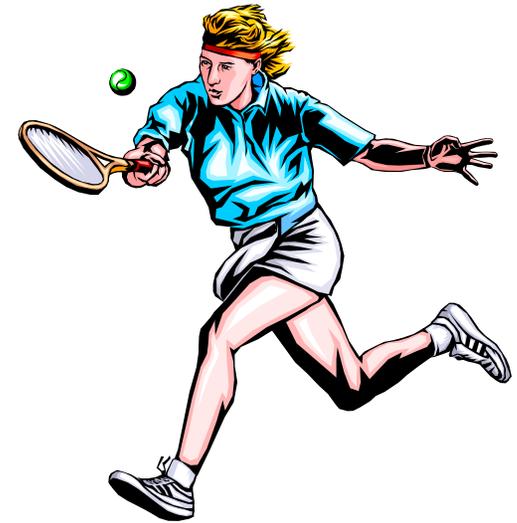


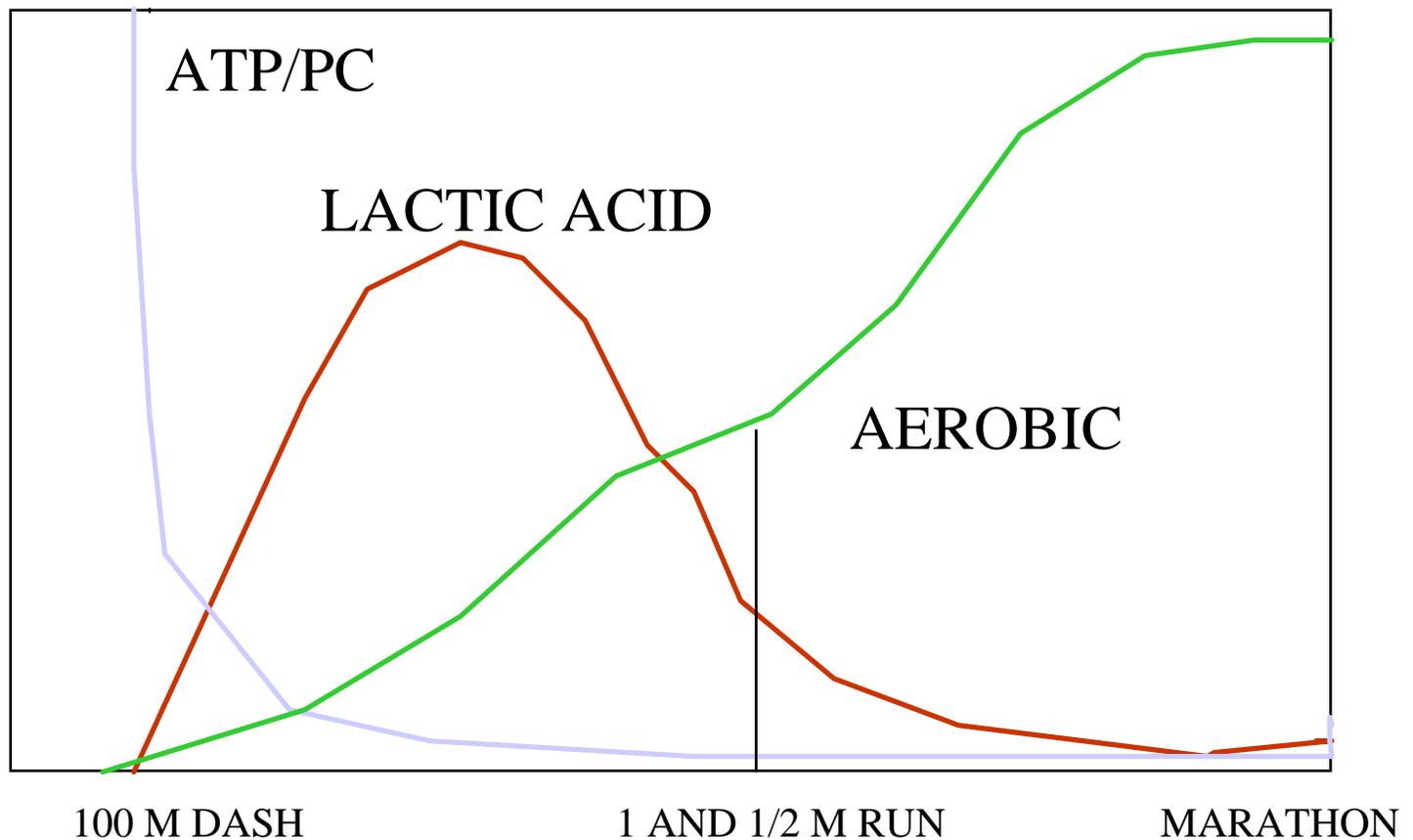
Components of Physical Fitness

- *Cardiorespiratory Fitness*
- Muscular Strength
- Muscular Endurance
- Flexibility
- Motor - Agility/Sport/Task Specific fitness
- Body Composition



Energy Systems Fueling Exercise

Energy Continuum





The Big Three Systems

- **ATP-PC System** (Adenosine Triphosphate-Phosphocreatine) system - Great for quick high volume bursts of energy (i.e.. 60 yard dash) – very short lived
- **Lactic Acid System** (anaerobic glycolysis) - Next in line the energy highway. Used for intense exercise lasting up to a couple of minutes (400 – 800 meter)
- **Aerobic Energy System** - The big **Kahuna**. The one energy system that allows us to live for more than a few minutes. Makes up more and more of the energy contribution as the event lengthens
- Remember -however- training all energy systems to some degree will help performance in nearly all events



What Determines Oxygen Use?

1. How much oxygen rich blood your cardiorespiratory system (heart and lungs) can deliver to your muscles (cardiac output) and
2. How effective your muscles are at utilizing the oxygen present in the blood (extraction ratio)

Cardiac Output (Q) = Heart Rate(HR) * Stroke Volume (SV)
(central mechanisms)

VO₂ ml/min = Q * Oxygen Extraction Ratio
(peripheral mechanisms)

So the person with both large central (cardiac function) and peripheral components (finely tuned muscles) will be “capable” of performing the most aerobic work.



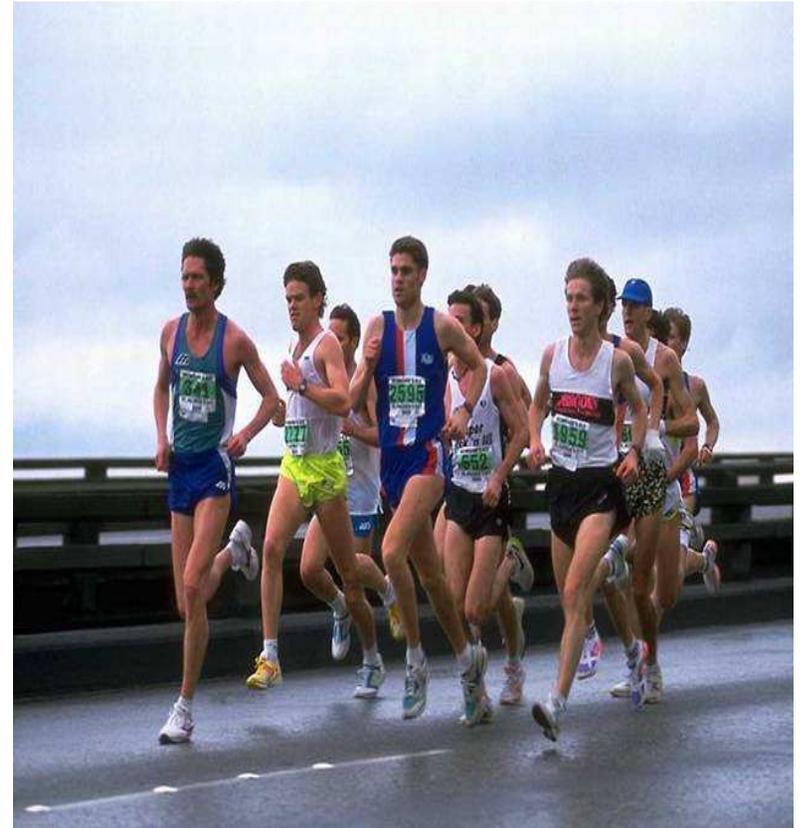
A Cardiorespiratory Fitness Terms

- **VO2 max** – is the maximal amount of oxygen your body can consume – it can be determined directly or estimated from maximal performance test (1 1/2 mile run) or extrapolated from heart rate response to sub maximal work (ergo test). The more oxygen you can consume the higher your aerobic work could be
 - **Units – mlO₂/kg/min** I.e. if your bike score is 30, the test estimated that your body could maximally consume 30 milliliters of oxygen per minute. The highest VO₂'s on record are in the high 80's possibly low 90's.
 - **MET – metabolic equivalent** – is the amount of oxygen we consume at rest – this is equal to 3.5 mlO₂/kg/min – if a machine displays you are working at 10 METs how much oxygen is that?
 - **Calories** – another unit of energy expenditure – one MET equals about 1 calorie burned per kilogram body weight per minute. So for a 70 Kg person (154 lbs), one MET would be 70 calories per minute. – Question - how many METS are you working out at when the readout on your treadmill says 700 calories per hour?
 - **WATTS** – is a unit of power. Power is the *rate* at which we are expending energy or doing work. For example, if I slow walk 1 mile, I burn about 100 calories and it takes 40 minutes. If I walk a little quicker I can walk one mile in 20 minutes. My calorie expenditure is the same (same amount of work) but my power is twice as great when I walk faster.



So why do some of the athletes with the best potential (highest aerobic capacity) fail to outshine the other competition?

- Aerobic capacity
- Efficiency of movement
- Lactic acid tolerance
- Lactic acid threshold
- Muscle Morphology
- Race Tactics
- Blood Chemistry
- Injuries Susceptibility





One Size Won't Fit All - A Few "at risk" Groups

- Cardiac disease and those with hypertension
- Arthritis
- Overweight
- those with impaired balance
- orthopedic concerns
- sports injuries
- increased reliance on RPE's
- Pregnancy
- Respiratory Disease



Reducing the Risk of Injury from exercise

- Use of a PARQ (physical activity readiness questionnaire) or similar questionnaire is suggested by the ACSM (American College of Sports Medicine) prior to initiation of a vigorous exercise program. The AF used a modified PARQ prior to the bike test shown on next slide.





Screening Tool Presently Used for the Bike Test

- 1. Are you currently on a medical profile exempting you from fitness activities or fitness assessment?
- 2. Has a doctor or health care provider ever said you have heart disease or heart trouble?
- 3. Do you feel you may have heart disease or heart trouble, or have symptoms of heart disease or heart trouble such as
 - A. Do you suffer from pains in your chest especially with physical activity?
 - B. Do you often feel faint or have spells of severe dizziness?
- 4. Are you taking medication for high blood pressure? Has high blood pressure medication been prescribed for you that you are not taking at the present time?
- 5. Has a doctor or health care provider ever told you that you have a bone or joint problem, such as arthritis, that has been aggravated by exercise or might be made worse with exercise?
- 6. Are you pregnant or think you might be pregnant?
- 7. Are you taking any medication that either from a health care provider or over the counter on a regular basis which you believe may affect your ability to exercise?

Any "Yes" answers required physician clearance for testing



Reducing the Risk of Injury from exercise

- A new more extensive questionnaire will be for screening prior to involvement in the ASC training program and later 1 ½ mile run tests. These activities will be more vigorous than the previous bike test and therefore require more extensive screening. Although this may still change in the future - as the AFI is developed - AFMOA has provided initial draft guidance on questionnaires to start a fitness program and later run testing. Theresa Siejack (the HAWC Health Promotion Manager) will describe on the next two slides the new questionnaire and how it will used.



Fitness Training Pre-Participation Screening Questionnaire

A POSITIVE QUESTIONNAIRE DOES NOT CONSTITUTE A WAIVER; IT DETERMINES THE NEED TO SEE A HEALTHCARE PROVIDER PRIOR TO ENGAGING IN FITNESS TRAINING. PLEASE BE HONEST IN YOUR ANSWERS

1

History Symptoms And Other Health Issues: If ANY of these statements apply to you, you have a ***POSITIVE QUESTIONNAIRE RESPONSE**. You must consult your healthcare professional before engaging in fitness training.

HAVE YOU EVER HAD:

1. A heart attack
2. Heart surgery
3. A Cardiac catheterization
4. A Coronary angioplasty (PTCA)
5. A pacemaker/implantable cardiac defibrillator device
6. Diagnosed heart disease (this includes heart rhythm problems)
7. A cardiac stress test
8. Congenital heart disease

DO YOU:

1. Experience chest discomfort with exertion
2. Experience unreasonable breathlessness
3. Experience dizziness, fainting, blackouts
4. Have musculoskeletal problems
5. Have concerns about the safety of exercise
6. Think you are/may be pregnant
7. Take or have you taken prescription medication for asthma, high blood pressure, or high cholesterol

2

Cardiovascular Risk Factors: If TWO OR MORE of the statements in this section apply to you, you have a ***POSITIVE QUESTIONNAIRE RESPONSE**. You must consult your healthcare provider before engaging in fitness training.

1. You are a man older than 45 years
2. You are a woman older than 55 years or you have had a hysterectomy or you are post menopausal
3. You have used tobacco (pipe, cigar, cigarette, or smokeless) within the past 30 days
4. Your SYSTOLIC blood pressure (top number) is 140 or higher and/or your DIASTOLIC blood pressure (bottom number) is 90 or higher
5. You don't know your blood pressure
6. Your blood cholesterol level is >240 mg/dl
7. You don't know your cholesterol level
8. You have a close blood relative who had a heart attack before age 55 (father or brother) or age 65 (mother or sister)
9. You are diabetic or take medicine to control your blood sugar
10. You are physically inactive (i.e. you get less than 30 minutes of physical activity on at least 3 days)
11. You are more than 20 pounds over Maximum Allowable Weight (AFI 40-502)



If any of your answers generated a ***POSITIVE QUESTIONNAIRE RESPONSE**, please notify the Unit Fitness Program Manager (UFPM). Note: you need not specify which statements apply, the UFPM will ensure that a medical evaluation is performed to determine if you should undergo fitness training.

***IMPORTANT:** IF YOU HAVE A POSITIVE QUESTIONNAIRE RESPONSE, DO NOT SIGN THIS DOCUMENT.

MY SIGNATURE BELOW CERTIFIES THAT, BASED ON THE STATEMENTS ABOVE, I AM FIT TO PARTICIPATE IN FITNESS TRAINING

NAME: LAST, FIRST MI (PRINT): _____ **SIGNATURE: _____

SSAN LAST 4: _____ ORG/OFFICE SYMBOL: _____ / _____ DATE: _____ DUTY PHONE: _____

MY SQUADRON COMMANDER'S RANK/NAME IS (MANDATORY ENTRY): _____

****NOTICE:** ONCE SIGNED, THIS DOCUMENT WILL BE KEPT IN YOUR PIF; IF YOUR STATUS CHANGES, NOTIFY YOUR UFPM ASAP.

*Adapted from the American Heart Association/American College of Sports Medicine Health/Fitness Pre-Participation Screening Questionnaire American College of Sports Medicine and American Heart Association Joint Position Statement
*Recommendations for Cardiovascular Screenings, Staffing, and Emergency Policies at Health/Fitness Facilities, " Medicine and Science in Sports and Exercise, Vol.30, No.6, p. 1012, 1998.

PLEASE REFER
TO YOUR
HARD COPY

UNIT FITNESS PARTICIPATION FLOW (DRAFT)

