



New approaches to exercise

Thursday Sep 4, 3 pm

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Disposition

- Clinical assessment
- Exercise definitions
- Exercise in historical perspective

- Metabolic milieu in muscle – why do muscles get weak?

- Effects of exercise in IIM
 - Disability and quality of life (QoL)
 - Disease activity and inflammation
 - Molecular effects in muscle tissue

Function and disability in myositis

- In the literature:
 - Muscle weakness, reduced muscle endurance
 - Reduced aerobic capacity, dyspnea
 - Skin rash
 - (pain and fatigue)
 - Limitations in daily life and quality of life
- Patients' experiences:
 - Muscle weakness and reduced muscle endurance
 - Pain
 - Fatigue
 - Cognitive impairment

Clinical assessment

- Impairment

- 6-item core set of disease activity measures: Physician's/patients global assessment, MMT, HAQ, muscle enzymes, extra-muscular disease activity/damage (MITAX/MYOACT/MDI) (*Miller et al. Rheumatology 2001;40:1262-73*)

- **Minimal clinical improvement criteria:**

Improving in 3 by 20%, deteriorating in no more than 2 by 25% (not including MMT) (*Rider et al, 2004*)

- Muscle strength: MMT, Myometer, Computerized system, CMAS (*Huber et al. Arthritis Rheum 2004;50:1595-1603*)
- Muscle endurance: Functional Index 2 (*Alexanderson et al. Arthritis Rheum 2006;55:114-22*)
- Maximal / Submaximal oxygen uptake

Measures of physical capacity

- Manual muscle test (maximal muscle strength)



- Handheld myometer



- Biodex (muscle strength or muscle endurance)



- Functional Index 2 (muscle endurance)



- Walking tests: 30-meter test, 15-meter test, 6-minute walking test

Measures of physical capacity (Cont)

- Timed-up and Go Test



- Timed Stands test and Sit-to-stand test



- Maximal oxygen uptake test
- Sub-maximal oxygen uptake test

Limitations of daily living and quality of life

- Health Assessment Questionnaire
 - Dressing/grooming, eating and prepare a meal, reaching/gripping, Walking...

- Myositis Activities Profile
 - Movement, Moving around, Personal hygiene, Domestic activities
 - Social activities, Avoid over exertion, Work, Leisure activities

- SF-36
 - Physical functioning, Role-physical, Bodily pain, General health, Vitality, Role emotional and Mental health.

Visual analogue scales / numerical scales

- Pain
- Fatigue
- Disease activity

No
symptom



Worst
symptom

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*)

Exercise studies in adult IIM

- 17 published studies have evaluated safety and/or effects of exercise in patients with adult PM, DM, IBM
 - 2 RCT + (3 ongoing)
 - 1 Controlled
 - 1 repeated measures design
 - 8 open studies
 - 3 case reports

(Habers and Takken. Rheumatology 2011;50:2113-24)

- Although small studies they all support safety of exercise with improvements in disability

Metabolic milieu in muscle

- Lactate is produced as a product of energy consumption in the muscle engines (the mitochondria).
- One study showed that individuals with established PM/DM had abnormally high lactate levels in blood following an incremental exercise bout compared to healthy controls indicating lower aerobic capacity locally in the muscle.
- Another study showed that there was no difference in lactate levels locally in muscle after an incremental exercise bout compared to healthy controls, but that the group of patients had markedly lower exercise capacity and whole-body aerobic capacity.
- Other factors contributing to muscle weakness could be: Lower levels of fospo creatine in rest and during exercise, lower numbers of capillaries, swollen capillaries expression pro-inflammatory cytokine interleukin 1. Muscle fibers abnormally express major histocompatibility complex which potentially can hamper muscle fiber contractility.

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.



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

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



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

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

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

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.

Aerobic exercise if you have low disease activity

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

Aerobic and endurance exercise

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

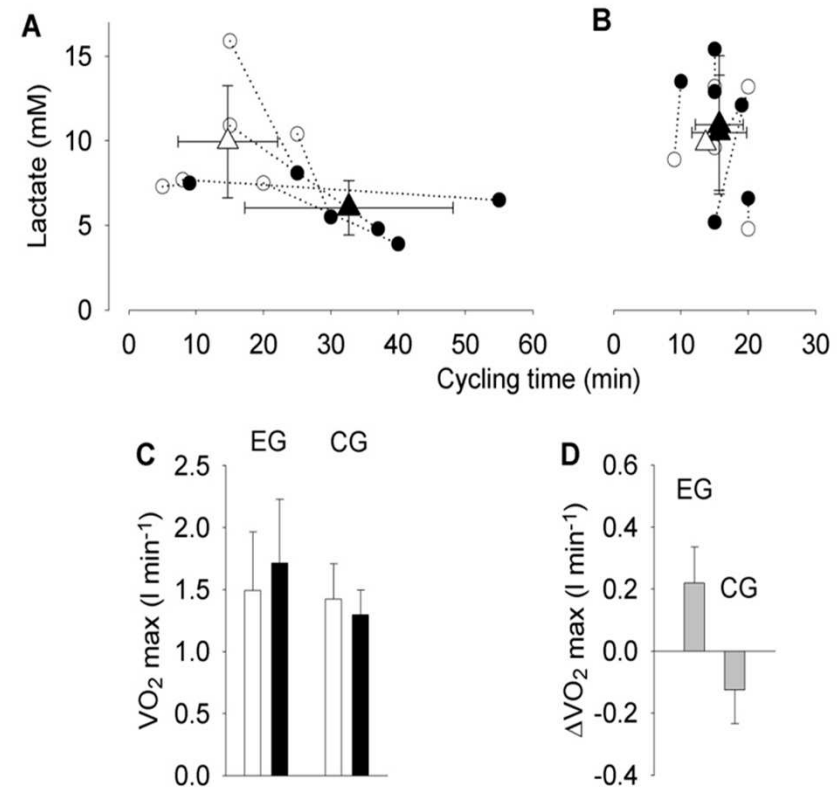
- **Exercise program**
- 3 times/ w, 12 weeks
- 30 min cycling (load of 70 % of VO_2 max)
- 20 min muscle endurance (30-40 % of 1VRM)



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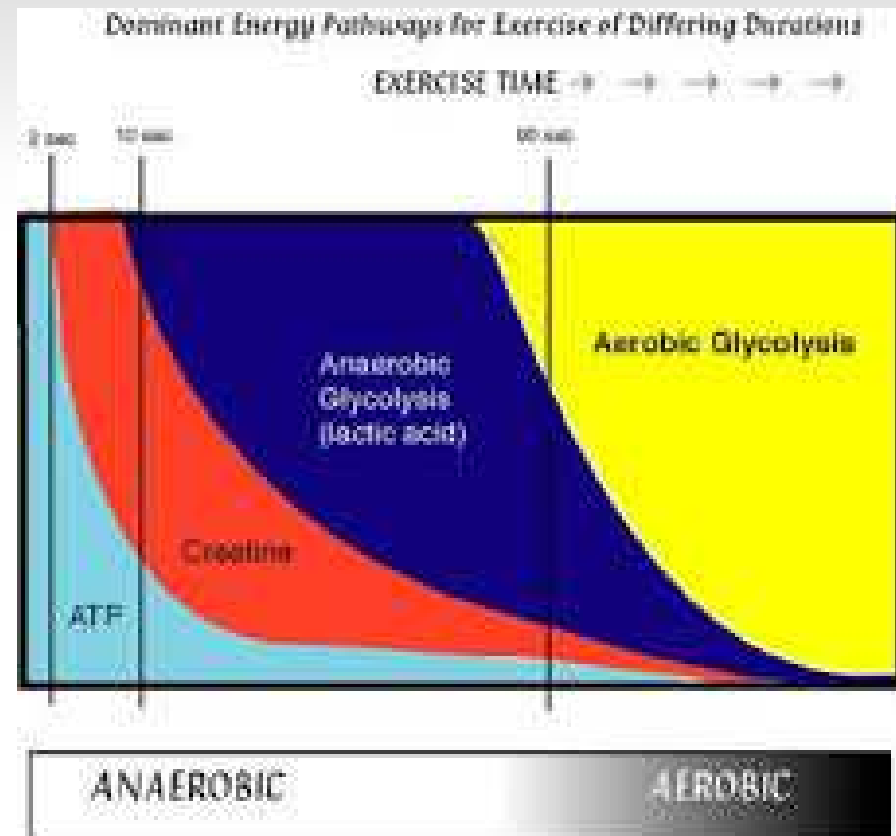
This program can:

- Improve whole-body aerobic capacity
- 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 comined 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.		

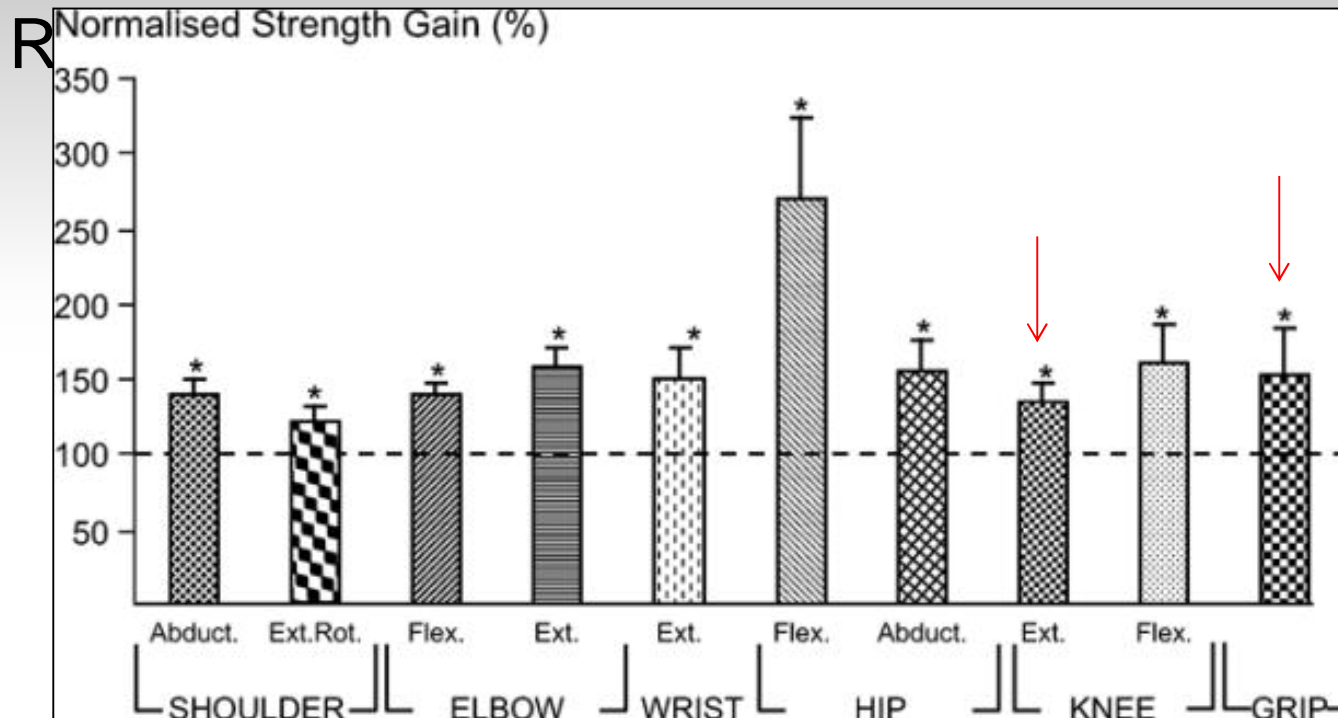
Exercises performed twice a day for 16 weeks

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

This program can improve

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





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).

Open study including 7 individuals with IBM

- **Exercise program**
- 3 times/ w, 12 weeks
- 30 min cycling (load of 80 % of VO_2 max)
- Combination with IBM home exercise program

Can improve your aerobic capacity



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Recommendations for physical activity and exercise for healthy and chronic health conditions – including myositis

	Frequency Times / week	Duration of exercise bouts Minutes	Intensity % of VRM	Intensity % of age predicted maximal heart rate
Increase muscle strength	2-3	-	60-80	-
Increase muscle endurance	2-3	-	30-40	-
Increase aerobic capacity	3	30-60		60-85
Improve / maintain health	4-7	30	-	50-70

(Garber et al (American College of Sports Medicine). *Med Sci Sports Exerc* 2011;43:1334-59, Kohrt et al. (American College of Sports Medicine). *Med Sci Sports Exerc* 2004;36:1985-96, Colberg et al (American College of Sports Medicine). *Diabetes Care* 2010;33:2612-6, Stenström CH and Minor MA. *Arthritis Care Res* 2003;49:428-34)

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!



Stockholm, Sweden