CityU Briefing Session for Standard Chartered Hong Kong Marathon 2017-2018

Coach: **Wong Tak Shing**

About me…

Year	Coaching
1984-1987	Coach (middle & long distance) of Colgate Women Athletics Training Course
1987-now	Teacher-in-charge of Athletics and Cross Country Team at school
1996-1998	Coach (middle & long distance) of HKAAA Athletics Junior Squad
1996-2001	Coach (middle & long distance) of TCAA Summer Athletics Training Course
1997-Feb	Team Manager of Hong Kong Junior Cross Country Team for the 4th Asian Cross Country Championships

About me…

Year	Coaching
1997-2002, 2006-2014	Lecturer of Level 1, 2, and 3 (Sports Psychology) Sports Coaching Courses of the Hong Kong Coaching Committee
2006-2010	Tutor/Coach of Joint Sports Centre* Running Classes
2007-2008	Tutor/Coach of CityU Quali-run for Wellness 2007
2007-now	Tutor/Coach of CityU Standard Chartered Hong Kong Marathon Running Classes
2009-2012	Tutor/Coach of BU Standard Chartered Hong Kong Marathon Running Classes

* Joint Sports Centre – BU, CityU, and PolyU

Is Running Safe?

Sudden Deaths in the SCHK Marathon*

Year	Gender	Age	Occurrence
2006	Male	53	13 Km after the start of the Marathon
2012	Male	26	40 m after crossing the finishing line of the Half-Marathon
2015	Male	24	Before the finishing line of the 10 K race
2017	Female	52	300 m before the finishing line of the 10 K race

* From Apple Daily 2017-02-14

Definition of Sudden Death

Adabag, et. al (2010)

- **Unexpected** death that occurs **within 1 h** from the **start of symptoms** when death is **witnessed**, and **within 24 h** of being seen alive and well when it is **unwitnessed**.

Risks of Sudden Death

Standard Chartered HK Marathon

- Over 860,000 participants since 1997.
- 4 deaths since 1997.
- 4/860000 or **1 in 215,000**.

No. of Participants since 1997										
1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
1,076	6,400	6,954	7,154	10,520	13,574	18,386	24,324	31,330	40,174	43,956
2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
50,577	59,113	60,077	65,168	70,072	73,953	73,334	73,805	73,895	74,402	74,000

Risks of Sudden Death

Earlier Research Results

- **Maron, et. al (1996)**
  - Risk of sudden cardiac death (SCD) with marathons is **1 in 50,000** finishers.
- **Pedoe (n.d.)**
  - London Marathon, from 1981 to 2003, 7 deaths or **1 in 67,414**.
- **Pedoe (2000)**
  - New York Marathon, **3 in 400,000**.

Risks of Sudden Death

Earlier Research Results

- **Frere, et al. (2004)**
  - 10 K, 12 K, 15 K and Half-marathon races between 1996 to 2000.
  - 5 deaths in 1,636,720 finishers or **1 in 327,344**.
  - Compared with the combined marathon results from Maron, et al (1996) and Pedoe (2000),
    - Risk of shorter races in their study: **3.1 in 1,000,000**.
    - Risk of Marathon races: **14 in 1,000,000**.
    - **No** significant differences among the shorter races.

Risks of Sudden Death

Roberts (2005): SCD Rates from the Twin Cities and Marine Corps Marathons

- 1976 to 1995: among 221,318 finishers, **1 in 55,000**.
- 1996 to 2004: among 220,606 finishers, **1 in 220,000**.
- Both subsets have virtually identical numbers of finishers.
- "This **decrease** in **mortality** observed among race participants experiencing cardiac arrest since 1995 is largely attributable to the expanded access to **external defibrillators** now available on many road racing courses, including the marathon."

Risks of Sudden Death

Webner, et. al (2012): SCA and SCD in US Marathons from 1976 to 2009

- **1 in 57,000** for **SCA** and **1 in 171,005** for **SCD** (28 or 93% **male** with a mean age **49.7** year).
- The majority occurring in **middle- to late-age males**.
- Most common in the **late stages** of the race.
- Resuscitation is most successful when there are **early** responders and an **AED** (**A**utomated **E**xternal **D**efibrillator) is used.

Risks of Sudden Death

AED (Automated External Defibrillator)

Risks of Sudden Death

Webner, et. al (2012): SCA and SCD in US Marathons from 1976 to 2009

- **Mortality** after **SCA**, with **no** intervention, is **greater than 95%**.
- After initial collapse, **survival decreases** by **7%–10%** with **each minute** that **defibrillation** is **delayed**.
- **Defibrillation within 3 min** of **SCA** can produce **survival rates** as high as **67%–74%**.

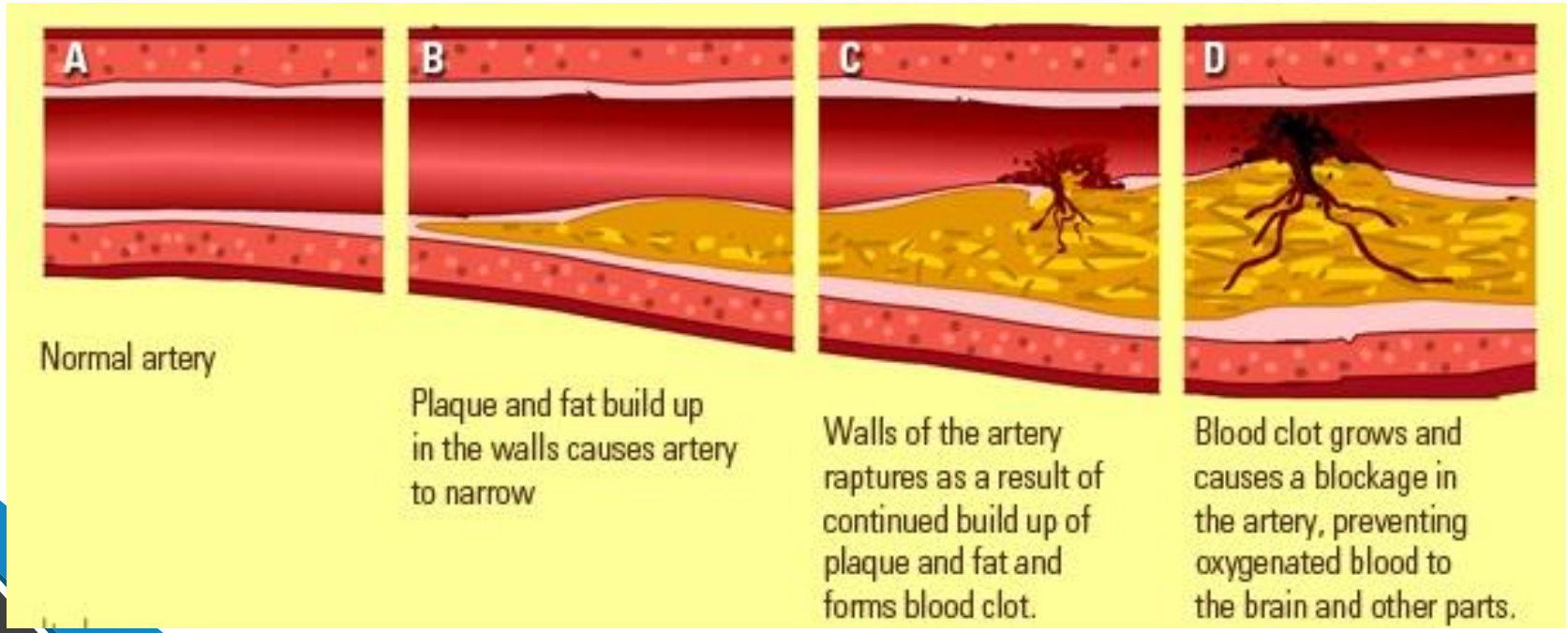
Causes of Sudden Death

Semsarian, et. al (2016)

- **Below 35 years**
  - Hypertrophic cardiomyopathy
    - Unexplained left ventricular hypertrophy, which can lead to ventricular tachycardia/fibrillation and sudden cardiac death.
  - Congenital coronary artery abnormalities
- **Aged 35 years and older**
  - Atherosclerotic coronary artery disease

Causes of Sudden Death

Atherosclerosis



PAR-Q

Physical Activity Readiness
Questionnaire - PAR-Q
(revised 2002)

PAR-Q & YOU

(A Questionnaire for People Aged 15 to 69)

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

If you are planning to become much more physically active than you are now, start by answering the seven questions in the box below. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. If you are over 69 years of age, and you are not used to being very active, check with your doctor.

Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly: check YES or NO.

YES	NO	
☐	☐	**1. Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?**
☐	☐	**2. Do you feel pain in your chest when you do physical activity?**
☐	☐	**3. In the past month, have you had chest pain when you were not doing physical activity?**
☐	☐	**4. Do you lose your balance because of dizziness or do you ever lose consciousness?**
☐	☐	**5. Do you have a bone or joint problem (for example, back, knee or hip) that could be made worse by a change in your physical activity?**
☐	☐	**6. Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?**
☐	☐	**7. Do you know of any other reason why you should not do physical activity?**

PAR-Q

If you answered

YES to one or more questions

Talk with your doctor by phone or in person BEFORE you start becoming much more physically active or BEFORE you have a fitness appraisal. Tell your doctor about the PAR-Q and which questions you answered YES.

- You may be able to do any activity you want — as long as you start slowly and build up gradually. Or, you may need to restrict your activities to those which are safe for you. Talk with your doctor about the kinds of activities you wish to participate in and follow his/her advice.
- Find out which community programs are safe and helpful for you.

NO to all questions

If you answered NO honestly to all PAR-Q questions, you can be reasonably sure that you can:

- start becoming much more physically active – begin slowly and build up gradually. This is the safest and easiest way to go.
- take part in a fitness appraisal – this is an excellent way to determine your basic fitness so that you can plan the best way for you to live actively. It is also highly recommended that you have your blood pressure evaluated. If your reading is over 144/94, talk with your doctor before you start becoming much more physically active.

DELAY BECOMING MUCH MORE ACTIVE:

- if you are not feeling well because of a temporary illness such as a cold or a fever – wait until you feel better; or
- if you are or may be pregnant – talk to your doctor before you start becoming more active.

PLEASE NOTE: If your health changes so that you then answer YES to any of the above questions, tell your fitness or health professional. Ask whether you should change your physical activity plan.

Informed Use of the PAR-Q: The Canadian Society for Exercise Physiology, Health Canada, and their agents assume no liability for persons who undertake physical activity, and if in doubt after completing this questionnaire, consult your doctor prior to physical activity.

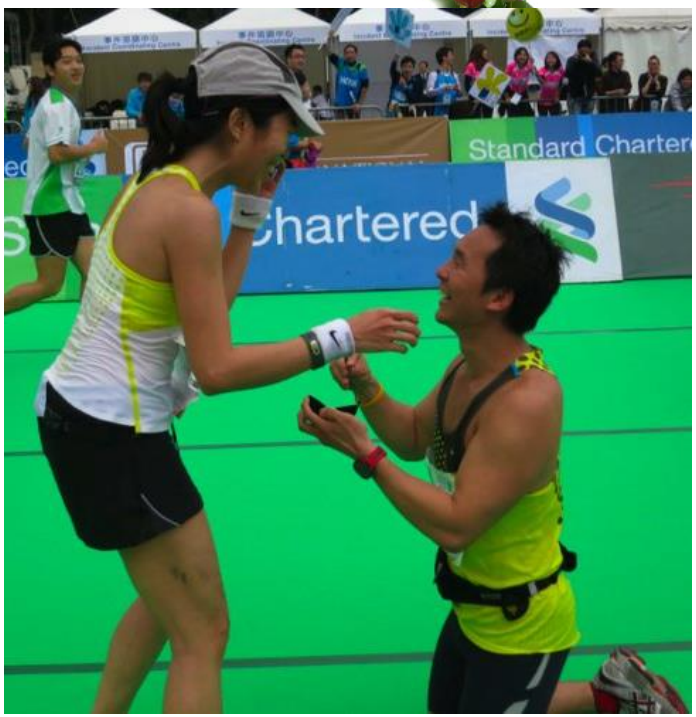
No changes permitted. You are encouraged to photocopy the PAR-Q but only if you use the entire form.

NOTE: If the PAR-Q is being given to a person before he or she participates in a physical activity program or a fitness appraisal, this section may be used for legal or administrative purposes.

"I have read, understood and completed this questionnaire. Any questions I had were answered to my full satisfaction."

Reasons for Running

- **Others** are running
- My **friends** are running
- My **boss** is running
- My **boss told** me to run
- My **love** is running
- I **love** running
- As an **elective programme**



Reasons for Running

Ng & Lonsdale (2010)

- **Five main reasons** for running:
  1. Physical health
  2. Mental health
  3. Social factors
  4. Achievements
  5. Fun

Reasons for Running

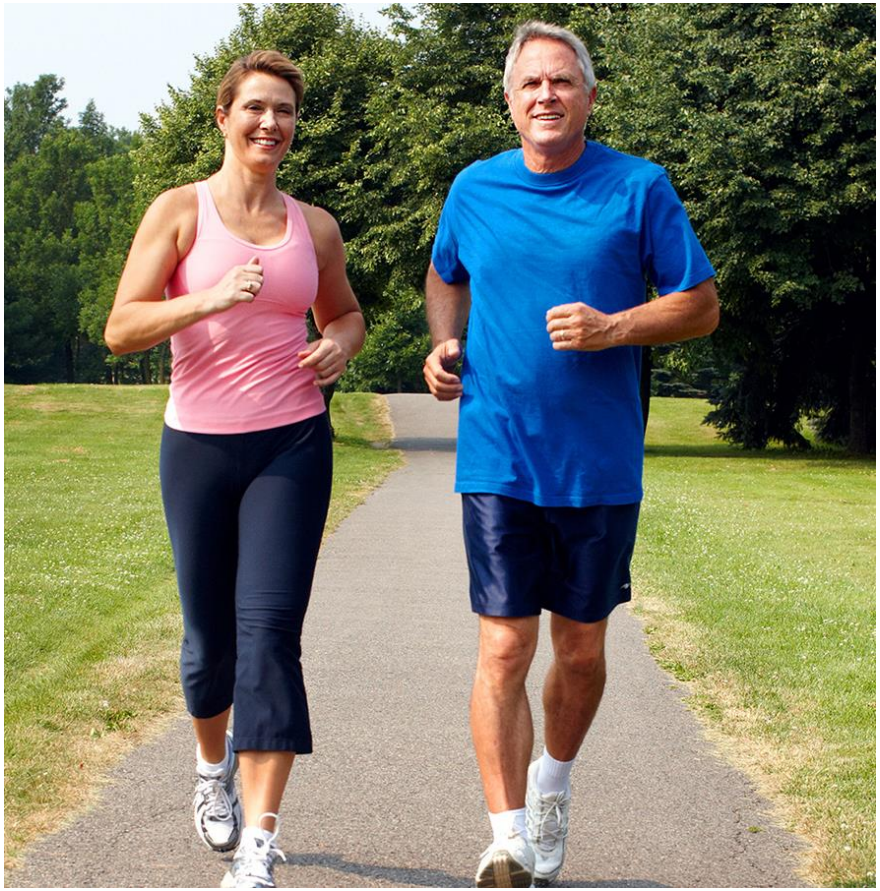
Curtis & McTeer (1981)

- For **most** **marathon** runners,
  - **At the beginning**
    - Physical and mental health
  - **Eventually**
    - Achievements and challenges

Reasons for Running

Ogles & Masters (2000)

- **Matured runners** (50+)
  - Health
  - Weight control
  - Meaningfulness
  - Socialization
- **Younger runners**
  - Personal goals



Goals for Running

- Just for **health** & **fitness**
- Just to **finish** the race
- To achieve **personal best**
- To obtain **medals**

Singer (1986, p. 31)

- "If you don't know where you're going, it is difficult to select a suitable **means** of getting there."

What is Training?

Klafs & Arnheim (1981)

- Training is a **systematic** process of **repetitive** and **progressive** exercise of work.
- Through systematic training and constant repetition, movements become more **automatic** and require less concentration by the higher nerve centers.
  - As a result, the amount of **energy** expended is **reduced**.

How to Train?

- **What** to train?
  - **Running**, cycling, swimming, weight training
- **How much?**
  - More is better?
  - Practice makes perfect?
- **How hard?**
  - No pain, no gain?

More is Better?

Grand, et al. (1984)

- Mileage↑ ⇒ Performance↑ (**but**, $r^2 = 0.1444$)
- 74% of runners who trained an average of **60 km/week** claimed that they had different degrees of overuse injuries.

Fredericson, et al. (2007)

- Risks of running injuries **significantly increase** when the weekly mileage **exceeds 40 miles (64 km)**.

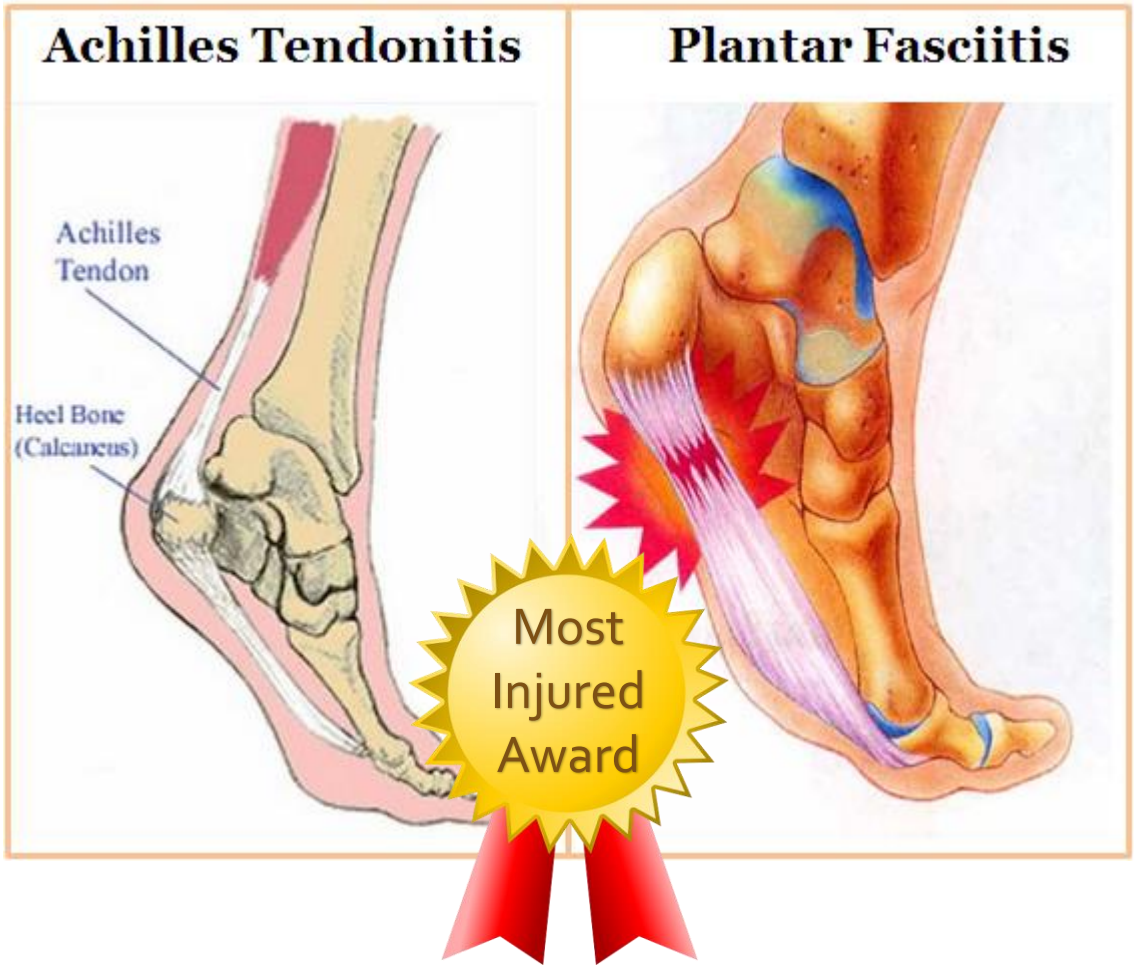
Practice Makes Perfect?

Vernacchia, McGuire & Cook (1992, p. 105)

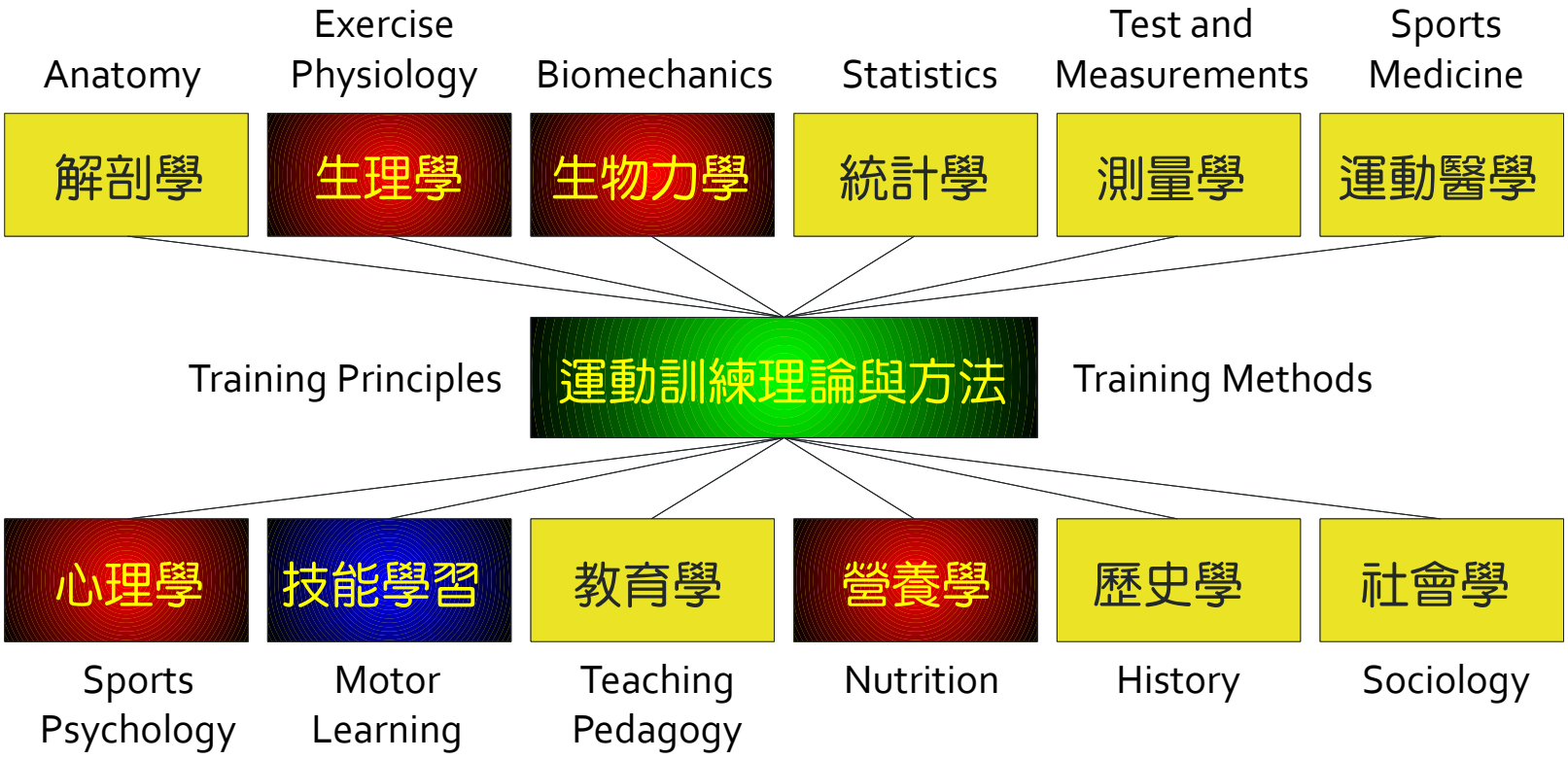
- "Practice **does not** make perfect; **perfect**, **planned**, **purposeful** practice makes perfect."

No Pain, No Gain?

No Pain, No Gain?

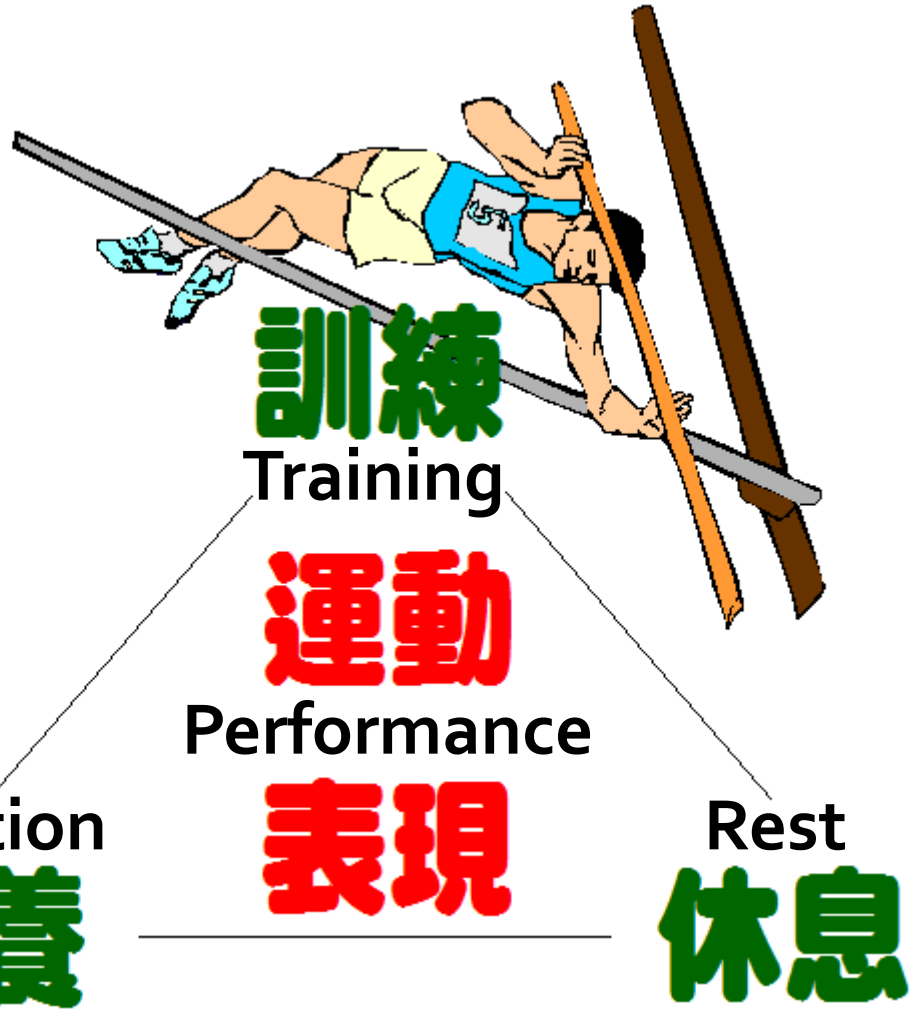


The Scientific Basis of Training



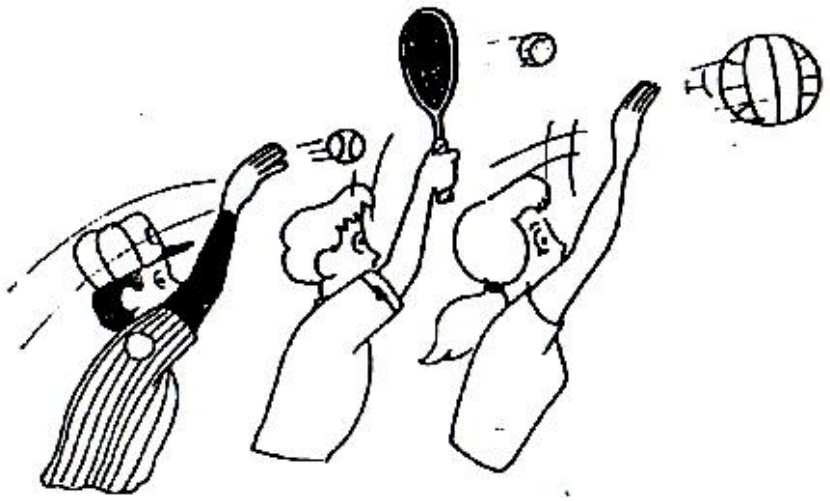
The Scientific Basis of Training

- **Rest** and **nutrition** are too often **neglected**.
- The **longer** the race, the more important is **nutrition**.



The Scientific Basis of Training

- **Sports Psychology**
  - **Psychological skills:** goal setting, arousal management, concentration & relaxation, imagery, building up confidence, …
  - **Cognitive strategies:** association and dissociation
- **Motor Learning**
  - Acquisition of skills
  - Transfer of learning



The Scientific Basis of Training

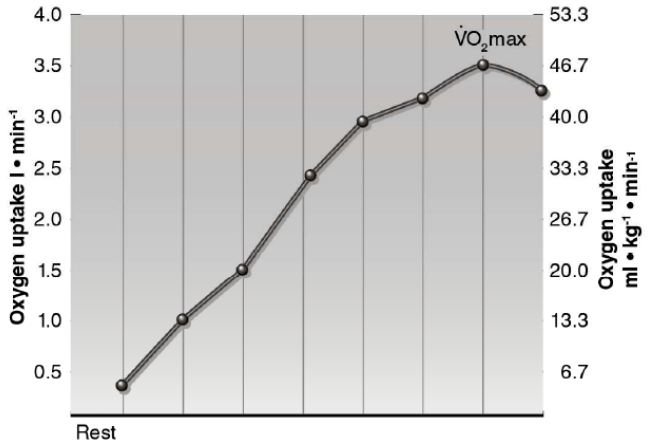
- **Biomechanics**
  - Analysis of **running skills**
  - Running economy
  - Wind resistance & equipment

The Scientific Basis of Training

- **Nutrition**
  - Energy systems of the human body
  - Balanced diet & weight control
  - **Water replacement** and **fuel supply** during training and competition
  - **Pregame meal** & carbohydrate loading

The Scientific Basis of Training

- **Exercise Physiology**
  - **Principles of Training**
  - **Training Methods**



Exercise on the treadmill

Speed km/h	4.8	8.0	11.2	11.2	11.2	11.2	11.2
Treadmill grade, %	0	5.5	7.5	9.5	11.5	13.5	15.5
Time, min	0-2	2-4	4-6	6-8	8-10	10-12	12-14

Mo Farah – London Olympics 2012 5000 m Final

Body Position

- Upper body erects, without leaning too much to the front.
- Eyes look forward at a distance far away.
- Face and neck muscles relax.

Mo Farah – London Olympics 2012 5000 m Final

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Drive and Swing

- As the swinging leg moves forward and upward, the driving leg impulsively extends its hip joint, followed by the knee and ankle joints.

Mo Farah – London Olympics 2012 5000 m Final

Drive and Swing

- As the swinging leg moves forward and upward, the driving leg impulsively extends its hip joint, followed by the knee and ankle joints.

Mo Farah – London Olympics 2012 5000 m Final

Drive and Swing

- Finally, push-off the ground with the toes.

Mo Farah – London Olympics 2012 5000 m Final

Drive and Swing

- The lower leg of the swinging leg should be relaxed all the time, hanging loosely from the knee.
- At the end of the drive phase, the driving leg (i.e., the support leg) extends almost completely

Mo Farah – London Olympics 2012 5000 m Final

Recovery

- As the driving leg breaks ground-contact, the heel of this foot rises towards the hip.
- The knee of the other leg (i.e., the swinging leg) has to relax, getting ready for the landing.

Mo Farah – London Olympics 2012 5000 m Final

Recovery

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Mo Farah – London Olympics 2012 5000 m Final

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Mo Farah – London Olympics 2012 5000 m Final

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Mo Farah – London Olympics 2012 5000 m Final

Landing and Support

- The foot forward of the body should make ground-contact (with knee slightly bent) within 30 cm in front of the projection of the body's centre of gravity

Mo Farah – London Olympics 2012
5000 m Final

Landing and Support

- The outer edge of the ball of the foot makes ground-contact first.
- Immediately afterward, the foot rolls inward and the heel comes to the ground to bear the full weight of the body, preparing for the drive.

Remarks:

1. The ground-contact can also be made with flatted foot.
2. Do not deliberately avoid the heel from touching the ground.

Mo Farah – London Olympics 2012 5000 m Final

Landing and Support

- The knee of the supporting leg is slightly bent when the foot rest flat on the ground.
- The swinging leg should be flexing towards the hip as it advances forward.

Mo Farah – London Olympics 2012 5000 m Final

Landing and Support

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Mo Farah – London Olympics 2012 5000 m Final

Landing and Support

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Mo Farah – London Olympics 2012 5000 m Final

Arm Movement

- Hold the fists lightly, with the thumbs resting on the index fingers.
- Elbows bend at 90 degrees or smaller.

Mo Farah – London Olympics 2012 5000 m Final

Arm Movement

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- Elbows bend at 90 degrees or smaller.

Mo Farah – London Olympics 2012 5000 m Final

Arm Movement

- Arms keep close to the body.
- Shoulders and chest should be relaxed, and arms should be swinging naturally just to counterbalance the momentum of the leg movements.

Mo Farah – London Olympics 2012 5000 m Final

Arm Movement

- No forceful arm actions should be emphasized.

Landing

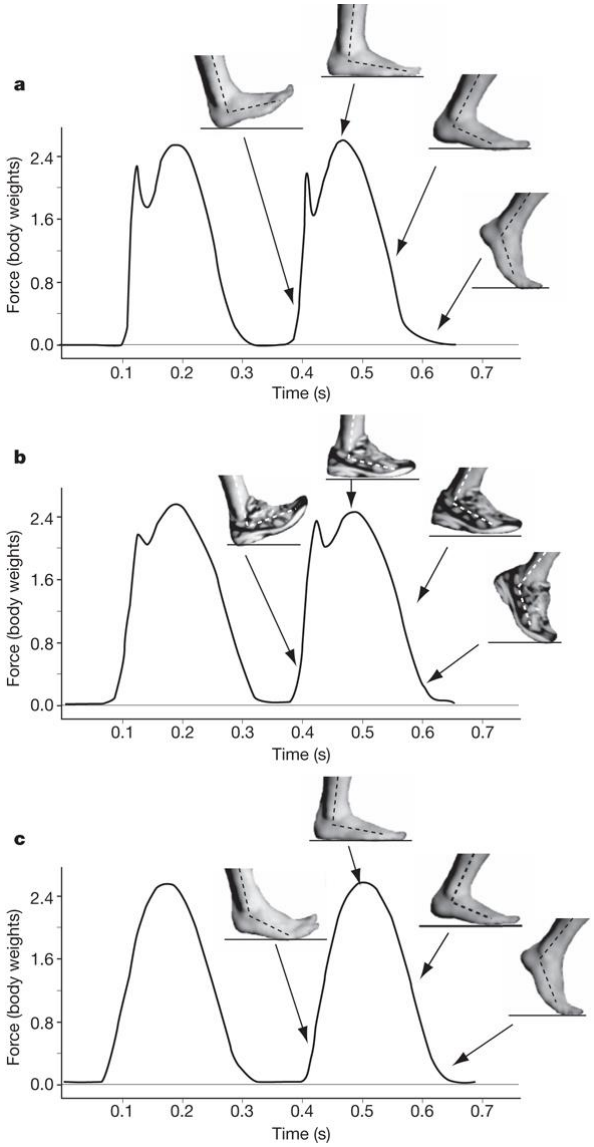
Lieberman, et al. (2010)

1. Rear-foot (heel) strike，RFS
2. Mid-foot strike，MFS
3. Forefoot strike，FFS

Landing

Lieberman, et al. (2010)

- Landing with the **heel** (with or without shoes)
  - Have to repeatedly overcome a spike resulting from the **normal reaction** force, which is about **1.5 to 3 times** the body weight.
  - Increase the risk of running injuries.



Landing



Do not prevent the **heel** from touching the ground even when using the **forefoot** strike.

Landing

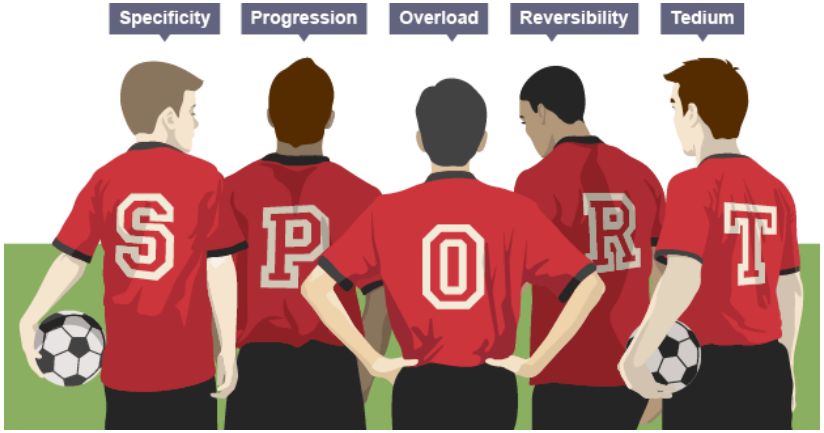
Payne (1983)

- In a group of 18 international **sprinters** competing in events up to 200 m, only one did not lower the heel to the track.
- In another group of 41 international runners competing over 400-1500 m, only 6 used the same technique.

Wong-Sir's Comments on Running Skills

- **Vertically** aligned head and body.
- Look **forward** and **further away**.
- Arms bent at **90° or smaller** at the elbow.
- **Do not over stride**.
- Use **forefoot** strike or **mid-foot** strike, **avoid heel** strike.
- Land **within 30 cm** in front of the projection of the C.G. on the ground.
- Run in a **steady** and **relax** manner.
- **Do not overemphasis** arms movement.

Principles of Training

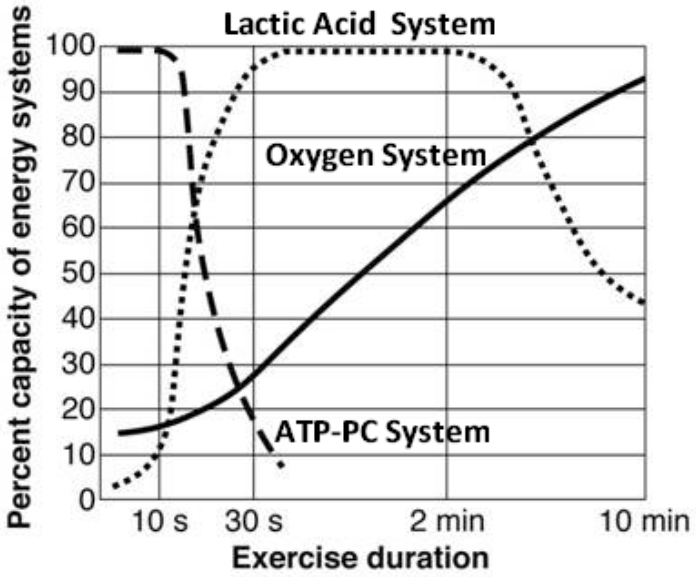


- Principle of Specificity
  1. Energy system
  2. Exercise mode
- Principle of Progressive Overload
- Principle of Hard and Easy Days
- Principle of Periodization

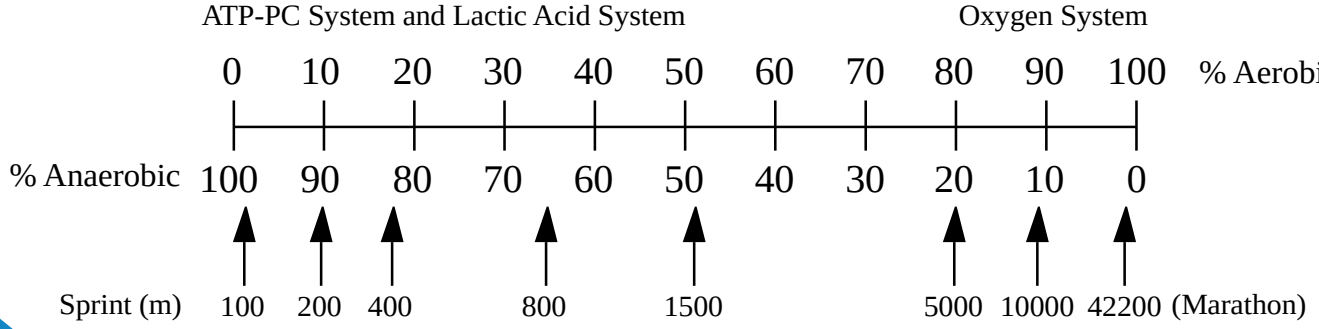
Principle of Specificity

1. Specificity of Energy System

- **ATP-PC system:** Less than 10 s
- **Lactic acid system:** 30 s to 2 min
- **Oxygen system:** Over 3 min



The Energy Continuum for Selected Track Events



Principle of Specificity

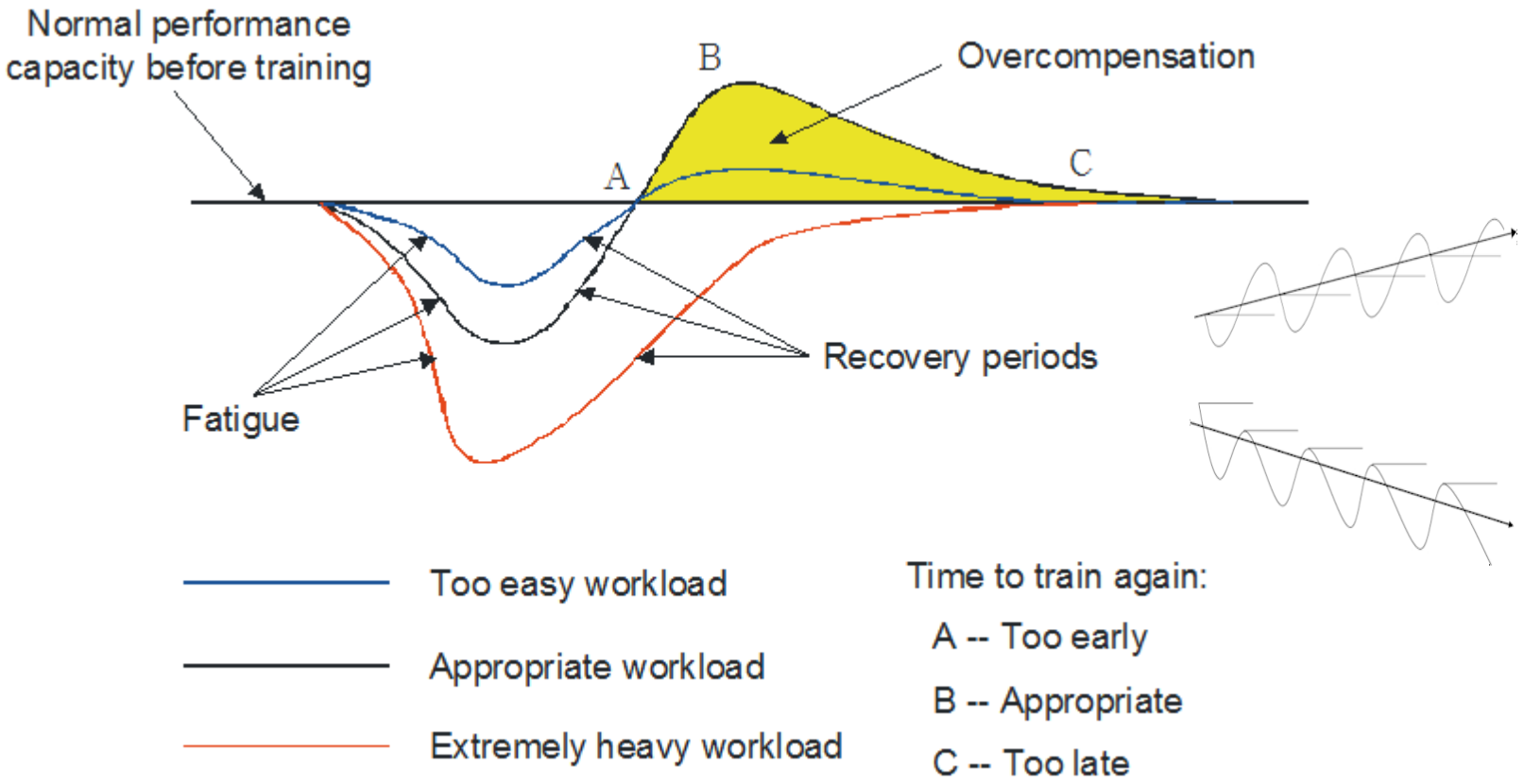
2. Specificity of Exercise Mode

- Cyclists should pedal
- Swimmers should swim
- **Runners should RUN**

Principle of Progressive Overload

- Once the athlete has **adapted** to a workload of the training program, the workload should be **increased**.
- The workload should be increased **progressively throughout** the training program whenever the condition of the athlete has been improved so that the workload is always **near to** the **maximal** fitness capacity of the athlete.

Principle of Progressive Overload



Principle of Hard and Easy Days

Grobler, et al. (2004)

- **Prolonged**, **exhaustive** **endurance** exercise can induce skeletal muscle damage and temporary impairment of muscle function.

Knitter, et al. (2000)

- If the exercise involves a large **eccentric** component, such as downhill running, damage is generally more severe.

Principle of Hard and Easy Days

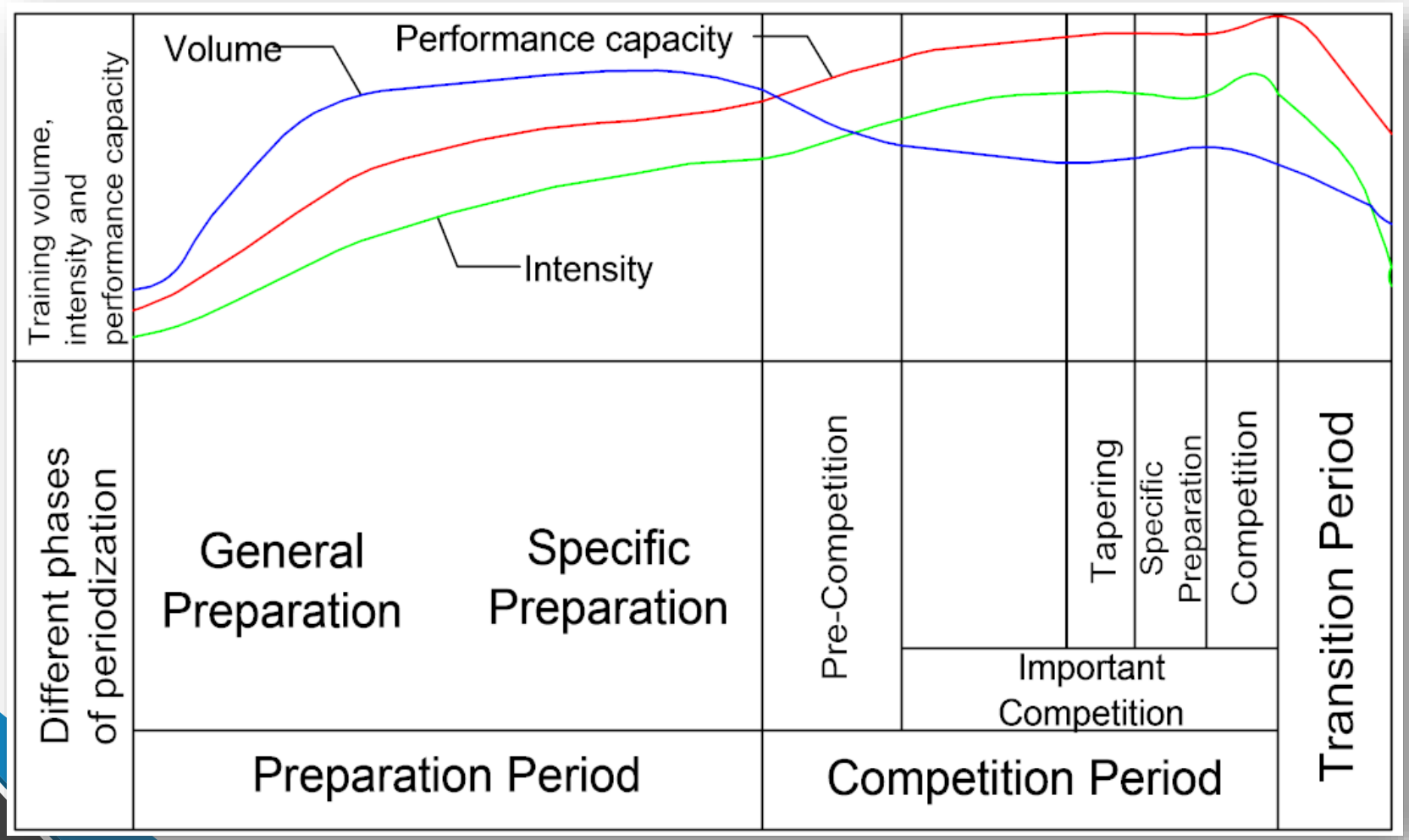
Gómez, et al. (2002)

- It took about **48 hours** to recover from a 10-Km race.

Grobler, et al. (2004)

- Evidence suggested that the repairing process after a 42.2 Km Marathon race might take **1 to 10 weeks** to be completed.

Principle of Periodization



Training Methods

- **Continuous Running Training**
- **Interval Training**
- Fartlek
- Hill running
- Time trial
- …

Continuous Running Training

Fox, Bowers, & Foss (1993)

1. Continuous Slow-Running Training

- Generally, athletes should cover from **2 to 5 times** of their race distance at a pace that can bring their **heart rate** to **80 to 85%** of the **HR_{max}** (i.e., maximal heart rate).
- Use as **foundation training** before moving up to **continuous fast-running training**, or as easy running sessions on **recovery days**.

$$HR_{max} = 220 - age$$

Continuous Running Training

Fox, Bowers, & Foss (1993)

2. Continuous Fast-Running Training

- The intensity of the run should bring the athlete's **heart rate** to **85 to 95%** of the **HR_{max}**.
- **Simulates** the **race situation better** than **continuous slow-running training**.

Interval Running Training

- Refers to a series of **repeated** bouts of **runs alternated** with periods of **recovery**.
  - e.g. 1, 20 x 200 m, 60 s each, jog 1 min between each.
  - e.g. 2, 8 x 1000 m, 5 min each, jog 3-4 min between each.
- The **intensity** or speed of the runs is usually **greater** or **faster** than that can be done **continuously** for the whole training session.
- The recovery periods are usually occupied by light or mild exercise (e.g., walking or jogging) rather than complete rest.
- **Advantage: quantity** of the runs can be increased while **quality** can be maintained.

Interval Running Training

Åstrand et al. (1960)

	Workload	Work	Rest	Total Time	Blood Lactate Concentration	Feeling of Subject
Continuously	350W	-	-	9 min	16.5 mM	Exhausted
Intermittently		3 min	3 min	30 min	13.2 mM	Exhausted
		30 s	30 s	30 min	2.2 mM	Not too tired

Interval Running Training

Christensen et al. (1960)

- Running on a **treadmill** at a speed of **20 km/h** (i.e., **2:06** marathon time)
  - The subject could only run **continuously** for **4 min** (covering a distance of about **1300 m**)
  - The blood lactic acid level at the end of the test was **16.5 mM**.
- When the activity was conducted as alternating periods of 10-s run and 5-s rest
  - the subject completed **20 minutes** of running at **20 Km/hr** in a **30-min** period (covering a distance of **6670 m**) **without** undue fatigue.
  - The blood lactic acid level at the end of the test was only **4.8 mM**.

Interval Running Training

Sharkey (1986)

- Approximately **equal work** and **rest** intervals between **2 to 5 min** seemed to produce the greatest **aerobic** improvements.
- Shorter work intervals (e.g., 15 s) with a **work-rest ratio** of **1:1** are also effective in developing the **aerobic** system.
- For **anaerobic** training, the **maximum** duration for any work interval **should not** exceed **90 s**, or the body might switch to the aerobic system to support the ongoing activity.

Training for Health and Fitness

USDHHS (2008) and WHO (2012)

- **For Health Benefits**
  - **Adults** should do **at least 150 minutes** (2 hours and 30 minutes) a week of **moderate-**intensity, or **75 minutes** (1 hour and 15 minutes) a week of **vigorous-**intensity **aerobic** physical activity, or an **equivalent combination** of **moderate-** and **vigorous-** intensity **aerobic** activity.
  - Aerobic activity should be performed in episodes of **at least 10 minutes**, and preferably, it should be spread throughout the week.

Training for Health and Fitness

USDHHS (2008) and WHO (2012)

- **For Additional and More Extensive Health Benefits**
  - **Adults** should increase their **aerobic** physical activity to **300 minutes** (5 hours) a week of **moderate-**intensity, or **150 minutes** a week of **vigorous-**intensity **aerobic** physical activity, or an **equivalent combination** of **moderate-** and **vigorous-**intensity activity.
  - **Additional** health benefits are gained by engaging in physical activity **beyond** this amount.

Training for Health and Fitness

USDHHS (2008) and WHO (2012)

- **Moderate-intensity**
  - At **3 to 5.9 METs** (i.e., 3 to 5.9 times the intensity of rest).
  - About **5 or 6** on a scale of **0 to 10** relative to an individual's personal capacity, where 0 is the level of effort of sitting, and 10 is maximal effort.
  - **2.5 mph** or **4 km/h** (3 METs) or faster.

Training for Health and Fitness

USDHHS (2008) and WHO (2012)

- **Vigorous-intensity**
  - **6 METs or above** (i.e., 6 or more times the intensity of rest).
  - About **7 or 8** on a scale of **0 to 10** relative to an individual's personal capacity.
  - **4 mph** or **6.4 km/h** (6 METs) or faster.
  - 1 minute of vigorous-intensity activity counts the same as 2 minutes of moderate-intensity activity.

Ainsworth, Haskell, & Leon et al. (2011)

The compendium of physical activities（體力活動綱要）

Speed				Intensity
mph	min/mile	min/km	min/400 m	MET
4	15	9:19	3:43	6.0
5	12	7:27	2:59	8.3
5.2	11.5	7:09	2:51	9.0
6	10	6:13	2:29	9.8
6.7	9	5:36	2:14	10.5

Ainsworth, Haskell, & Leon et al. (2011)

The compendium of physical activities（體力活動綱要）

Speed				Intensity
mph	min/mile	min/km	min/400 m	MET
7	8.5	5:17	2:07	11.0
7.5	8	4:58	1:59	11.5
8	7.5	4:40	1:52	11.8
8.6	7	4:21	1:44	12.3
9	6.5	4:02	1:37	12.8

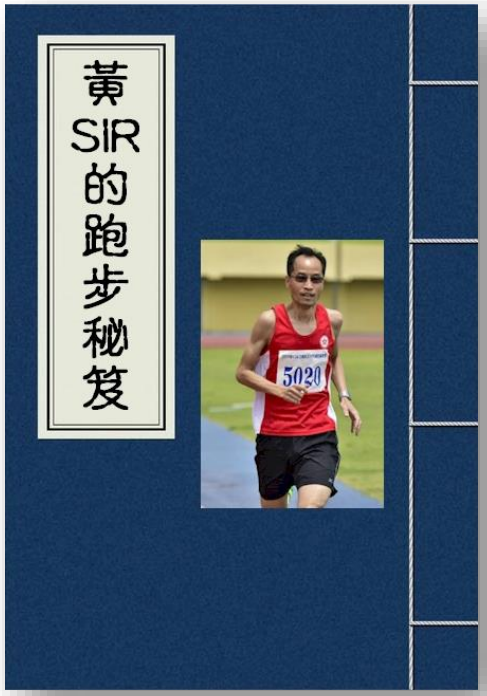
Ainsworth, Haskell, & Leon et al. (2011)

The compendium of physical activities（體力活動綱要）

Speed				Intensity
mph	min/mile	min/km	min/400 m	MET
10	6	3:44	1:29	14.5
11	5.5	3:25	1:22	16.0
12	5	3:06	1:15	19.0
13	4.6	2:52	1:09	19.8
14	4.3	2:40	1:04	23.0

Wong-Sir's Comments on Training for Race Performance

- **No** definite answer from **authorities**
- Take part in a race for the first time
  - **Goal: Finish** the race
- Take part in the race again
  - **Goal: PB** or **medal**
- **Pace judgement** is extremely important



Determinants of Aerobic Performances

Joyner & Coyle (2008)

- **Maximal oxygen consumption** (**$\dot{V}O_2max$**), **anaerobic threshold** (**AT**) and **running economy** (**RE**) are the **three main factors** appear to play key roles in **endurance** performance.

Midgley, et al. (2007)

- These three determinants explain **> 70%** of the between-subject variance in **long distance running** performance.

HR_{max}

National Council on Strength & Fitness

% VO_2max	% HRmax	Speed
50%	70%	Very Slow (warm up, cool down, recovery)
60%	75%	Slow Running (early measure of a long run, recovery day)
70%	82%	Steady Running (off-season; maybe challenging for LIT runs)
80%	88%	Half Marathon Pace; Just above Marathon Pace
90%	95%	10K Speed
95%	98%	5k Speed
100%	100%	3K Speed
110%	100%	1500 Speed

Wong-Sir's Comments on $v\dot{V}O_2max$ Running Prescription

Major Distance Running Events	Training Speed (% $v\dot{V}O_2max$)
1,500 m, 1 mile (1,609 m), 2K (2,000 m)	100 to 115%
3K (3,000 m), 5K (5,000 m)	95 to 105%
10K (10,000 m), 15K (15,000 m)	90 to 100%
Half Marathon (21,097 m)	85 to 95%
Marathon (42,195 m)	75 to 85%

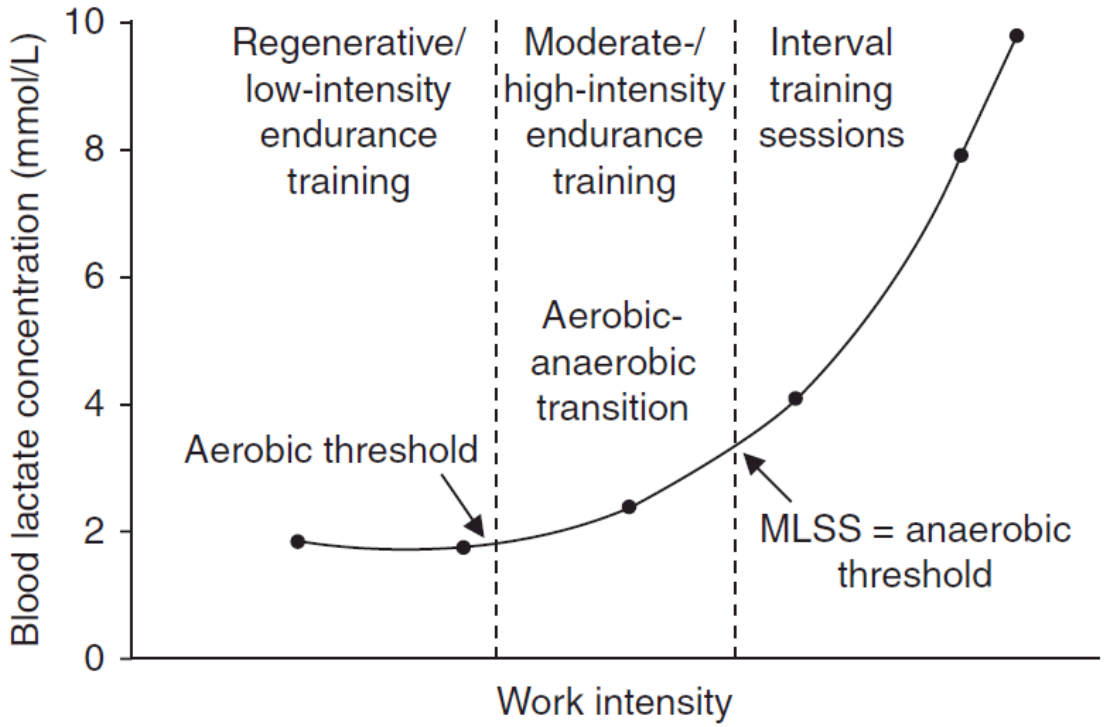
Remarks:

1. *Data adjusted (by me) for local runners.*
2. *3000 m is considered as running close to 100% for elite runners.*

One More Thing…

Anaerobic Threshold

- Become more important when **$\dot{V}O_2max$** has reached its plateau.



Wong-Sir's Comments on Training for Race Performance

Pace Running

- Run at a **steady pace** as much as possible.
  - Newton's 1st and 2nd laws of motion
- Most of the runs should be conducted at **race pace** or **slightly faster** than **race pace**.
  - To facilitate **Transfer of Learning**

Constant Speed Tables for Selected Distances

100 m	200 m	300 m	400 m	600 m	800 m	1000 m	1200 m	1500 m	1 Mile	2000 m	3000 m	4000 m	5000 m	10000 m	H-Mar	Marathon
0:00:15	0:00:30	0:00:45	0:01:00	0:01:30	0:02:00	0:02:30	0:03:00	0:03:45	0:04:01	0:05:00	0:07:30	0:10:00	0:12:30	0:25:00	0:52:45	1:45:29
0:00:16	0:00:32	0:00:48	0:01:04	0:01:36	0:02:08	0:02:40	0:03:12	0:04:00	0:04:17	0:05:20	0:08:00	0:10:40	0:13:20	0:26:40	0:56:16	1:52:31
0:00:17	0:00:34	0:00:51	0:01:08	0:01:42	0:02:16	0:02:50	0:03:24	0:04:15	0:04:34	0:05:40	0:08:30	0:11:20	0:14:10	0:28:20	0:59:47	1:59:33
0:00:18	0:00:36	0:00:54	0:01:12	0:01:48	0:02:24	0:03:00	0:03:36	0:04:30	0:04:50	0:06:00	0:09:00	0:12:00	0:15:00	0:30:00	1:03:18	2:06:35
0:00:19	0:00:38	0:00:57	0:01:16	0:01:54	0:02:32	0:03:10	0:03:48	0:04:45	0:05:06	0:06:20	0:09:30	0:12:40	0:15:50	0:31:40	1:06:49	2:13:37
0:00:20	0:00:40	0:01:00	0:01:20	0:02:00	0:02:40	0:03:20	0:04:00	0:05:00	0:05:22	0:06:40	0:10:00	0:13:20	0:16:40	0:33:20	1:10:19	2:20:39
0:00:21	0:00:42	0:01:03	0:01:24	0:02:06	0:02:48	0:03:30	0:04:12	0:05:15	0:05:38	0:07:00	0:10:30	0:14:00	0:17:30	0:35:00	1:13:50	2:27:41
0:00:22	0:00:44	0:01:06	0:01:28	0:02:12	0:02:56	0:03:40	0:04:24	0:05:30	0:05:54	0:07:20	0:11:00	0:14:40	0:18:20	0:36:40	1:17:21	2:34:43
0:00:23	0:00:46	0:01:09	0:01:32	0:02:18	0:03:04	0:03:50	0:04:36	0:05:45	0:06:10	0:07:40	0:11:30	0:15:20	0:19:10	0:38:20	1:20:52	2:41:45
0:00:24	0:00:48	0:01:12	0:01:36	0:02:24	0:03:12	0:04:00	0:04:48	0:06:00	0:06:26	0:08:00	0:12:00	0:16:00	0:20:00	0:40:00	1:24:23	2:48:47
0:00:25	0:00:50	0:01:15	0:01:40	0:02:30	0:03:20	0:04:10	0:05:00	0:06:15	0:06:42	0:08:20	0:12:30	0:16:40	0:20:50	0:41:40	1:27:54	2:55:49
0:00:26	0:00:52	0:01:18	0:01:44	0:02:36	0:03:28	0:04:20	0:05:12	0:06:30	0:06:58	0:08:40	0:13:00	0:17:20	0:21:40	0:43:20	1:31:25	3:02:51
0:00:27	0:00:54	0:01:21	0:01:48	0:02:42	0:03:36	0:04:30	0:05:24	0:06:45	0:07:14	0:09:00	0:13:30	0:18:00	0:22:30	0:45:00	1:34:56	3:09:53
0:00:28	0:00:56	0:01:24	0:01:52	0:02:48	0:03:44	0:04:40	0:05:36	0:07:00	0:07:31	0:09:20	0:14:00	0:18:40	0:23:20	0:46:40	1:38:27	3:16:55
0:00:29	0:00:58	0:01:27	0:01:56	0:02:54	0:03:52	0:04:50	0:05:48	0:07:15	0:07:47	0:09:40	0:14:30	0:19:20	0:24:10	0:48:20	1:41:58	3:23:57
0:00:30	0:01:00	0:01:30	0:02:00	0:03:00	0:04:00	0:05:00	0:06:00	0:07:30	0:08:03	0:10:00	0:15:00	0:20:00	0:25:00	0:50:00	1:45:29	3:30:59
0:00:31	0:01:02	0:01:33	0:02:04	0:03:06	0:04:08	0:05:10	0:06:12	0:07:45	0:08:19	0:10:20	0:15:30	0:20:40	0:25:50	0:51:40	1:49:00	3:38:00
0:00:32	0:01:04	0:01:36	0:02:08	0:03:12	0:04:16	0:05:20	0:06:24	0:08:00	0:08:35	0:10:40	0:16:00	0:21:20	0:26:40	0:53:20	1:52:31	3:45:02
0:00:33	0:01:06	0:01:39	0:02:12	0:03:18	0:04:24	0:05:30	0:06:36	0:08:15	0:08:51	0:11:00	0:16:30	0:22:00	0:27:30	0:55:00	1:56:02	3:52:04
0:00:34	0:01:08	0:01:42	0:02:16	0:03:24	0:04:32	0:05:40	0:06:48	0:08:30	0:09:07	0:11:20	0:17:00	0:22:40	0:28:20	0:56:40	1:59:33	3:59:06
0:00:35	0:01:10	0:01:45	0:02:20	0:03:30	0:04:40	0:05:50	0:07:00	0:08:45	0:09:23	0:11:40	0:17:30	0:23:20	0:29:10	0:58:20	2:03:04	4:06:08
0:00:36	0:01:12	0:01:48	0:02:24	0:03:36	0:04:48	0:06:00	0:07:12	0:09:00	0:09:39	0:12:00	0:18:00	0:24:00	0:30:00	1:00:00	2:06:35	4:13:10
0:00:37	0:01:14	0:01:51	0:02:28	0:03:42	0:04:56	0:06:10	0:07:24	0:09:15	0:09:55	0:12:20	0:18:30	0:24:40	0:30:50	1:01:40	2:10:06	4:20:12
0:00:38	0:01:16	0:01:54	0:02:32	0:03:48	0:05:04	0:06:20	0:07:36	0:09:30	0:10:11	0:12:40	0:19:00	0:25:20	0:31:40	1:03:20	2:13:37	4:27:14
0:00:39	0:01:18	0:01:57	0:02:36	0:03:54	0:05:12	0:06:30	0:07:48	0:09:45	0:10:28	0:13:00	0:19:30	0:26:00	0:32:30	1:05:00	2:17:08	4:34:16
0:00:40	0:01:20	0:02:00	0:02:40	0:04:00	0:05:20	0:06:40	0:08:00	0:10:00	0:10:44	0:13:20	0:20:00	0:26:40	0:33:20	1:06:40	2:20:39	4:41:18
0:00:41	0:01:22	0:02:03	0:02:44	0:04:06	0:05:28	0:06:50	0:08:12	0:10:15	0:11:00	0:13:40	0:20:30	0:27:20	0:34:10	1:08:20	2:24:10	4:48:20
0:00:42	0:01:24	0:02:06	0:02:48	0:04:12	0:05:36	0:07:00	0:08:24	0:10:30	0:11:16	0:14:00	0:21:00	0:28:00	0:35:00	1:10:00	2:27:41	4:55:22
0:00:43	0:01:26	0:02:09	0:02:52	0:04:18	0:05:44	0:07:10	0:08:36	0:10:45	0:11:32	0:14:20	0:21:30	0:28:40	0:35:50	1:11:40	2:31:12	5:02:24
0:00:44	0:01:28	0:02:12	0:02:56	0:04:24	0:05:52	0:07:20	0:08:48	0:11:00	0:11:48	0:14:40	0:22:00	0:29:20	0:36:40	1:13:20	2:34:43	5:09:26
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Nutrition for Athletes

Fox, Bowers, & Foss (1993)

- The biggest difference in food requirements for the athlete versus the non-athlete is the **total** number of **calories** consumed; and the athlete will require more.

US National Research Council (1989)

- **Recommended Dietary Allowances (RDAs)**
  - **Male:** 2,900 kcal/day
  - **Female:** 2,200 kcal/day

Nutrition for Athletes

American College of Sports Medicine, American Dietetic Association, and Dietitians of Canada (2000)

- Unless athletes restrict themselves from energy intake or eliminate one or more food groups from their diet, **supplementation** of **vitamins** and **minerals** is generally **not** required.

Pregame Meal

ACSM, ADA, & DC (2000)

- **Sufficient** in **fluid** to maintain hydration.
- **Low** in **fat** and **fiber** to facilitate gastric emptying and minimize gastrointestinal distress.
- **High** in **carbohydrate** to maintain blood glucose and maximize glycogen stores.
- **Moderate** in **protein**, and composed of foods **familiar** to the athlete.

Pregame Meal

Wilmore & Costill (1994)

- **Carbohydrates** consumed either **5 minutes** or **2 hours before**, or **during** exercise enhance endurance performance (lasting over 1 hour).
- However, athletes should keep away from **carbohydrates 15 to 45 minutes before** exercise to avoid the secretion of **insulin**, which reduces blood glucose level and leads to premature fatigue.

Pregame Meal

Competition in the Morning

- High-carbohydrate dinner the night before.
- Light breakfast or some snacks in the morning on race day.

Competition in the Afternoon

- High-carbohydrate diets the night before and in the morning of race day.
- Light meal or some snacks only for lunch.

Competition in the Evening

- High-carbohydrate breakfast and lunch on race day.
- Some snacks only in the afternoon.

Hydration and Dehydration

- **Water** makes up almost **40 to 60%** of body weight.
- A **Marathon** runner may lose **6 to 10%** of her body weight simply due to **perspiration** in a race.

Wilmore and Costill (1994)

- Found that a runner, who had finished the 10,000 m in 35 minutes before, could run **2:48 slower** (i.e., by 4%) due to dehydration.

Hydration and Dehydration ACSM, ADA, & DC (2000)

Before Exercise

- Drink an **extra 400 to 600 ml** of water within the **2 to 3 hours before** exercise starts.

During Exercise

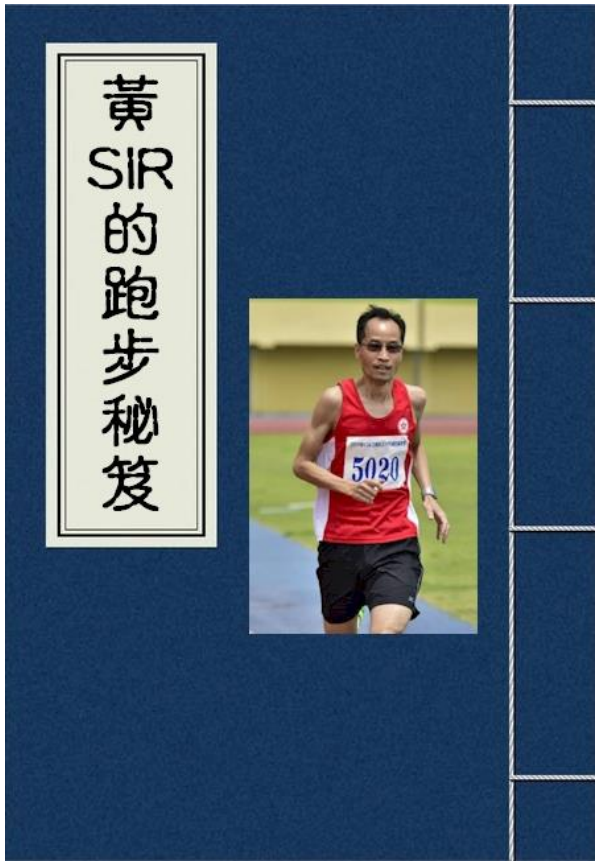
- Consume **150 to 350 ml** of water at **15- to 20-minute intervals**, beginning at the start of exercise.
- also better for the drink to contain **4 to 8%** of **carbohydrate** if the event lasts over one hour.

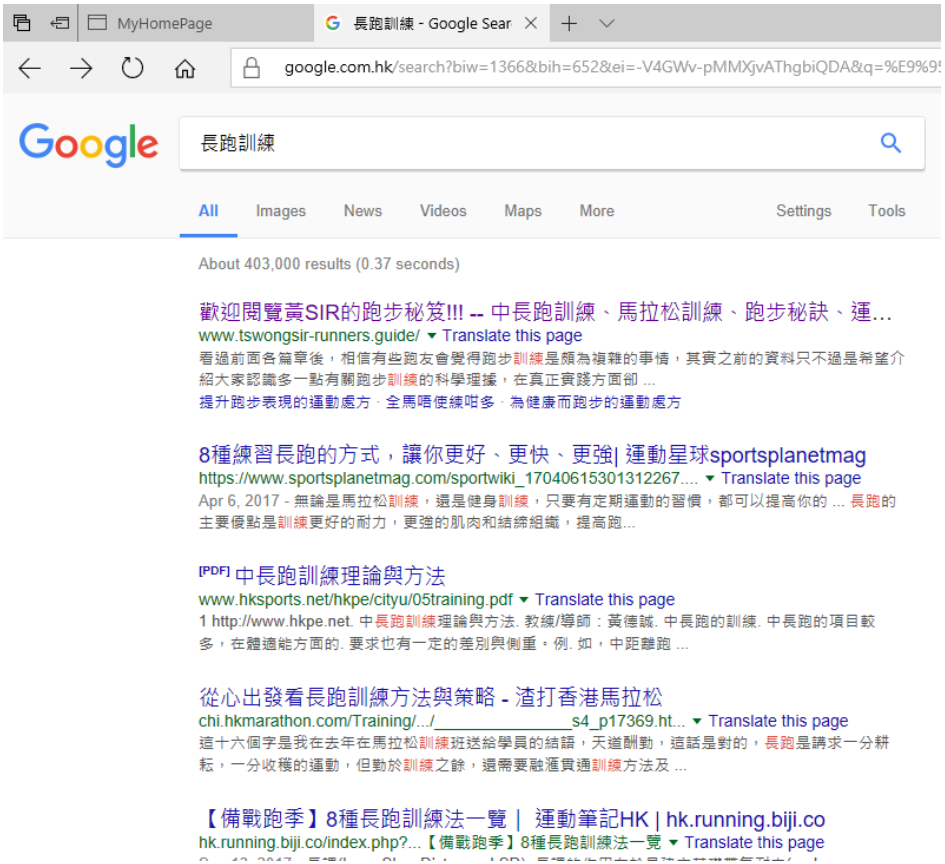
After Exercise

- Continue to drink water up to **150%** of their **body weight loss**.

Running Training Q&A

Want to know more...





http://www.tswongsir-runners.guide