Healthy Heart

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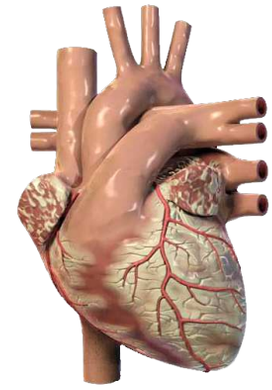
Care Institute of Medical Sciences



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From the desk of editor:

Dear Friends,

With modernization, everybody is getting busier and facing increased stress of life with increasing prevalence of various risk factor. Cardiovascular disease incidence and morbidity-mortality due to it has been significantly increasing across the globe and more so in India. Physical inactivity itself has been found to be directly responsible for more than 2 million deaths per year (WHO, 2000). If we add its contribution to obesity, hypertension and diabetes; the tally will be ten times more. It's high time that we realize the importance of exercise and physical activity, or face serious consequences. In this issue we have tried to give a brief description of various forms of exercise. As most Doctors are not fully aware about rising importance of resistance training, same has been stressed more than the counterpart- endurance training. Hope this will help all of us to be motivated for daily exercise!

Dr. Anish Chandarana

Exercise and Health

Let's know certain terms :

1. Physical activity: Any bodily movement produced by skeletal muscles that results in energy expenditure.
2. Exercise: Planned and structured bodily movement resulting in increased oxygen consumption and caloric expenditure leading to improvement in fitness and sense of well-being and also helping to lose or maintain body weight.
3. Aerobic exercise: Exercise that primarily stresses the oxygen transport (cardio-pulmonary) system and includes activities such as walking, jogging, swimming, cycling etc.
4. Resistance exercise: Exercise that primarily stresses the musculoskeletal system and includes weight lifting.
5. Exercise training: Exercise performed repetitively in order to increase the performance capacity of cardio respiratory and musculoskeletal systems.

Muscle Contraction:

- Mechanical properties
  - Dynamic (Isotonic)
  - Static (Isometric)
- Metabolic Properties
  - Aerobic
  - Anaerobic

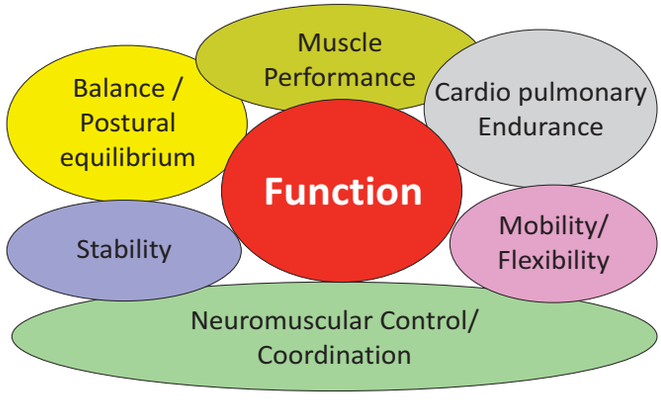
Most physical activities involve both dynamic and static contractions and aerobic and anaerobic metabolism.

Because of major differences in the physiological responses during mainly dynamic – aerobic (endurance) exercise compared with mainly

heavy dynamic resistance – anaerobic(strength) exercise, these 2 general types of activities need to be dealt with separately while developing exercise recommendations.

Goal of exercise programme:

To achieve many inter related aspects of physical function.



Physiological benefits of regular exercise :

- Maintains Healthy weight
- Reduces Abdominal adiposity
- Maintains lean mass
- Normalizes Blood Pressure
- Improves Insulin sensitivity
- Improves Endothelial function
- Heart rate variability
- Improved myocardial function
- Decreased platelet aggregation
- Reduced blood / plasma viscosity
- Decreased myocardial oxygen demand
- Increased mitochondrial density
- Increased fibrinolysis
- Reduced systemic inflammation

Proven benefits of weight loss and physical activities :

Disease/Risk Factor	Weight Loss	Physical Activity
Hypertension	↓↓↓	↓↓↓
Type 2 diabetes mellitus	↓↓↓	↓↓
Lipid profile	Definite improvement	Definite improvement
Coronary heart disease	↓↓	↓↓↓
Stroke	↓	↓↓
Colorectal cancer	↓	↓↓
Breast cancer	↓	↓
Osteoarthritis	↓↓	↓
Osteoporosis		↓↓↓
Gallbladder disease	↓	↓
Sleep apnea	↓↓	Unknown
Mental health	Probable improvement	Probable improvement

Safety Considerations

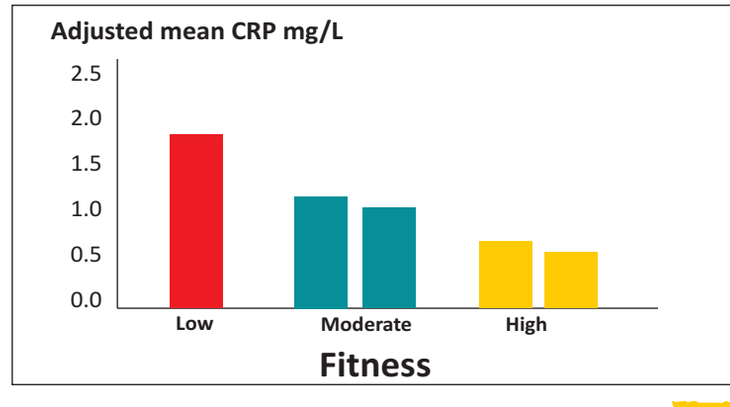
Before prescribing or starting exercise programme safety the following considerations must be evaluated thoroughly: They include

1. A brief health history and evaluation of current health status by clinical examination and if required, by different investigations (blood tests,ECG,Echo,TMT etc)
2. Drug history: Some medicines have significant impact on balance, coordination, heart rate, blood pressure and overall cardiopulmonary response.
3. Environmental (floor space, ventilation, temperature) and instruments evaluation.
4. Proper instructions before and during exercise, because
   - Accuracy of performance decides safety
   - Posture, alignment of body and correct movement patterns determine chances of injury.
   - Intensity, speed, duration and frequency of each exercise needs to be decided individually.

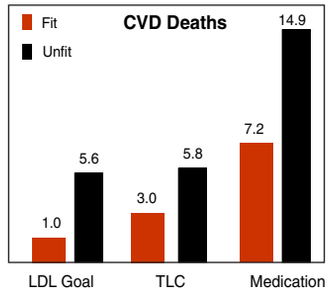
Some scientific data on health and exercise :

1. Importance of physical activities at work place was first objectively documented way back in 1953 in England. In a study over 31000 London transport workers, prevalence of cardiovascular events was found to be almost three times commoner in drivers than conductors.

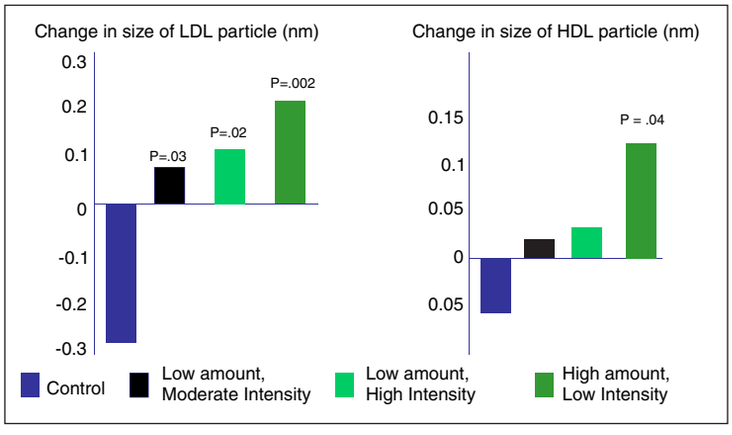
2. We all know that hSCRP is an important risk marker. In one study carried out in 2002 in USA, mean adjusted hSCRP levels were significantly lower in people who were regular exercisers and fit, against those who did not do regular exercise.



3. Benefits of exercise on cardiovascular mortality have been found to be independent of cholesterol levels of individual. In one such analysis (published in Circulation, 2005) fit people had less mortality than unfit people irrespective of the fact whether they needed medicine for lipids or not



4. With regular exercise, lipids improve due to direct effect of exercise on lipids and more due to its effect on obesity. Data has shown only very regular (5-6 days a week) and intense (>50-75 min vigorous) exercise improves lipid profile. But exercise does alter the size of LDLC and HDLC particles favorably.



Resistance Training (RT):

Benefits of resistance training on many health variables are additional and independent of endurance training. Following tables give exact comparison of these two forms of exercise on health and fitness variables.

Variable	Aerobic Exercise	Resistance Exercise
Cardiovascular Dynamics		
Resting heart rate	↓ ↓	0
Stroke volume, resting and maximal	↑ ↑	0
Cardiac output, rest	0	0
Cardiac output, maximal	↑ ↑	0
SBP at rest	↓ 0	0
DBP at rest	↓ 0	0
Vo_2max	↑ ↑ ↑	↑ 0
Submaximal and maximal endurance time:Stamina	↑ ↑ ↑	↑ ↑
Submaximal exercise rate-pressure product	↓ ↓ ↓	↓ ↓
Basal Metabolic rate	↑ 0	↑
Health-related quality of life	↑ 0	↑ 0

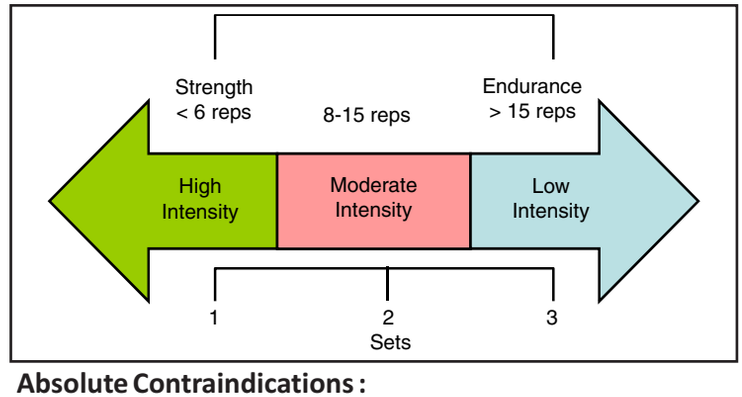
Variable	Aerobic Exercise	Resistance Exercise
Body composition		
Bone mineral density	↑ ↑	↑ ↑
Percent body fat	↓ ↓	↓
Lean body mass	0	↑ ↑
Muscle strength	0 ↑	↑ ↑ ↑
Glucose metabolism		
Insulin response to glucose challenge	↓ ↓	↓ ↓
Basal Insulin levels	↓	↓
Insulin sensitivity	↑ ↑	↑ ↑
Plasma Lipids and Lipoproteins		
HDL cholesterol	↑ 0	↑ 0
LDL cholesterol	↓ 0	↓ 0
Triglycerides	↓ ↓	↓ 0

Tips before starting resistance training :

Resistance training should be performed

1 In a rhythmic manner at a moderate to slow controlled speed.
2 Through a full range of motion.
3 Avoiding breathholding and straining (Valsalva maneuver) by exhaling during the contraction or exertion phase and inhaling during the relaxation phase
4 Alternating between upper-and lower-body work to allow for adequate rest between exercises
5. Before starting resistance (strength) training, we must rule out contraindications.

Objective of resistance training:



Absolute Contraindications :

- Unstable CHD
- Decompensated HF
- Uncontrolled arrhythmias
- Severe pulmonary hypertension (mean pulmonary arterial pressure >55 mm Hg)
- Severe and symptomatic aortic stenosis

- Acute myocarditis, endocarditis, or pericarditis
- Uncontrolled hypertension (>180/110 mm Hg)
- Aortic dissection
- Marfan's syndrome
- High-intesity RT (80% to 100% of 1-RM) in patients with active proliferative retinopathy or moderate or worse nonproliferative diabetic retinopathy

Relative (should consult a physician before participation)

Contraindications:

- Major risk factors for CHD
- Diabetic at any age
- Uncontrolled hypertension (>160/>100 mm Hg)
- Low function capacity (<4 METs)
- Musculoskeletal limitations
- Individuals who have implanted pacemakers or defibrillators

The metabolic effects of reduced muscle mass, engendered by normal aging or decreased physical activity, leads to a high prevalence of obesity, insulin resistance, type-2 diabetes, dyslipidemia and hypertension.

Skeletal muscle is the primary metabolic "sink" for glucose and triglyceride disposal and is an important determinant of resting metabolic rate (BMR)

Cross-sectional studies have shown that muscular strength is inversely associated with all-cause mortality and the prevalence of metabolic syndrome, independent of cardiorespiratory fitness levels.

Overwhelming research evidence indicates that RT prevents decline in skeletal muscle mass and function when the mechanical stimuli provided by tasks of daily living are not sufficient to offset these declines with aging. Adults who do not perform RT lose approximately 0.46 kg of muscle per annum from fifth decade on. This accounts for > 50 % loss of type-2 muscle fibers by age of 70 years. The profound beneficial effects of RT on the muscle skeletal system can contribute to the maintenance of functional abilities and prevent osteoporosis, sarcopenia and accompanying falls, fractures and disabilities.

Long term RT reduces cortisol response to acute stress, increase total energy expenditure and physical activity in healthy and frail older adults, and relieves anxiety, depression and insomnia in clinical depression. RT has beneficial effects on bone density, osteoarthritic symptoms, hypertension, lipid profiles and exercise tolerance in coronary artery disease. Conversely, the loss of skeletal muscle mass and contractile function that accompanies aging, for example sarcopenia, is linked to peripheral insulin resistance, dyslipidemia and increased adiposity.

Although randomized controlled trials among diverse populations are needed to further examine the role of RT in reducing CV risk factors, the following conclusions can be made regarding the mitigating effects of RT on the risk of cardiovascular disease :

1) RT does not alter glucose tolerance or glycemic control unless baseline glucose tolerance is abnormal. RT reduces HbAIC significantly in diabetic men and women.
2) Although there is some evidence that RT can increase central arterial stiffness, no studies could find rise in BP or peripheral vascular resistance. Rather, some studies did show average 3 mm of Hg reduction in SBP and DBP in healthy normotensive persons.
3) There is good evidence that RT reduces total body fat mass and visceral adipose tissue.
4) There is little evidence that RT improves lipid profile.
5) Although RT by itself may have limited beneficial effects on CV disease risk factors, this mode of exercise is beneficial in the prevention and management of musculoskeletal injuries and disorders, osteoporosis and sarcopenia. RT also reduces susceptibility to falls and prevents or delays impaired physical function in frail and elderly persons.

Thus, RT should be an integral part of exercise prescription for all adults. Regular exercise with a proper mix of cardiorespiratory (endurance) training, resistance training, abdomen training and stretching will help an individual to remain fit and live a better quality and quantity of life.

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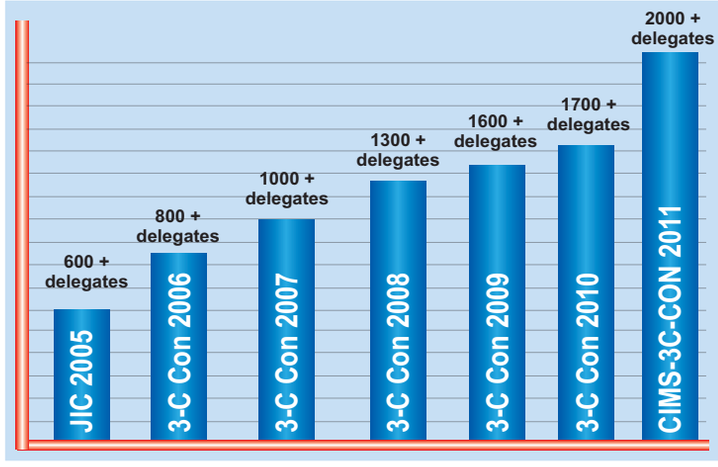

We hope to see you again next year

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To

Dr. Keyur Parikh and ***Dr. Milan Chag***

in

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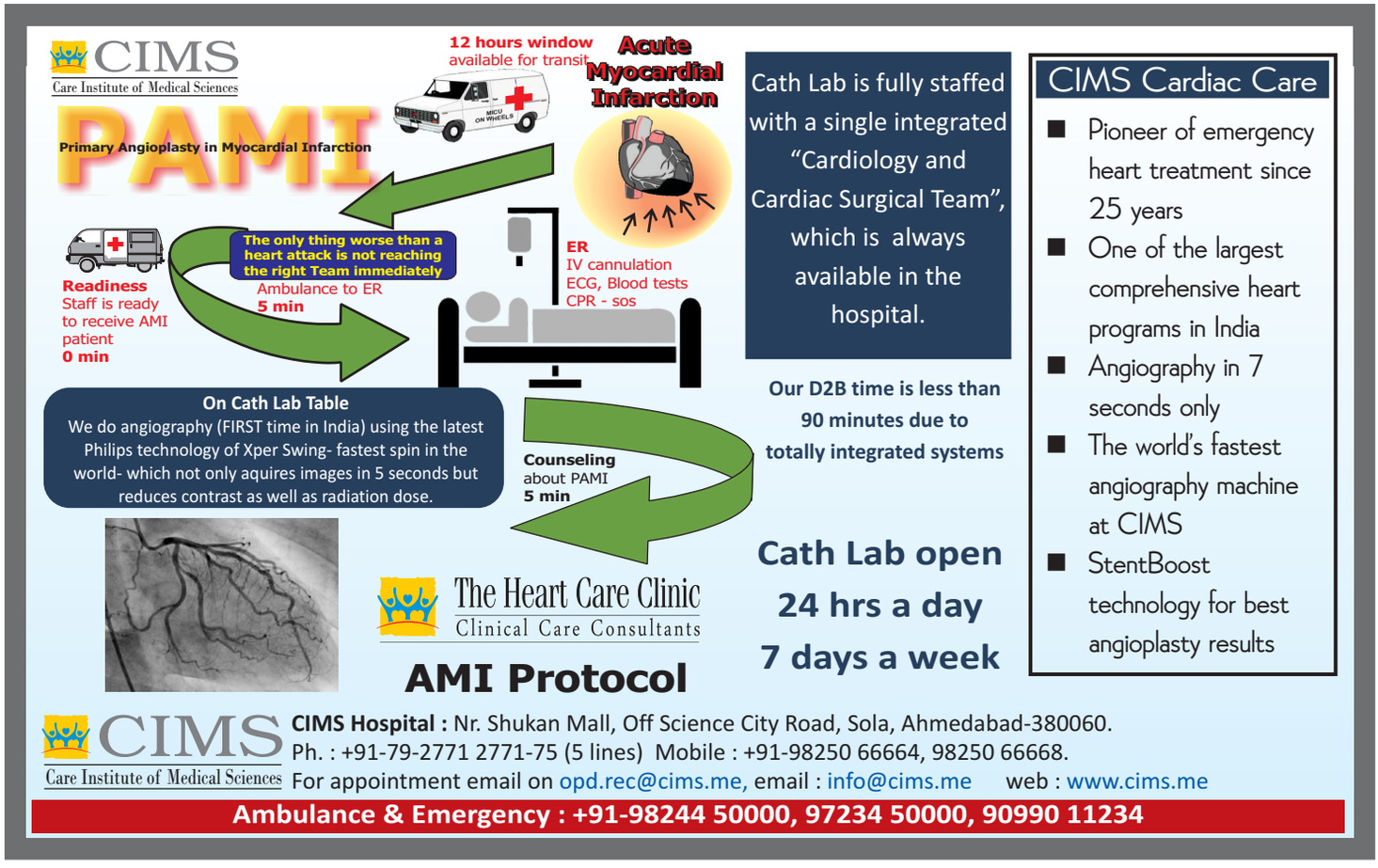

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