



Systemic effects to exercise

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Disposition

- Exercise in historical perspective
- Metabolic milieu in muscle – why do muscles get weak?
- Specific exercise programs and effects on:
 - Disability and quality of life (QoL)
 - Disease activity and inflammation
 - Effects in muscle tissue

Exercise in historical perspective

- Discouraged from active exercise
- Passive / active ROM exercise
- Isometric muscle exercise in low disease activity
- First case studies evaluating exercise in adult PM and DM – 1993 (*Escalante et al. J Rheumatol 1993;20:1340-4, Hicks et al. J Rheumatol 1993;20:1399-401*)

Metabolic milieu in muscle

- Lactate is produced as a product of energy consumption in the muscle (the mitochondria).
- Reduced aerobic capacity in muscles?
 - Reduced or normal lactate levels after exercise? – Lactate is produced in muscle when waste products are not transported away...
- Other factors that could contribute to muscle weakness:
 - Lower levels of phospho creatine in rest and during exercise,
 - Lower numbers of capillaries, swollen capillaries expression pro-inflammatory cytokine interleukin 1
 - Corticosteroid treatment – breaks down muscle tissue
 - Inactivity
 - Inflammation

A home exercise program if you:

- ...recently was diagnosed with PM or DM
- ...go into a flare in PM or DM
- ...if you haven't exercised for a long time or never before

Home exercise program – recent diagnosis, flare



1. Warm-up



2. Shoulder mobility



3. Grip strength



4. Strength knee extensors



5. Strength shoulders



6. Strength hip extensors



8. Strength hip flexors



7. Strength neck flexors and trunk

- Improved muscle function and health (Physical, Pain, Fatigue) without increased muscle Inflammation
- Signs of reduced inflammation in patients with low disease activity

How to use the home exercise program?

- Get started with a physical therapist if possible.
- Start with about 10 repetitions of each exercise. Your perceived exertion should initially not exceed 3-4 (Borg CR-10 scale), 0-10. If needed, add extra weights using weight cuffs or rubber bands. With improved muscle function and lower disease activity you should exercise on an intensity corresponding to 5-7.
- Short exercise sessions of 15-20 minutes with additional 20-minute walks five days a week during first 12 weeks
- Be sure to flex between exercising upper- and lower limbs (For example: don't do all upper limb tasks in a row, but rather perform according to the sequence on the previous slide.



Borg CR-10 scale – to rate perceived exertion

0	No exertion
0.5	Extremely weak (light)
1	Very light
2	Light
3	Moderate
4	Somewhat strong
5	Strong (heavy)
6	
7	Very strong
8	
9	
10	Extremely strong (almost maximal)
•	Maximal

To rate your perceived exertion after an exercise session, just register the number that you feel best represents your experience

Lower number correspond to lower exertion, while higher number describes a higher level of exertion

The anchor words are there to help, and you can always use numbers without an anchor word.

For example: a 6 corresponds to an experience of exertion that is stronger than a 5, but not exerting enough to be described as a 7.

When to start?

- Recent diagnosis: After about 4 weeks following introduction of corticosteroid treatment. You and your rheumatologist should see some clinical signs of improvement before starting.
- Be sure to assess muscle function and aerobic capacity before starting and then follow-up after about three months. With improvement progress intensity or try other types of exercise, such as
 - Aquatic training
 - Gym exercises
 - Nordic walking or biking
 - Any exercise that you enjoy

Frequent walking

- To improve aerobic capacity you should walk or do other aerobic physical activity at least 20-30 minutes at least 2-3 days a week on an intensity of 50-70% of your maximal heart rate.
- You can calculate your estimated maximal heart rate: $220 - \text{age}$ and then you can calculate on which range of heart rate you need to be to improve aerobic capacity.
- Example: I am 45 years old: $220 - 45 = 175$ (my estimated maximal heart rate). Then I need to calculate my range of heart rate for exercise session: $175 \times 0.5 = 87.5$ and $175 \times 0.7 = 122.5$ (my heart rate range during exercise should be: 87.5 – 122.5).
- Check your heart rate manually or by using heart rate monitor

Effects of easy to moderate home exercise

- Improved muscle function and aerobic capacity
 - No difference between the home exercise and medical treatment group and the ROM exercise and medical treatment group.
 - Getting started early on led to increased physical activity levels compared to the group that started after 24 weeks.
- No signs of increased muscle inflammation or disease activity
 - CK levels, muscle biopsy and MRI
- Well tolerated – OK to divide the program in two

The following program can be applied when:

- You have low disease activity, lower corticosteroid doses. Stable phase of disease

- This program is contraindicated if:
 - You have severe osteoporosis and have experienced fractures
 - If you have corticosteroid dose exceeding about 20 mg/day
 - If you have severe arthritis

Intensive resistance training in low-active adult PM and DM



Deltoids



Quadriceps



Lat dorsi/biceps

3 sets of 10 repetitions
on 10 voluntary repetition
maximum
(the weight you can lift
10 times but not 11, 70% of
Maximal strength)



Gastrocnemius



Trunk/neck

12 weeks of exercise 3d/week

- Improves muscle strength and endurance
- Reduces disease activity and inflammation

(Alexanderson et al. *Arthritis Rheum* 2007;57:768-77)

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How to get started and apply resistance?

- Get started under supervision of PT if possible
- Start on lower loads allowing 20 VRM (=20 repetitions, about 50% of maximal strength)
- Always warm-up before exercising and don't forget to stretch!
- To achieve effect on muscle function you have to exercise at least 2 days a week (not 2 days in a row) and eventually reach the goal intensity of 10 voluntary repetitions maximum (70% of max)
- It is normal to experience muscle soreness a couple of days after exercise (especially in the beginning or after increasing loads)
- During exercise you should not exceed perceived exertion of 7 on the Borg CR-10 scale and you should always be able to be active during the rest of the day
- Joint pain during exercise does not mean that the loads are too high, however, use lower loads if joints tend to swollen and be painful after exercise.
- As long as you feel that you get stronger and healthier, continue. If you don't experience improvements or get weaker, contact your PT or rheumatologist.

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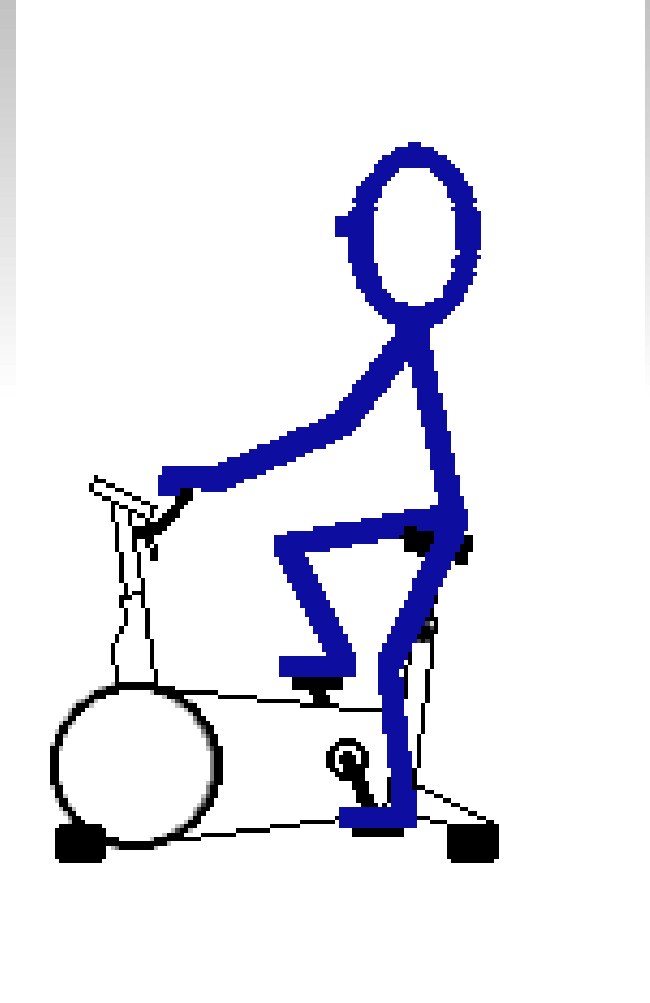
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Aerobic exercise if you have low disease activity

- Has shown even better results on muscle function and disease activity than the previously presented resistance training program

evaluated in randomized controlled trial comparing this exercise program to a non-exercising control group on a stable level of physical activity

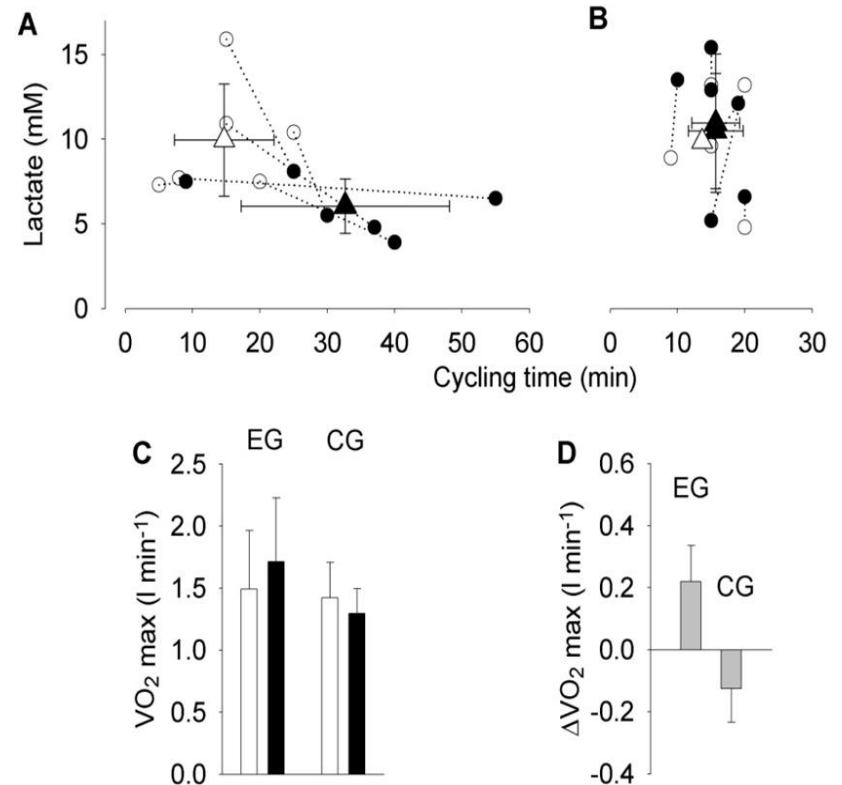
- **Exercise program**
- 3 times/ w, 12 weeks
- 30 min cycling (load of 70 % of VO_2 max)
- 20 min muscle endurance (30-40 % of 1VRM)



© Name photograph

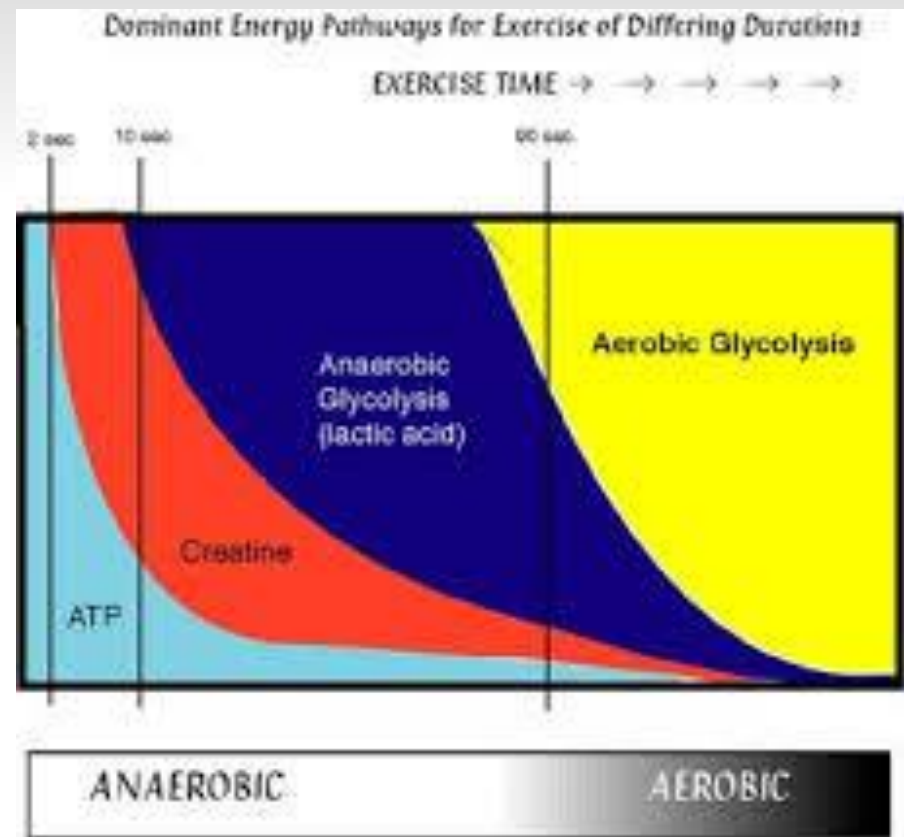
This program can:

- Improve whole-body aerobic capacity
- Improve aerobic capacity in muscle by:
 - Reduce lactate levels in muscle and improve mitochondria function and increase numbers of capillaries in muscle
- Improve muscle strength and endurance
- Improve ability to perform daily activities
- Improve quality of life (physical function, general health and vitality (fatigue))
- Reduce disease activity and inflammation



Creatine supplementation AND exercise in myositis

- Phosphocreatine (Pcr) is an important part of the muscle glycolytic (anaerob) metabolism
- Individuals with DM are reported to have low levels of Pcr
- Pcr is most important in the muscle energy system during the first seconds of exercise, but is still used to continue muscle contractions up to 2 minutes
- Five months creatine supplements combined with regular exercise (like home exercise) is more effective than exercise alone in established PM/DM.
- Talk to your rheumatologist before starting



Creatine dose

- Introduce creatine in addition to 2-3 days a week exercise
 - Could be any kind of resistance training alone or combined resistance and aerobic exercise
- Loading dose of 8 grams / day for 3 days
- Continue with a maintenance dose of 3 grams / day for 3 months
- Take a 4-week break from creatine and continue to exercise
- Start again with the maintenance dose for another 3 months and continue this cycle
- Creatine supplements can **ONLY** have positive effects on muscle function in combination with exercise
- If you don't exercise regularly – **DON'T** take creatine supplementations!

Home exercise for IBM

- This program can be performed by individuals with IBM with various disease duration. Can be adapted further if you can not walk or stand up. (see presentation slides presented on Saturday Sep 6, 4 PM)

Exercises	Preintervention	Postintervention
1. Whole body		
Sitting to standing (from standard height chair with arms)	3 sets of 6/day	3 sets of 10/day
2. Upper limbs		
Biceps curls*	2 sets of 10/arm/day	2 sets of 10/arm/day
Shoulder presses*		
Seated rowing (Thera-Band)		
Wrist flexion/extension*		
3. Lower limbs		
Calf raises (on tiptoe)		1 minute 2/day
Calf stretches (against wall)		15-20 seconds 3/day
Vastus medialis (isometric)		
Ankle dorsiflexion		2 sets of 20/day
*Holding a 375-g can of food in each hand.		

Exercised performed twice a day for 16 weeks

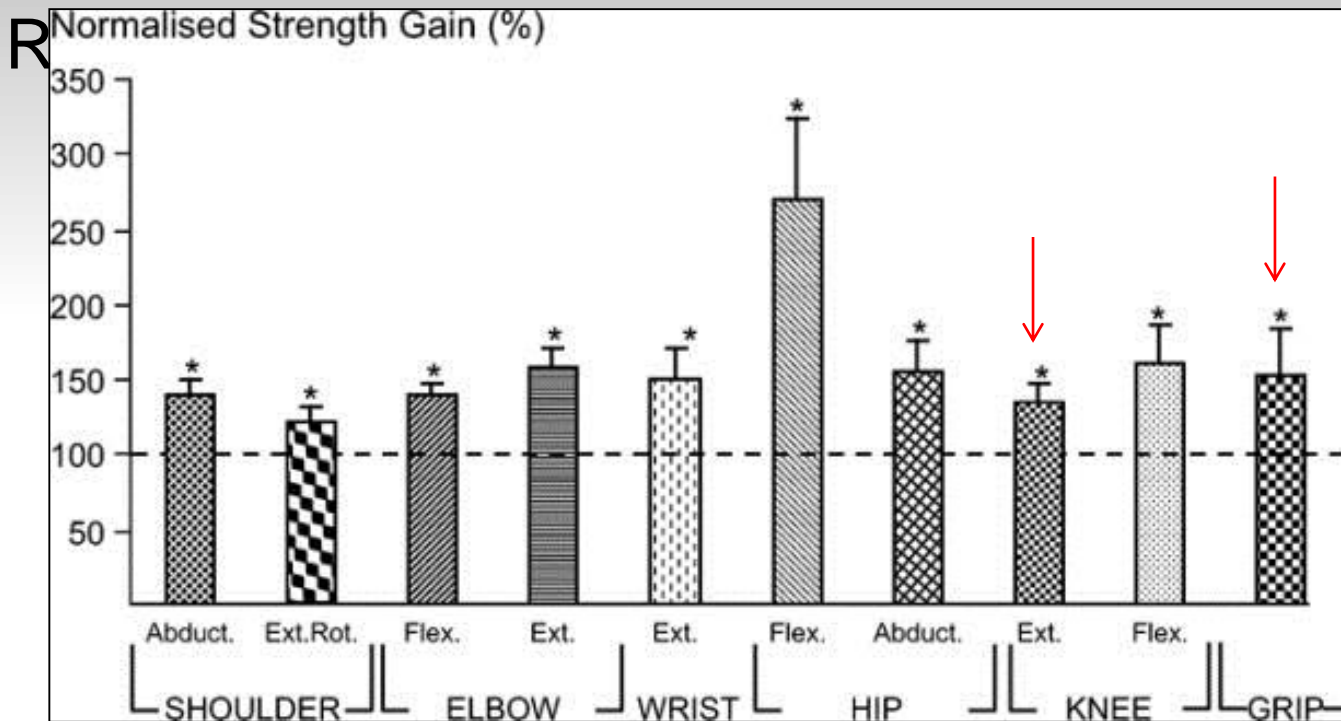
(Johnson et al. Muscle Nerve 2007;20:1242-48).

This program can improve

- Muscle strength
- Ability to stand up from sitting
- Walking ability



Improved muscle strength in IBM after home exercise



Mean percentage change in patients (n = 7) muscle strength following the exercise intervention when compared to pre-intervention strength levels normalized to 100%.

*P > 0.05

(Johnson et al. Muscle Nerve 2007;20:1242-48).

Health benefits from regular physical activity

- Strong association between aerobic capacity and health! Both in healthy and in myositis
- Regular physical activity and exercise can:
 - Improve quality of life
 - Reduce risk of type II diabetes, osteoporosis and cardiovascular disease
 - Reduce high blood pressure
- Important as individuals with inflammatory rheumatic diseases are at higher risk of developing cardio-vascular disease



Take home message

- Exercise should be designed individually and adapted to disease activity and disability with regular follow-up during active disease
- Active progressive exercise should be recommended to patients in all stages of disease – better to do something rather than nothing
- Exercise should be able to be incorporated in your daily life
- Regular physical activity

Thank you for listening!



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