

The Masters Athlete and The Disabled Athlete

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Overview

- Define masters athlete
- Review of physiology of aging
- Identify pertinent sport restrictions as guided by screening
- Focus attention to proper exercise
- Discuss clearance issues for injury
- Educate athletes to avoid future injury
- Discuss common injury for the disabled athlete

The Masters Athlete

- Growing aging population “Baby Boomers”
- National Senior Games (>50 yr)
 - 1987: 2,500 participants
 - 2013: 10,881 participants
- NYC Marathon
 - 1983 → 1999: 119% increase
 - 1987 winner: Priscilla Welch (42y)
- 1994 Eamonn Coghlan runs 1st sub 4 min mile (41y)
- 2005 Kozo Haraguchi world rec 100m 22.04s (95y)

The Aging Population

- National Health Interview Survey
 - 23% adult exercise ≥ 30 min daily, 3x weekly
 - 29% adults 65y + completely sedentary
- Sedentary persons
 - 65-75y young old
 - 75-85y middle old
 - 85y+ very old
- Chronically ill: 50-64y

Defining the Masters Athlete

- Age 35
- World Masters Athletics: international events & standards for age
 - Swimmers 18y
 - Track & Field 35y
 - Golf 50y
- Newcomers to sport & exercise
- Prior competitive, prominent career
- Return to sport after inactivity / wkend warrior
- Compete against self & others

Balancing Goals

Athlete

- Competition
 - Others
 - Clock
 - Younger self
 - Younger competitors
- Improve fitness/performance
- Personal achievement
- Team atmosphere
- Independence
- Quality of life

Physician

- Benefits of continued exercise¹
 - ↓ CV, Obesity, DM Risk
 - ↑ BMD
 - ↓ Fall risk ↑ Strength
 - ↓ Dementia & Depression
 - ↑ Self-esteem ↓ Anxiety
- Educate natural physiology
- Realistically refine goals
- Maintain competitive spirit
- Exercise prescription

Physical Fitness Benefits

- Improved physical / mental health
- Enhancement of brain function and cognition¹
 - Increased blood and oxygen flow to the brain²
 - Increased norepi and endorphins, improved mood^{3,4,5}
 - Increased GF encourage synaptic plasticity⁶

1 Hillman Nat Rev Neurosci 2008, 2 Jorgensen Exer and Circ 2000, 3 Fleshner Int J Sports Med

2000, 4 Winter Neuro Learn Mem 2007, 5 Yeung J Psychosom 2006, 6 van Praag 1999

Physiology of Aging

- VO_2max : peak aerobic power
- Natural decline in peak O_2 transport at 50yr (5-10% per decade)
- Progressive inactivity, $\uparrow$ body fat & deconditioning
- Sarcopenia $\uparrow$
 - $\downarrow$ muscle performance: late 30s
 - Endurance & sprinting $\downarrow$ 75% of peak performance 60-70y
- Loss of Type II Muscle fibers
- Slow decline with maintaining activity

Pre-participation Screening

- Hypertension
- Cardiovascular Screening
- Heat illness
- Bone mineral strength
- Diet / nutrition
- Cardiovascular exercise
- Weight training
- Osteoarthritis
- Joint Replacement

General Physical Exam

- Routine Snellen Testing – vision loss
- Screen for DM, Anemia, Renal disease
 - BMP, HbA1C, CBC, Iron studies

Contraindications to exercise in the elderly

Acute febrile illness

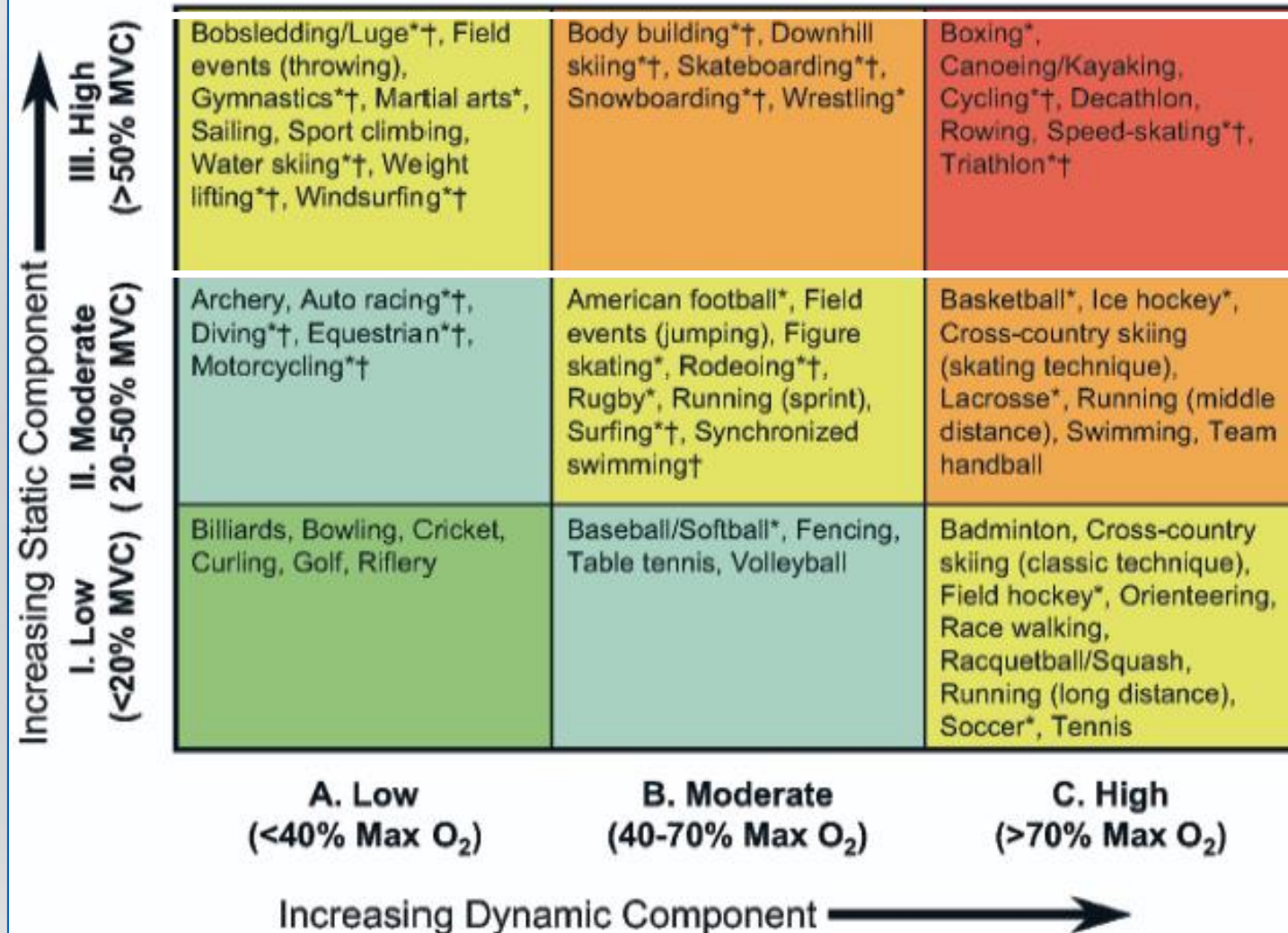
Acute unstable chest pain

Uncontrolled diabetes, hypertension, asthma, congestive heart failure, severe aortic stenosis

New falls, musculoskeletal pain

Hypertension

- Correct cuff size & Multiple measurements (3)
- Consider medications
 - Cold / Allergy meds
 - Caffeine, EtOH use
 - Steroids / PES
- Moderate - Severe Hypertension
 - Restrict from highly static (isometric) sports
 - Avoid heavy weight lifting, power lifting
 - Large intramuscular forces : $\uparrow$ Systolic, Diastolic & MAP
 - OK to return to exercise once BP improves, follow q2 mo
- Restrict if resting
 - systolic $\geq 200\text{mmHg}$
 - diastolic $\geq 115\text{mmHg}$



CV Screening

- CAD m/c cause sudden cardiac death athletes $\geq 40y^{1,2}$
- Unaccustomed vigorous activity > less intense activity
- Cardiac history:
 - Exertion related syncope, chest pain
 - Palpitations
 - BP, cholesterol, murmur, cardiomyopathy
 - EKG, echo
 - FHx: Heart prob <50yo, Marfans, Sudden death
- Cardiac PE:
 - Auscultate rate, rhythm, murmur
 - Assess changes sitting, supine, standing, squatted
 - Pulses

CV Screening

- EKG all ≥ 40 y
- ECG exercise testing:
 - Men ≥ 40 y and Women ≥ 50 y with 1 cardiac risk factor: Dyslipidemia, HTN, Tobacco use, DM, Hx MI/SCD < 60 yo
 - ≥ 65 y low risk
 - ≥ 60 y symptomatic CAD
- Echo:
 - Documented CAD
 - Inducible ischemia

CV Restrictions

- Restrict high-intensity sports
 - LV EF $\leq$ 50%
 - Exercise-induced myocardial ischemia
 - Ventricular arrhythmia
 - Systolic hypotension

Diabetic Athlete

- ↑ frequency of BG check & carb correction before, during & after
- Decrease insulin requirements
- Alert team, hypoglycemic plan
- Peripheral Neuropathy: proper footwear
- Nephropathy: BP $\leq$ 200 mmHg
- Retinopathy: avoid rapid ↑BP (static exercises)

Heat Illness and Elderly

- INCREASED:

- Time to acclimate
- Excretion urinary water
- Sweat threshold

- DECREASED:

- Sweat Capacity
- Ability to maintain thermostasis at temp extremes
- Cutaneous vasodilation
- Thirst drive

Heat Illness

- Cause: heat retention
 - Undue physical exertion
 - Insufficient recovery between exercise
 - Inappropriate clothing/uniforms/protective equipment
- Preventable
 - Avoid participation if recently ill
 - Closely monitor s/s heat illness
- Modify activity if humid
- Increase hydration if history of heat illness
- Longer rest tournament play

Heat Illness



- Educate
 - Pre-Event: 16-20 oz 2-3hr then 8-10 oz 10-20 min
 - During Game: every 20 min / Event Thirsty
 - Post: Until urine clear & replace over 2 hr
 - Thirsty = drink
 - Don't restrict fluids, salt
 - Water is best fluid to drink, no calories!
 - Extra water breaks
- Acclimation period 10-14 days
- Teach s/s of dehydration, heat illness, heat stroke

Nutritional Requirements

- ↓ resting metabolic rate, energy expenditure and lean body mass
- ↑ protein while maintaining carb:fat ratio
- ↓ ability to syn Vit D, abs Ca^{+2} and Vit B₁₂
 - Supplementation Vit D 2000IU/day
 - Ca^{+2} 1500 mg/day
 - 1.5 x RDA B₁₂
- Eat throughout the day with snacks
- Carb w/in 1 hour exercise
- Protein & Carb (0.7-2 g/kg) recovery p exercise



ACSM Exercise Recommendations for Healthy Adults

Type of Training	Frequency	Quality
Aerobic	3-5 days per week for 20-60 minutes per session	55% to 95% of maximum heart rate for moderate to vigorous intensity; light intensity for deconditioned adults or those with chronic diseases
Resistance	2-3 days per week	2-4 sets of 8-20 repetitions incorporating all major muscle groups
Flexibility	Minimum 2-3 days per week	Incorporated into existing routine, repeat stretch 2-4 times for total of 60 seconds per stretch
Balance	2-3 days per week	20-30 minutes per neuromotor or proprioceptive exercise session

^aFrom American College of Sports Medicine position stand on the recommended quantity/frequency and quality of exercise for developing and maintaining cardiorespiratory, muscular fitness, flexibility, and balance in healthy adults.¹⁰

Physical Fitness Recommendations

- Defining “intensity”
- MET – metabolic equivalent¹
 - Estimate of energy expenditure (ee)
 - 1 MET = ee when sitting quietly
 - Light < 3.0 METs
 - Moderate 3.0 to 6.0 METs
 - Vigorous > 6.0 METs

1 Ainsworth MSSE 2000

Light < 3 MET	Mod 3-6 METs	Vigor > 6 MET
Walking slowly 2.0	<u>Walking</u> 3mph = 3.3 4mph = 5.0	<u>Jogging</u> 5mph = 8 7mph = 11.5
Light work at home 2-2.5	Sweeping / Cleaning 3 to 3.5	Heavy lifting / manual labor 7-8.5
Sitting at desk 1.5	Biking 6.0	Basketball game 8.0
Playing an instrument 2-2.5	Tennis doubles 5.0	Soccer 7-10
Fishing 2.5	Golf 4.3	Swimming
		8-11

Physical Fitness Recommendations

- Healthy People 2020 (released 2010)
 - Aerobic PA $\geq$ 60 min, 7 d/wk
 - Muscle strengthening $\geq$ 3 d/wk
 - Aerobic and muscle strengthening should be combined
 - Target HIGH risk populations

Little is better than none!



Exercise

- Start slow!
 - Build a routine, rest 1d/wk
 - 10 min sessions to increase compliance
 - Increase 10% / wk
- Mix up stretching, strengthening, cardio
 - Need time to adapt
 - Prevent boredom
- Low impact is good
 - Pool, bike, elliptical, walking
- Weight Training
 - Start low, high repetition

Weight Training

- No power / max lifts
 - Ballistic motions at extreme end ROM
 - Power clean, clean and jerk, dead lift
 - Incline, overhead press
- Emphasis on proper form
- High reps, low weight



Master's Athlete Injuries

- M/C sports related injury – tissues less durable
- Require longer rehab & recovery – difficulty healing
- Survey masters athletes
 - Days of Restriction:

7d	60%
>21d	33%
 - Athletes ≥ 70 , 20% reported persistent pain 1 yr post injury
- Osteoarthritis
 - XR Knee weight bearing 45 degree flexion: Rosenberg view
 - Repetitive high loading (running) controversial
 - Low-moderate impact no risk
 - Simple quadriceps strengthening program $\downarrow$ pain $\uparrow$ funct

Table 2. Estimated intensity of joint impact and torsional loading

Joint loading level	Activity	
Low	Recreational swimming	
	Stationary rowing, cycling, or skiing	
	Tai Chi	
	Low-impact aerobics	
	Golf	
	Walking	
	Water aerobics	
	Calisthenics	
	Downhill skiing	
	Sailing	
Moderate	Bowling	Speed walking
	Fencing	Cross-country skiing
	Bicycling	Table tennis
	Rowing	Canoeing
	Ice skating	Hiking
	Rock climbing	Horseback riding
	Doubles tennis	Inline skating
	Weight lifting	
	Baseball/softball	Lacrosse
	Basketball	Soccer
High	Volleyball	Rugby
	American football	Singles tennis
	Handball/racketball	Squash
	Competitive running	

(Data from Buckwalter and Martin [41••].)

Master's Athlete Injuries

- Joint Arthroplasty

- Avoid return to high-impact activity but may return to low-impact sports
- Implant loosening, fracture, worse prosthesis survival
- Balance: ↓ BMD from little activity & ↑ wear on device

Table 2. Recommendations for selected sports following total joint arthroplasty

Allowed	Allowed with Experience	Not Allowed	No Consensus
Golf	Doubles tennis	Football	Singles Tennis
Bowling	Alpine Skiing	Basketball	Martial Arts
Cycling	Nordic Skiing	Soccer	
Hiking	Weightlifting	Running	
Dancing		Snowboarding	

ACSM: Bone Mineral Density

Table 1. American College of Sports Medicine position stand: physical activity and bone health

To preserve bone health during adulthood

Mode: weight-bearing endurance activities (tennis, stair climbing, jogging, jumping activities, resistance training)
Intensity: moderate to high, in terms of bone loading forces
Frequency: weight-bearing endurance activities 3–5 times per week, resistance exercise 2–3 times per week
Duration: 30–60 minutes daily of a combination of weight-bearing endurance activities, activities involving jumping, and resistance training exercises

Exercise programs for elderly women and men should include not only weight-bearing endurance and resistance activities aimed at preserving bone mass, but also activities designed to improve balance and prevent falls

The Disabled Athlete

Injuries Among Disabled Athletes

- Rate similar to able bodied athletes
- Limited epidemiological studies
- Cross disability retrospective study: 426 athletes
 - National competition NWAA, USBA, USCPAA
 - 32% reported 1 injury prior 6 mo
 - 57% NWAA UE
 - 53% blind LE
 - MC athlete: CP
 - Knee 21% > Ankle > Shoulder

Autonomic Dysreflexia

- T6 and above SCI athletes: lack of supraspinal neuro inhibition, SNS unchecked
 - Headache
 - Piloerection
 - Sweating
 - Paroxysmal HTN
 - Bradycardia
- Noxious stimuli below SCI: pressure sores, UTI, tight clothes, distended bowel/bladder
- Tx: remove stimuli, HTN 10mg nifedipine SL
- Boosting

Pressure Sores

- Improperly fitted prosthetics
- Wheelchair athletes
- Tx:
 - Proper positioning in chair, correctly fit equipment
 - Regular pressure reliefs: Lift off the seat 10-20 sec/d
 - Cushion
 - Wicking or reducing skin moisture
 - Minimizing skin shear

Thermoregulation

- Loss of muscle mass
 - Loss of motor neural control
 - Dec input to hypothal reg centers
 - Ineffective shiver response to maintain core temp
-
- Watch for clothing dampness
 - Thermo monitor during and after activity
 - Rapid cooling

Venous Blood Pooling

- SCI Diminished reflexive control of blood flow
 - Hypovolemic athlete 2/2 dehydration
 - Hypotension risk due to medications
 - Diminished CO
-
- TX: Abdominal binder, compression garment, or functional electrical stimulation

Alanto-Axial Instability

- Down's Syndrome patients
 - Flexion and extension cervical spine xrays
 - Measure movement of anterior ring C1 on odontoid process C2
 - >5mm instability
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- 17% patients with DS
 - Risk with forward flexion
 - Evaluate yearly

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QUESTIONS?