

## Energy systems

### SUMMARY

<u>Energy systems</u>	<u>Aerobic</u>	<u>Anaerobic</u>		<u>Energy systems</u>	<u>Aerobic</u>	<u>Anaerobic</u>	
		<u>Glycogen – Lactic acid system</u>	<u>ATP-CP system</u>			<u>Glycogen – Lactic acid system</u>	<u>ATP-CP system</u>
Energy production (ATP)	Unlimited	Limited	Very limited	Mitochondria density & Myoglobin	Very high	Medium	Low
Fuel used	Carb, fat, protein (in the order)	Carbs (as glycogen)	ATP, CP, glycogen	Activity	Long term aerobic	Long-term anaerobic	Short bursts of anaerobic activity
Also	Can consume lactic acid	Produces Lactic acid and Creatine Phosphate (CP)	Consumes CP	Duration	Endless/ hours together	Last for max 1-3 minutes	Less than 30 seconds
After-burn	Very-little	High	High	Example in Sports	Marathon	Middle-distance running, upto 800m	Sprints
Muscle Fibre type	Type 1	Type 2a	Type 2b	Examples of activities more relevant for me	Cardio or Endurance trg	Interval trg, weight trg, sports at competitive level	Power trg or heavy weight-trg, sprint trg or jumps
Contraction ability	Slow	Fast	Very Fast				

## Summary of Rules

<u>Basic Rules</u>	<u>Instructions for sequence of strength training workout</u>	<u>Exmaples/ Comments</u>
1. Specific warm-ups	(a) Perform warm-up set of 12-15 reps before workout set (b) Use 50% of the main workout weight (c) Rest for 30 seconds to 3 minutes before starting main workout set	Warm up allows the blood flow to move through the specific muscle groups and warms up the specific joints that will be trained
2. Maximum muscle fibre recruitment	(d) Train large muscle groups before small muscle groups (e) Train multiple joints before single joints (f) Perform higher intensity before lower intensity exercises. (g) Allow for adequate recuperation between two weight-training sessions	(i) Back before Biceps. (ii) Squats before leg extensions (iii) Chest press before flies (iv) After-burn and recovery continues for 36-48 hrs after weight-training session.
3. Duration not to exceed 30 minutes	(h) Perform about 8-10 sets in total (excluding warm-up) that train major muscle groups (j) Perform 8-15 reps per set, with good form and to a point of fatigue (k) Use both multi-joint & single-joint exercises	(i) Glycogen stores don't last beyond 60 minutes, usually 30 minutes (k) After Glycogen stores are over, body starts breaking down muscle protein

## Work out Sample Plans

<u>Category-1 (Never Worked out)</u>	<u>Category-II (Some experience)</u>
Start : 1 –Day Split (10 days)	Week-1 : Full Body(1 Day)
Grad : 2 –Day Split 12 Weeks)	Week-2 : Upper & Lower body(2 days)
Grad : 3-day Split	Week-3 : Lower body(1 day)
	Week-4 : Upper body & Lower body (2 days)
	Week-5 : Upper body (1 day)
	Week-6 : Upper body & Lower body (2 days)
Weight Trg : Twice/Week (Extremely efficient for making gains in strength, BMD & loss of body fat)	<b>Method</b> : Will undergo workout atleast Twice a week at every alternate week.

## Strength Training

Ser	Cat	How it helps
<b><u>Pre-Workout</u></b>		
1	Gap of 20 mins or less before workout (a) Fruits (Gap of 60-120 minutes before workout) (b) Homemmade B-fast/Lunch (c) Grilled veg sandwich	(a) Keeps Blood sugar stable throughout workout (b) Blunts Cortisol response during & post exercise (c) Allows quick delivery of Glycogen to working muscle group (d) Minimises muscle tissue damage
2	About 30 mins before Exercise (c) Fresh fruit – Seasonal (d) Banana – preferable for intense exercises or Exercise in warm conditions	(a) Allows you to top off Liver glycogen stores (b) Ensures that blood sugars are at optimum (c) Allows the body a smooth transition to fat burning within minutes of exercise
<b><u>4 Rs Post workout (within 20 mins – max 45 mins)</u></b>		
3	(a) Water (b) Banana / Potato / seasonal fruit (c) Protein shake (whey) (d) Vitamins C,E,A (e) Minerals Se, Zn, Cr	(a) Makes up fluid and electrolyte losses during workout (b) Replenishes glycogen stores and shifts metabolic machinery from catabolic to anabolic (c) Reduces metal damage and boosts immune response (d) Speeds up muscle & systematic recovery (e) Speeds up eleimation of exercise by-products
<b><u>4Rs Post Workout (Wholesome meal after 1 hr of 4Rs &amp; every 2 hrs after that)</u></b>		
4	(a) Poha/ Upma/ Idli Dosa/ Paratha/ nachni stava (b) Dahi / Chaas/ Fruit (c) Paneer Paratha / Rice-dal-sabzi / Veg pulao-raita / Roti-sabzi-dahi	(a) Maintains increased insulin sensitivity (b) Sustains the anabolic state (c) Prevents muscle breakdown & accelerates Tissue repair (d) Allows for maximum glycogen replenishment (e) Repays O2 debt and clears out lactic acid. (f) Prevents and repairs neurological damage or damage to motor neurons (g) Speeds up fat metabolism

## Sample Strength Training Plans

1-DAY SPLIT / BEGINNER'S PLAN				2-DAY SPLIT / INTERMEDIATE PLAN				
Exercise	Tgt Muscle group	Sets	reps	Lower Body	Exercise	Tgt Muscle group	Sets	reps
Leg press	Quads, glutes, hamstrings	2	12-15		Squats	Glutes, quads, hams, adductor, calf	2	10-12
Leg extn	Quads	1	12-15		Leg press	Quads, glutes, hamstrings	2	10-12
Leg curl	Hamstrings	1	12-15		Leg extension	Quads	1-2	10-12
Lat pull down	Lats(back), traps, post-delt, biceps	1-2	12-15		Leg curl	Hamstrings	1-2	10-12
Seated row	Lats(back), traps, post-delt, biceps	1	12-15		Calf raises	Gastroc	2	10-12
Dumbbell / Bar press	Pecs, ant. Delt, triceps	2	12-15		Upper Body			
Pec Dec/Fly	Pecs	1	12-15		Lat pull down	Lats(back), traps, post-delt, biceps	1-2	10-12
Side laterals	Middle deltoid	1	12-15		Seated row	Lats(back), traps, post-delt, biceps	1-2	10-12
					Hyper extension	Erector Spiinae	1	10-12
					Dumbbell/ Bar press	Pecs, ant. Deltoid, triceps	2	10-12
					Pec dec/ Fly	Pecs	1-2	10-12
					Side laterals	Middle deltoid	1-2	10-12
					Dumbbell curl	Biceps	1	10-12
					Tricep push down	triceps	1	10-12



### 3-DAY SPLIT / ADVANCED PLAN

Exercise Lower Body	Tgt Muscle group	Sets	reps		Exercise	Tgt Muscle group	Sets	reps
Squats	Glutes, quads, hams, adductor, calf	2	8-10		Pushing muscles – Chest, ant. Delt, Triceps			
Lunges	Glutes, quads, hams, adductor, calf	2	8-10		Incline / decline DB press	Pecs, ant. Delt, Triceps	2	8-10
Leg extension	Quads	1	8-10		Flat machine press / Seated Chest Press	Quads Pecs, ant. Delt, Triceps	1	8-10
Stiff leg deadlift	Glutes & hamstring	1-2	12-15		Pec Dec/ Fly	Pecs	2	8-10
Leg curl	Hamstrings	1	12-15		Overhead DB Press	Pecs, ant. Delt, Triceps (more involvement of ant. Delt)	1	8-10
Standing calf raises	Gastroc	2	12-15		Side Lateral DB	Middle deltoid	2	8-10
Seated calf raises	Soleus	1	12-15		Cable push down	Triceps	1	8-10
Pulling muscles – Back, post, delt, biceps					DB extension	Triceps	1	10-12
Barbell row	Lats(back), traps, post-delt, biceps	2	8-10					
Lat Pull down	Lats(back), traps, post-delt, biceps	2	8-10					
Shrugs	Traps	2	8-10					
Reverse per deck	Post. Delt	2	8-10					
Barbell curl	Biceps	2	8-10					
Hammer curl	Biceps	1	8-10					

## Reference table for strength training

Muscle group (from big to small)	Exercise	Free / Assisted on machine	Joints involved	Compound / Isolation
<b>1. Legs</b> – Note that Compound exercises on legs use all the muscles of the lower body as well as the core				
Glutes (Hip muscle)	Squads Lunges Step Ups	Free, done with a barbell on shoulders	Hip Lower back Knee Ankle	Involves multiple joints to flex(bend) and extend (open out) simultaneously, so compound.
	Leg Press	Machines with plates/ stack	Machine reduces involvement of lower back but hip, knee, ankle active	Compound
Quads (front of the thigh)	Leg extension	Machine	Knee	Isolation
Hamstring (back of the thigh)	Stiff leg dead lift	Free with barbell in hand	Hip & Knee	Compound
	Leg curl	Machine	Knee	Isolation
Gastroc and soleus (calf muscle)	Calf raises Toe raises	Free with BB/DB or with machine	Ankle	Isolation
Adductor (outer thigh) Abductor (inner thigh)	Adductor Abductor	Mostly machines / done lying ground (all side-kick varieties)	Hip	Isolation
<b>2. Back</b>				
Erector Spinae (Lower back, the muscle that runs parallel to the spine)	Dead lift	Similar to the squat but BB held in hand vs on shoulder	Hip Lower back Knee Ankle	Compound
	Back extension	Lying on floor/beach	Lower back	Isolation
Lats (middle back)	Bent over row I am DB row T bar rows Lat pull down Seated row Pull ups	Machine and/or free  *mostly on machine as most of us too weak to do 8-12 reps	Back Shoulder Elbow	Compound moves through many joints
Traps (Upper back)	Shrugs	Free with DB/BB	Shoulder blades, Shoulder	Isolation

Muscle group (from big to small)	Exercise	Free / Assisted on machine	Joints involved	Compound / Isolation
<b>3. Chest</b> – Sometimes also called as Upper & Lower pec to mean Upper & Lower part of chest				
Pecs (Chest muscles)	Chest Press Incline/ Decline / Flat DB or BB Press Push up	Machine Done on a bench	Chest Shoulder Front) Elbow	Compound – Moves through many joints
	Flies	Free but not strong to do 8-12 reps with good form	Involves lower back and oter core muscles too	Compound
		Can be done both free using DB or machine	Shoulder	Isolation – Uses primarily one joint
<b>4. Shoulders or Deltoid</b> – has three heads or parts – Back(Posterior), middle and front (anterior) of the shoulder. Every upper body exercise will involve the deltoid. Training the back involves the p.delt & chest the a.delt. Depending on the choice of back & chest exercise, shoulder involvement varies.				
Psterior delt (Back)	Rev Fly	Free & machine	Shoulder	Largely isolation exercises – involves only one joint  *Overhead press is compound as it uses elbows too along with shoulders
<b>5. Arms</b> – Every upper body exercise involves arms. The back involves the bicep & chest the tricep				
Tricep (back of the arm)	DB extension	Free	Elbow	Isolation
	Pushdown	Free or machine	Shoulder elbow –  Wrist – Small involvement	Compound
Bicep (front of the arm)	Curls of all types	Free/machine	Elbow	Isolation

## Cardio

Ser	Cat	How it helps
<u>Pre-Workout</u>		
1	(a) The night before of 4-6 hrs earlier Dal-Rice-SABzi with gree/ Roti-sabzi-dal with ghee/ Poha/ Upma / Paratha / Idly-Chutney-Sambar wholesome, regional, traditional meal with carbs, protein & essential fats	(a) Slow steady rise in blood sugar (b) Allows body to optimize liver and muscle-glycogen stores (c) Essential fats reach the body to preferentially burn the FFA(Free fatty acids) during exercise (d) Puts your mind in 'Workout mode' versus snooze mode (e) Delays fatigue during exercise
2	About 30 mins before Exercise (a) Fresh fruit – Seasonal (b) Banana – preferable for intense exercises or Exercise in warm conditions	(a) Allows you to top off Liver glycogen stores (b) Ensures that blood sugars are at optimum (c) Allows the body a smooth transition to fat burning within minutes of exercise
<u>During Exercise</u>		
3	Indoors and not more than 50 mins of workout (a) Plain room temperature or cool water (b) Sip immediately. Slow down and sip, <b>Don't gulp</b>	(a) Allows the working muscle to contract without cramping (b) Better thermoregulation (c) Prevents heat injury
4	2 longer than 60 mins and outdoors Hypotonic or diluted nimbu pani or glucose water with salt(use unprocessed salt for better ratio of Na and K – the two main electrolytes of the body)	(a) Has a protective effect on the vital organs – heart & kidneys (b) Delays fatigue and ensures optimum fat burning



Ser	Cat	How it helps
<u>Post-Workout</u>		
1	(a) Follow 4 R (Rehydrate, replenish, Repair, recover) (b) Water, carb, Protein, Anti-oxidants (c) For long runs – Potato & Sandwich (d) Carry it with you and have a protein shake after getting home	(a) Allows the body to shift from catabolism to anabolism (b) Brings back the electrolyte balance of the body (c) Prevents the body from slipping into hypoglycaemic state (d) Quicker glycogen replenishment (e) Prevents muscle tissue breakdown and accelerates recovery (f) Anti-oxidants keep the free radical damage in check (g) Lessens tissue damage and other aesthetic issues like tanning, break-outs etc.

### Developing Lactate Threshold (Technique)

<u>Ser</u>	<u>Activity</u>	<u>Time</u>	<u>RPE</u>
1	Warm-up Run	10 mins	3
2	Easy Run	3 mins	5
3	Fast Run	2 mins	6-7
4	Easy Run	3 mins	5
5	Fast Run	2 mins	7

## Training Diary for Cardio

<u>Exercise</u>	<u>Surface</u>	<u>Resistance</u>	<u>Time</u>	<u>Distance</u>	<u>RPE</u>	<u>Enjoyment</u>	<u>Date</u>
Cycling	Road	4	20 mins	5	6	7	2 <sup>nd</sup>
Walking	Grass						5 <sup>th</sup>
Elliptical	Gym						8 <sup>th</sup>
Swim	Water						12 <sup>th</sup>
Rowing	Gym						15 <sup>th</sup>

### Walking – Group-1 Cardio Activity

<u>Wk-1 Exercise</u>	<u>Surface</u>	<u>Resistance</u>	<u>Time</u>	<u>Distance</u>	<u>RPE</u>	<u>Enjoyment</u>
Walking	Grass	-	40 mins	3 rounds around the park	4	9
Walk-run	Grass	10 mtr Jog every 5 mins	20 mins	Approx 1.5 rounds	8	8

<u>Wk-4 Exercise</u>	<u>Surface</u>	<u>Resistance</u>	<u>Time</u>	<u>Distance</u>	<u>RPE</u>	<u>Enjoyment</u>
Walking	Grass	-	40 mins	3.2 rounds around the park	5	10 (covered more distance in same time)
Walk-run	Grass	10 mtr Jog every 4 mins	20 mins	Approx 2 rounds	8	8.5 (good fun)

<u>Wk-12 Exercise</u>	<u>Surface</u>	<u>Resistance</u>	<u>Time</u>	<u>Distance</u>	<u>RPE</u>	<u>Enjoyment</u>
Walking	Grass	Doing some slopes in between	40 mins	4.5 rounds around the park	5	9 (made some super friends)
Walk-run	Grass	Not needing to walk now	20 mins	Approx 3 rounds	8	10 (fab run)