain:

Number of previous pregnancies? ________

#### PART 2: STATUS OF CURRENT PREGNANCY

Due Date: ____________

During this pregnancy, have you experienced:

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Marked fatigue?</td>
<td>q</td>
</tr>
<tr>
<td>2. Bleeding from the vagina (“spotting”?</td>
<td>q</td>
</tr>
<tr>
<td>3. Unexplained faintness or dizziness?</td>
<td>q</td>
</tr>
<tr>
<td>4. Unexplained abdominal pain?</td>
<td>q</td>
</tr>
<tr>
<td>5. Giddiness, swelling of ankles, hands or face?</td>
<td>q</td>
</tr>
<tr>
<td>6. Persistent headaches or problems with headaches?</td>
<td>q</td>
</tr>
<tr>
<td>7. Swelling, pain or redness in the calf of one leg?</td>
<td>q</td>
</tr>
<tr>
<td>8. Absence of fetal movement after 6th month?</td>
<td>q</td>
</tr>
<tr>
<td>9. Failure to gain weight after 5th month?</td>
<td>q</td>
</tr>
</tbody>
</table>

If you answered YES to any of the above questions, please explain:

#### PART 3: ACTIVITY HABITS DURING THE PAST MONTH

List only regular fitness/recreational activities:

<table>
<thead>
<tr>
<th>INTENSITY</th>
<th>FREQUENCY</th>
<th>TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>(times/week)</td>
<td>(minutes/day)</td>
<td></td>
</tr>
<tr>
<td>Heavy</td>
<td>1-2</td>
<td>&lt;20</td>
</tr>
<tr>
<td>Medium</td>
<td>2-4</td>
<td>20-40</td>
</tr>
<tr>
<td>Light</td>
<td>4+</td>
<td>40+</td>
</tr>
</tbody>
</table>

2. Does your regular occupation (job/home) activity involve

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy lifting?</td>
<td>q</td>
</tr>
<tr>
<td>Frequent walking/standing?</td>
<td>q</td>
</tr>
<tr>
<td>Occasional walking (once/hr)?</td>
<td>q</td>
</tr>
<tr>
<td>Prolonged sitting?</td>
<td>q</td>
</tr>
<tr>
<td>Mainly sitting?</td>
<td>q</td>
</tr>
<tr>
<td>Normal daily activity?</td>
<td>q</td>
</tr>
</tbody>
</table>

3. Do you currently smoke tobacco? YES NO

4. Do you consume alcohol? YES NO

#### PART 4: PHYSICAL ACTIVITY INTENTIONS

What physical activity do you intend to do?

Is this a change from what you currently do? YES NO

(Note: Pregnant women are strongly advised not to smoke or consume alcohol during pregnancy and during lactation.)
PARmed-X for PREGNANCY

PHYSICAL ACTIVITY READINESS MEDICAL EXAMINATION

C CONTRACTINDICATIONS TO EXERCISE: to be completed by your health care provider

<table>
<thead>
<tr>
<th>Absolute Contraindications</th>
<th>Relative Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the patient have:</td>
<td>Does the patient have:</td>
</tr>
<tr>
<td>1. Ruptured membranes, premature labour?</td>
<td>1. History of spontaneous abortion or premature labour in previous pregnancies?</td>
</tr>
<tr>
<td>2. Persistent second or third trimester bleeding/placenta previa?</td>
<td>2. Mild/moderate cardiovascular or respiratory disease (e.g., chronic hypertension, asthma)?</td>
</tr>
<tr>
<td>3. Pregnancy-induced hypertension or pre-eclampsia?</td>
<td>3. Anaemia or iron deficiency? (Hb &lt; 100 g/L)?</td>
</tr>
<tr>
<td>4. Incompetent cervix?</td>
<td>4. Malnutrition or eating disorder (anorexia, bulimia)?</td>
</tr>
<tr>
<td>5. Evidence of intrauterine growth restriction?</td>
<td>5. Twin pregnancy after 26th week?</td>
</tr>
<tr>
<td>6. High-order pregnancy (e.g., triplets)?</td>
<td>6. Other significant medical condition?</td>
</tr>
<tr>
<td>7. Uncontrolled Type I diabetes, hypertension or thyroid disease, other serious cardiovascular, respiratory or systemic disorder?</td>
<td></td>
</tr>
</tbody>
</table>

PHYSICAL ACTIVITY RECOMMENDATION: ❑ Recommended/Approved ❑ Contraindicated

Precription for Aerobic Activity

RATE OF PROGRESSION: The best time to progress is during the second trimester since risks and discomforts of pregnancy are lowest at that time. Aerobic exercise should be increased gradually during the second trimester from a minimum of 15 minutes per session, 3 times per week in the appropriate target heart rate or RPE to a maximum of approximately 30 minutes per session, 4 times per week at the appropriate target heart rate or RPE.

WARM-UP/COLD-DOWN: Aerobic activity should be preceded by a brief (10-15 min.) warm-up and followed by a short (10-15 min.) cool-down. Low intensity cardiovascular, stretching and relaxation exercises should be included in this warm-up/cold-down.

FIT

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>INTENSITY</th>
<th>TIME</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begin at 3 times per week and progress to 4 times per week</td>
<td>Exercise within an appropriate RPE range and target heart rate zone</td>
<td>Attempt 15 minutes, even if it means reducing the intensity</td>
<td>Non weight-bearing or low-impact endurance exercise using large muscle groups (e.g., walking, stationary cycling, swimming, aquatic exercises, low impact aerobic)</td>
</tr>
</tbody>
</table>

TALK TEST: A final check to avoid overexertion is to use the “talk test”. The exercise intensity is excessive if you cannot carry on a verbal conversation while exercising.

TARGET HEART RATE ZONES

The heart rate zones shown below are appropriate for most pregnant women. Work during the lower end of the HR range at the start of a new exercise program and in late pregnancy.

<table>
<thead>
<tr>
<th>AGE</th>
<th>HEART RATE ZONES</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 20</td>
<td>140-155</td>
</tr>
<tr>
<td>20-29</td>
<td>135-150</td>
</tr>
<tr>
<td>30-39</td>
<td>130-145</td>
</tr>
</tbody>
</table>

RATING OF PERCEIVED EXERTION (RPE)

Check the accuracy of your heart rate/target zone by comparing it to the scale below. A range of about 10-14 is appropriate for most pregnant women.

<table>
<thead>
<tr>
<th>RPE</th>
<th>HEART RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Very, very light</td>
</tr>
<tr>
<td>7</td>
<td>Very light</td>
</tr>
<tr>
<td>8</td>
<td>Somewhat light</td>
</tr>
<tr>
<td>9</td>
<td>Hard</td>
</tr>
<tr>
<td>10</td>
<td>Very hard</td>
</tr>
<tr>
<td>11</td>
<td>Very, very hard</td>
</tr>
<tr>
<td>12</td>
<td>Very hard</td>
</tr>
<tr>
<td>13</td>
<td>Somewhat hard</td>
</tr>
<tr>
<td>14</td>
<td>Hard</td>
</tr>
<tr>
<td>15</td>
<td>Very hard</td>
</tr>
<tr>
<td>16</td>
<td>Very, very hard</td>
</tr>
</tbody>
</table>

No changes permitted. Translation and reproduction in its entirety is encouraged.

The original PARmed-X for PREGNANCY was developed by L.A. Wolfe, Ph.D., Queen’s University. The muscular conditioning component was developed by M.P. Motola, Ph.D., University of Western Ontario. The document has been revised based on advice from an Expert Advisory Committee of the Canadian Society for Exercise Physiology chaired by Dr. N. Gidwani, with additional input from Drs. Wolfe and Motola, and Gregory A.L. Davies, M.D., FRSC(C) Department of Obstetrics and Gynaecology, Queen’s University, 2002.

Additional copies of the PARmed-X for PREGNANCY, the PARmed-X and the PAR-Q can be downloaded from: http://www.ospa.ca/par.htm.

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Disponible en français sous le titre «Examen médical sur l’aptitude à l’activité physique pour les femmes enceintes (X-AMP pour les femmes enceintes)».

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For more information contact the:

Canadian Society for Exercise Physiology
185 Somerset St. West, Suite 200, Ottawa, Ontario CANADA K2P 0J2
tel. 1-877-651-3755 FAX (613) 234-3585 www.ospa.ca
PARmed-X for PREGNANCY

PHYSICAL ACTIVITY READINESS MEDICAL EXAMINATION

Prescription for Muscular Conditioning

It is important to condition all major muscle groups during both prenatal and postnatal periods.

<table>
<thead>
<tr>
<th>WARM-UPS &amp; COOL DOWN: Range of Motion, neck, shoulder, griddle, back, arms, hips, knees, ankles, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static Stretching: all major muscle groups</td>
</tr>
<tr>
<td>(DO NOT OVER STRETCH)</td>
</tr>
</tbody>
</table>

**EXAMPLES OF MUSCULAR STRENGTHENING EXERCISES**

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>PURPOSE</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper back</td>
<td>Promotion of good posture</td>
<td>Shoulder shrugs, shoulder blade pinch</td>
</tr>
<tr>
<td>Lower back</td>
<td>Promotion of good posture</td>
<td>Modified standing opposite leg &amp; arm lift</td>
</tr>
<tr>
<td>Abdomen</td>
<td>Prevention of low back pain</td>
<td>Abdominal tightening, abdominal cut-ups, head raises lying on side or standing position</td>
</tr>
<tr>
<td>Pelvic floor</td>
<td>Prevention of urinary incontinence</td>
<td>&quot;Wave&quot; or &quot;elevator&quot;</td>
</tr>
<tr>
<td>Upper body</td>
<td>Improvement of respiratory function</td>
<td>Shoulder rotations, modified push-ups against a wall</td>
</tr>
<tr>
<td>Buttocks, lower limbs</td>
<td>Facilitation of weight-bearing, prevention of muscular imbalances</td>
<td>Buttocks squeezes, standing leg lifts, heel raises</td>
</tr>
</tbody>
</table>

**PRECAUTIONS FOR MUSCULAR CONDITIONING DURING PREGNANCY**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>EFFECTS OF PREGNANCY</th>
<th>EXERCISE MODIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Position</td>
<td>In the supine position (lying on the back), the enlarged uterus may either decrease the flow of blood returning from the lower half of the body or press on major veins (inferior vena cava) or it may decrease flow to a major artery (abdominal aorta)</td>
<td>Post 4 months of gestation, exercises normally done in the supine position should be altered; such exercises should be done side lying or standing</td>
</tr>
<tr>
<td>Joint Laxity</td>
<td>Ligaments become relaxed due to increasing hormone levels; joints may be prone to injury</td>
<td>Avoid rapid changes in direction and bouncing during exercises; stretching should be performed with controlled movements</td>
</tr>
<tr>
<td>Abdominal Muscles</td>
<td>Presence of a ripping (bulging) of connective tissue along the midline of the pregnant abdomen (diastasis recti) may be seen during abdominal exercise</td>
<td>Abdominal exercises are not recommended if diastasis recti develops</td>
</tr>
<tr>
<td>Posture</td>
<td>Increasing weight of enlarged breasts and uterus may cause a forward shift in the centre of gravity and may increase the arch in the lower back; this may also cause shoulders to slump forward</td>
<td>Emphasis on correct posture and neutral pelvic alignment. Neutral pelvic alignment is found by bending the knees, tuck shoulder blades apart, and aligning the pubis between accentuated lordosis and the posterior pelvic tilt position.</td>
</tr>
<tr>
<td>Precautions for Resistance Exercise</td>
<td>Emphasis must be placed on continuous breathing throughout exercise; exhale on exertion, inhale on relaxation using high repetitions and low weights; Valsalva Maneuver (holding breath while working against a resistance) causes a change in blood pressure and therefore should be avoided</td>
<td></td>
</tr>
</tbody>
</table>

PARmed-X for Pregnancy - Health Evaluation Form

(to be completed by patient and given to the prenatal fitness professional after obtaining medical clearance to exercise)

I. PLEASE PRINT (patient's name), have discussed my plans to participate in physical activity during my current pregnancy with my health care provider and I have obtained his/her approval to begin participation.

Signed: ____________________________

(patient's signature)

Date: ____________________________

Name of health care provider: ____________________________

Address: ____________________________

Telephone: ____________________________

HEALTH CARE PROVIDER'S COMMENTS:

(health care provider's signature)

http://www.csepx.ca/
Advice for Active Living During Pregnancy

Pregnancy is a time when women can make beneficial changes in their health habits to protect and promote the healthy development of their unborn babies. These changes include adopting improved eating habits, abstinence from smoking and alcohol intake, and participating in regular moderate physical activity. Since all of these changes can be carried over into the postnatal period and beyond, pregnancy is a very good time to adopt healthy lifestyle habits that are permanent by integrating physical activity with enjoyable healthy eating and a positive self and body image.

**Active Living:**
- see your doctor before increasing your activity level during pregnancy
- exercise regularly but don’t overexert
- exercise with a pregnant friend or join a prenatal exercise program
- follow FITT principles modified for pregnant women
- know safety considerations for exercise in pregnancy

**Healthy Eating:**
- the need for calories is higher (about 300 more per day) than before pregnancy
- follow Canada’s Food Guide to Healthy Eating and choose healthy foods from the following groups: whole grain or enriched bread or cereal, fruits and vegetables, milk and milk products, meat, fish, poultry and alternatives
- drink 6-8 glasses of fluid, including water, each day
- salt intake should not be restricted
- limit caffeine intake i.e., coffee, tea, chocolate, and cola drinks
- dieting to lose weight is not recommended during pregnancy

**Positive Self and Body Image:**
- remember that it is normal to gain weight during pregnancy
- accept that your body shape will change during pregnancy
- enjoy your pregnancy as a unique and meaningful experience

For more detailed information and advice about pre- and postnatal exercise, you may wish to obtain a copy of a booklet entitled *Active Living During Pregnancy: Physical Activity Guidelines for Mother and Baby* © 1999. Available from the Canadian Society for Exercise Physiology, 185 Somerset St. West, Suite 202, Ottawa, Ontario Canada K2P 0G2. Tel: 1-877-651-3755 Fax: (613) 234-3569 Email: info@csepi.ca (online: csepi.ca). Cost: $11.95

For more detailed information about the safety of exercise in pregnancy you may wish to obtain a copy of the Clinical Practice Guidelines of the Society of Obstetricians and Gynaecologists of Canada and Canadian Society for Exercise Physiology entitled *Exercise in Pregnancy and Postpartum* © 2003. Available from the Society of Obstetricians and Gynaecologists of Canada online at www.soeg.org

For more detailed information about pregnancy and childbirth you may wish to obtain a copy of *Healthy Beginnings: Your Handbook for Pregnancy and Birth* © 1990. Available from the Society of Obstetricians and Gynaecologists of Canada at 1-877-519-7999 (also available online at www.soeg.org) Cost $12.95.

For more detailed information on healthy eating during pregnancy, you may wish to obtain a copy of *Nutrition for a Healthy Pregnancy: National Guidelines for the Childbearing Years* © 1999. Available from Health Canada, Minister of Public Works and Government Services, Ottawa, Ontario Canada (also available online at www.hc-sc.gc.ca).
Fetal Response to Acute Exercise

- Normal fetal heart rate = 120-160 bpm
- Normal response of fetal heart rate to exercise
  - Increase of 10-30 bpm during and immediately after exercise
- Lowering of blood flow to uterus during exercise
  - Magnitude is related to intensity and duration
- Increase in maternal body temperature
- Maternal-fetal demands for glucose
  - Reduced blood glucose with prolonged exercise (>30 minutes)
    - 60 min in normal clients
Thermoregulation

- Heat dissipation to protect overheating of fetus:
  - Increase circulation to skin
  - Get rid of body heat through exhalation
- Start sweating sooner to protect mother and baby from overheating
  - Avoid exercise in warm or humid environment
  - Drink plenty of water before, during and after exercise
Potential Health Issues

Preeclampsia (PE)

- Characterized by maternal high blood pressure, proteinuria, and edema
- Risk factors:
  - Obesity, sedentary lifestyle, history of diabetes, family history of hypertension, depression/anxiety
- Regular PA participation during first 20 weeks resulted in reduction in risk of PE
Regular Physical Activity

Exercise as Therapy for Gestational Diabetes Mellitus (GDM):
- Physically active women have lowest prevalence of GDM
- Regular exercise in previously sedentary women shows promise for normalizing blood glucose levels
- Early diagnosis of women at risk of GDM (especially obese) and addition of structured PA may have promising results
Potential health issues

- **Diastasis Recti**
  - Incidence as high as 67%
  - Long term effects – abdominal wall pain, pelvic dysfunction, low back pain

- **Foot/leg pain**
  - Cramping beginning mainly in 2\(^{nd}\) and 3\(^{rd}\) trimester
  - No association between exercise and pregnancy-related complaints
Potential health issues

- Ligamentous laxity – labrum of hip and knee meniscus at increased risk of injury

- Nerve injury
  - Lower extremity nerve injury more result of labour/delivery
  - Upper extremity nerve injury result from repetitive/prolonged positioning of upper limb in childcare activities
Contraindications to Exercise

**Absolute Contraindications**
- Ruptured membranes
- Preterm labour
- Hypertensive disorders of pregnancy
- Incompetent cervix
- Growth restricted cervix
- High order multiple gestation (≥ triplets)
- Placenta previa after 28th week
- Persistent 2nd or 3rd trimester bleeding
- Uncontrolled Type I diabetes, thyroid disease, or other serious cardiovascular, respiratory or systemic disorder
Contraindications to Exercise

Relative Contraindications

- Previous spontaneous abortion
- Previous preterm baby
- Mild/moderate cardiovascular disorder
- Mild/moderate respiratory disorder
- Anemia
- Malnutrition or eating disorder
- Twin pregnancy after 28th week
- Other significant medical conditions
When and How to Start and Exercise Program

- Often best time to start is second trimester
  - Nausea, vomiting and fatigue of first trimester has passed, and before physical limitations of third trimester
- Women who have been previously active may continue their exercise regime throughout pregnancy using specific guidelines
Fitness Levels Prior to Pregnancy

- **Beginner**
  - Never worked out
  - Has not been consistent for a period of time

- **Intermediate**
  - Works out 2-4x/week consistently
  - Has been working out for at least 3 months prior

- **Advanced**
  - Works out 4+ days/week consistently
  - Athletic background
  - Has been working out for at least 6 months prior
Warm Up and Cool Down

- Make warm-up longer – 10-15min
- Include range of motion exercise and static stretching
- Important not to overstretch
- Use large muscle groups
Muscular Conditioning

- Some women may experience symptomatic hypotension from compression of vena cava.
- Important to avoid supine position after 14 weeks gestation.

Body Position
- In supine, enlarged uterus may decrease flow of blood returning from lower half of body as it presses on a major vein or may decrease flow to major artery.
- Ability to perform abdominal strengthening may be impeded by development of diastasis recti and associated abdominal muscle weakness.
- Exercises normally done in supine should be altered to side-lying, incline lying, or standing.
## Beginner Exercises

<table>
<thead>
<tr>
<th>Trimester</th>
<th>Instructions and Activities</th>
</tr>
</thead>
</table>
| **First Trimester**  | • Need to wait until 2\textsuperscript{nd} trimester to begin  
|                      | • Walking best choice  
|                      | • Do not overheat                                                                |
| **Second Trimester** | • 15-30min of mild to moderate aerobic exercise (adding 2-3min/wk)  
|                      | • 3-4 days per week  
|                      | • Non-weight bearing activities are best  
|                      | • Use light weights to build upper body strength and improve posture  
|                      | • Don’t lie supine after 14 weeks                                                  |
| **Third Trimester**  | • Intensity and duration should NOT be increased during this time  
|                      | • Most women naturally and gradually cut back  
|                      | • Maintain a regular schedule of 3-4x/week  
|                      | • Stay hydrated and eat prior to exercise                                            |
### Intermediate to Advanced Exercise

<table>
<thead>
<tr>
<th>First Trimester</th>
</tr>
</thead>
<tbody>
<tr>
<td>• In absence of complications, most active women can continue to exercise at close to same levels</td>
</tr>
<tr>
<td>• 3-4 days/week</td>
</tr>
<tr>
<td>• Stick to exercise that is familiar</td>
</tr>
<tr>
<td>• Listen to bodies</td>
</tr>
<tr>
<td>• Do not overheat</td>
</tr>
<tr>
<td>• Competitive training and events should be put on hold</td>
</tr>
<tr>
<td>• Weight training is safe if relatively low weight and moderate reps (12-15)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Trimester</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Good time to increase exercise slightly</td>
</tr>
<tr>
<td>• Participation in full range of activities is generally safe</td>
</tr>
<tr>
<td>• Contact sports should be avoided</td>
</tr>
<tr>
<td>• Weight training is safe (12-15 reps)</td>
</tr>
<tr>
<td>• After 14 weeks no supine exercise</td>
</tr>
<tr>
<td>• As weight and posture changes, avoid sudden changes in direction or explosive movements</td>
</tr>
</tbody>
</table>
| **Third Trimester** | • Slow down as continued weight and balance changes dictate  
• Non-weight bearing may be most comfortable in late pregnancy  
• Okay to decrease intensity and duration but not consistency  
• Try to maintain 3-4 days/week |
## General Exercise Prescription

| FREQUENCY      | Begin 3x/week  
<table>
<thead>
<tr>
<th></th>
<th>Progress to 4-5x/week</th>
</tr>
</thead>
</table>
| INTENSITY      | 12-14 on Borg Scale  
|                | Within target HR zone |
| TIME           | At least 15min  
|                | Gradually increase to 30min  
|                | 1-2 sets of 10-15 reps |
| TYPE           | Dynamic physical activities that use large muscle groups  
|                | Non weight-bearing or low-impact |
## Modified Target Heart Rate Zones

<table>
<thead>
<tr>
<th>Maternal Age</th>
<th>Target Heart Rate Zone (bpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 20</td>
<td>140-155</td>
</tr>
<tr>
<td>20-29</td>
<td>135-150</td>
</tr>
<tr>
<td>30-39</td>
<td>130-145</td>
</tr>
<tr>
<td>40 or greater</td>
<td>125-140</td>
</tr>
</tbody>
</table>
Aerobic Exercise

- Previously sedentary women should begin with 15 minutes of continuous exercise, 3 times per week
  - Increasing gradually to 30 minute sessions 4 times a week
- Activities should minimize risk of loss of balance and fetal trauma
- Choose exercises that cause less trauma to joints and ligaments and less bouncing
- Examples:
  - Brisk walking, stationary cycling, swimming and aquafit
Goals of Aerobic Exercise

- Maintain good fitness level throughout pregnancy
- Elite athletes who continue to train require supervision
Muscular Conditioning

Purpose: to promote good posture

- Abdominals
  - Prevent low back pain
  - Prevent diastasis recti
  - Strengthen muscles for labour

- Pelvic Floor
  - Promote good bladder control

- Upper Body
  - Improve muscular support for good posture

- Glutes and Lower Body
  - Facilitate weight bearing
  - Prevent varicose veins
Precautions for Muscular Conditioning

- Emphasis must be placed on continuous breathing throughout exercise.
- Exhale on exertion, inhale on relaxation using high repetitions and low weights.
- Valsalva maneuver causes a change in blood pressure and should be avoided.
Abdominal Muscles

- Presence of rippling (bulging) of connective tissue along the midline of the pregnant abdomen (diastasis recti) may be seen during abdominal exercises.
- Abdominal exercises are not recommended if diastasis recti develops.
Outcomes of Exercise in Pregnancy

- Exercising does not make labour shorter or easier
  - Will increase endurance and stamina
Summary - Goals of Exercise Program

- Reduce stress
- Keep heart, mind and body healthy
- Stay fit and gain the right amount of weight
- Ease some discomforts during pregnancy
- Reduce risk of developing conditions associated with pregnancy
  - Hypertension, gestational diabetes, preeclampsia
Summary of Recommendations

1. All women without contraindications should be encouraged to participate in aerobic and strength-conditioning exercises as part of a healthy lifestyle during their pregnancy.

2. Reasonable goals of aerobic conditioning in pregnancy should be to maintain a good fitness level throughout without trying to reach peak fitness.

3. Women should choose activities that minimize the risk of loss of balance and fetal trauma.
Summary of Recommendations

4. Women should be advised that adverse pregnancy or neonatal outcomes are not increased for exercising women.

5. Initiation of pelvic floor exercises in the immediate postpartum period may reduce risk of future urinary incontinence.

6. Women should be advised that moderate exercise during lactation does not affect the quantity or composition of breast milk or impact infant growth.
Benefits of Exercise After Pregnancy

- Promote weight loss
- Improve cardiovascular fitness
- Restore muscle strength
- Boost energy level
- Improve mood
- Relieve stress
- Help prevent and promote recovery from postpartum depression
Exercise in Postpartum

- Exercise generally may begin 4-6 weeks after delivery.
- Deconditioning typically occurs during initial postpartum period, it is important to gradually increase physical activity levels.
- Initiation of pelvic floor exercises in immediate postpartum period may reduce risk of future urinary incontinence.
Postpartum Exercise Considerations

Risk of Hemorrhage:

- Normal bleeding just after childbirth is primarily from open blood vessels in the uterus, where the placenta was attached.
- As the placenta begins to separate, these vessels bleed into the uterus.
- After the placenta is delivered, the uterus usually continues to contract, closing off these blood vessels.
What is Diastasis Recti (DR)

- DR is the resulting separation of the rectus abdominis muscles bellies, as the line alba becomes stretched and lax. The most common cause of diastasis recti is pregnancy, although it can be seen in men and children too.
What is Diastasis Recti (DR)

- It’s commonly thought that DR has an inter-recti distance (IRD) of at least two finger widths, although it’s common to be as wide as 5-6 finger-widths, or even wider.
Why is Diastasis Recti Important

- The separated muscles and linea alba do not offer support. Limited support can lead to imbalanced muscle tone and postural deficiencies which can lead to further problems.
- If not corrected, clients will eventually find a way to compensate and use other muscles (e.g. hip flexors) to stabilize their pelvis.
- If DR is left untreated, clients may develop low back pain.
Checking For Diastasis Recti

- **Step 1**: Client is in a supine, crook lying position, preferably on a treatment table.
- **Step 2**: Relax the abdominals and glutes.
- **Step 3**: Firmly press 2-3 fingers just above belly button with the fingers and hand running vertically along the linea alba. Fingertips are facing the head.
Checking For Diastasis Recti

- **Step 4:** Ask your client to tuck their chin towards the chest and slowly lift their head off the table until you feel the sides of the muscle bellies just start to pull together. Have them repeat this 2-3 times to get an accurate measurement. You may need to add or takeaway fingers (or hands) to get the appropriate width. Mark down how many fingers wide the IRD (inter-recti distance) is.
Checking For Diastasis Recti

- **Step 5:** In this position, see how far into the belly you can press your fingers down. This will tell you how overstretched the connective tissue is. Take note if the connective tissue feels really shallow and taut or if you can press your fingers into the belly quite far.

- **Step 6:** Repeat Steps 4 & 5, 1.5-2 inches above and below the belly button.
Checking For Diastasis Recti

- **Step 7:** Repeat the assessment at the belly button, below the belly button, and above the belly button. This time, instruct your client to exhale and brace their abdominal muscles before they lift their head. Record if there are differences in the feeling of the connection tissue or in the IRD.

- In a well functioning core, you will feel tension in the linea alba when your client does their head lift and abdominal brace. In a diastasis that still requires healing, you will feel the linea alba stay lax with the head lift and abdominal brace.
Other Things to Consider with DR

- DR will cause abdominal and pelvis dysfunctions. Your client may be in the habit of compensating causing more muscle imbalances and altered body positions.

- Focus on neutral spine alignment in standing, seated, and supine exercises and in daily life tasks. For example, proper body mechanics and core bracing should be used when picking the baby up from a crib.
What To Do

- When selecting exercises choose ones that keep the pressure off the DR as possible.
  - Teach neutral spine alignment
  - Focus on abdominal activation
  - Use pelvic floor activation and relaxation
  - Focus on heel slides, deadbug variations, side planking and Pallof pressing.
Avoid:

- crunches, sit-ups, front loaded exercises (bird dogs, front planks), and any exercise where the client is forward flexed and can’t create enough tension to hold the abdominals tight (e.g., conventional deadlifts).

- Focus on quality of exercise, not quantity.
Indicated exercises for Diastasis Recti
Diaphragmatic Breathing

Neutral Position
Beginner Dead Bug  Stabilization Hip Flexion
Stabilization ABD/ER

Leg Slide
Leg/Arm Slide  

Dead Bug
Leg Lowering

Leg Circles
ABD/ER

Core Stability, Lower One Leg
Dead Bug with Band

Dead Bug Holding a Ball
Foam Roller Heel Slide

Foam Roller Heel Slide + Abduction
Single Leg Raise with Ball
Side Plank Knees Bent

Side Plank Leg Raise
Modified Side Plank Single Leg Raise

Side Plank + Abduction
Side Plank Knee + Abduction

Stabilization Side Plank
Side plank - variations

Side Plank

Side Plank, Hip Abduction
Modified side plank for painful shoulders

Quadratus Lumborum
Side Kneeling Pallof Press  Cable Kneeling Pallof Press
Side Pallof Press

Cable Pallof Press
Stir The Pot
Contraindicated exercises for Diastasis Recti
Mini Crunch
Partial Crunches
Isometric Trunk Flexion Hold

Abdominal Crunch on Ball
Bird Dog

Plank on Knees
Deadlift with Alternating Rows
More to consider

- There may be something more serious going on in addition to the DR (prolapsed uterus, rectum, or bladder). This requires more attention and a Doctor referral. Referrals to a pelvic floor physiotherapist may be necessary in many cases. In addition to the weak abdominal muscles there may be muscles in the pelvic floor that are under spasm. A pelvic floor physiotherapist will be able to assess this and start to treat.
Relaxin

- Will stay in a women’s body for up to 6 months after giving birth
- Will begin to slowly be flushed out of body and ligaments will begin to tighten up to stabilize joints
- Important consideration when working with clients and getting them back into exercising after pregnancy
Pubic Symphysis Diastasis

- Starting from the 7th month of pregnancy a widening of the sacroiliac joint and pubic symphysis occurs.
- Common symptoms: acute and persistent pain in the pelvic area postpartum.
- High amount of hip pain 4-6 months after delivery.
Exercise and Breastfeeding

- Exercise does not negatively affect milk production or composition
  - Lactic acid has been shown to be increased in the breast milk of women exercising at maximal intensity but not at a moderate level
- Growth of breastfed babies in exercising women is normal
- Energy needs increase 500kcal for breastfeeding mother of infant less than 6 months old
- Feeding prior to or 1 hour post-exercise is suggested
Further Reading

Active Living During Pregnancy: Physical Activity Guidelines for Mother and Baby

Nutrition for a Healthy Pregnancy: National Guidelines for the Childbearing Years

Healthy Beginnings: Your Handbook for Pregnancy and Birth
E-mail: Kathiesharkeyrkin@gmail.com
Thank you
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- Exercise pictures – physiotec.ca