
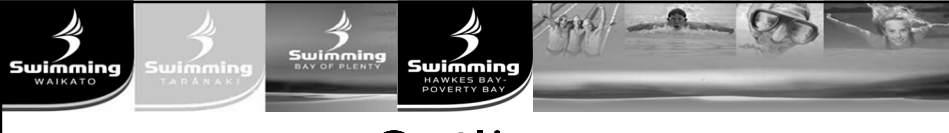


Development of Aerobic Capacity in younger Swimmers

By: Graham Smith

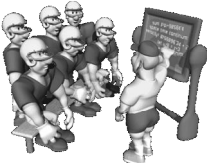


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Outline

- Long Term Athlete Development (LTAD)
- Priorities in Swimmers Training
- Aerobic Development
- Examples of LTAD




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LTAD

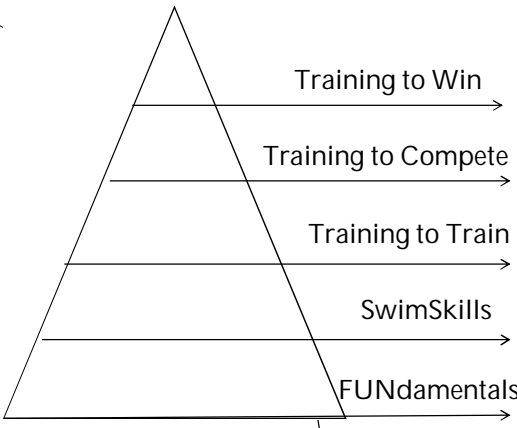
Childhood	- FUNdamentals
Late childhood	- SwimSkills
Adolescence	- Training to Train
Early adulthood	- Training to Compete
Adulthood	- Training to Win

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LTAD

Ages
M: 18+ F: 16+
M: 15-18 F: 14-16
M: 12-15 F: 11-14
M: 9-12 F: 8-11
M: 6-9 F: 5-8




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LTAD- FUNdamentals

Female 6-8 years, Male 6-9 years.
Positive and fun approach.
Movement literacy- throwing, catching etc
Overall development of physical capabilities.
Participation in wide range of sports.


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LTAD- Swimskills

Female 8-11 years, Male 9-12 years.
Emphasis on skill development.
Learn all 4 strokes, starts, turns and finishes.
Training emphasis on 200 IM.
Period of peak motor development.
Cannot be recaptured at a later time.

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LTAD- Training to Train

Female 11-14 years, Male 12-15 years.
 Sports specific training all year round.
 Emphasis on training rather than competing.
 Individual medley

Period of peak aerobic development.
 High volume, low intensity.
 Cannot be fully recaptured at a later time.


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LTAD- Growth & Development

	FUNDamental	SwimSkills	Training to Train	Training to Compete	Training to Win
Ages (Years)	<u>Chrono</u> Female: 5-8 Male: 6-9	<u>Chrono/Bio</u> Female: 8-11 Male: 9-12	<u>Bio</u> Female: 11-14 Male: 12-16	<u>Bio</u> Female: 14-16 Male: 16-18	<u>Chrono</u> Female: 16+ Male: 18+
Development Phases	Movement Literacy	Skill Development	Skill / Aerobic Development	Competitive / Physical Development	Specialisation, Performance Development
Development Focus	ABCs Speed (1)	ABCs Motor Co-ordination Core Stability	Aerobic Refine Skills Speed (2) Core Stability	Aerobic Strength Anaerobic Core Stability Tactical Mental Prep	Anaerobic Strength Aerobic Core Stability Tactical Mental Prep Knowledge/ Experience

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LTAD- Training

	FUNdamental	SwimSkills	Training to Train	Training to Compete	Training to Win
Training Sessions (per week)	General Sport: 5-6 sessions 30-45 mins/ses	Swimming: 4-6 sessions 60-90 mins/ses	Swimming 6-12 sessions 120 mins/ses	Swimming 8-12 sessions 120 mins/ses	Swimming 10-15 sessions 120 mins/ses
Training Hours (per week)	Sessional	Pool: 4-7 hrs Land: 1-2 hrs	Pool: 12-24 hrs Land: 2-3 hrs	Pool: 16-24 hrs Land: 3-4 hrs	Pool: 20-24 hrs Land: 3-6 hrs
Training Volumes (per week)		8-14 km/wk	24-32 km/wk Leading to: 43-52 km/wk	43-52+ km/wk	43-52+ km/wk (Depends on specialism)
Periodisation	None	Single (1 x 48 weeks)	Double (2 x 24 weeks)	Double (2 x 24 weeks) Triple (3 x 15 weeks)	Double (dist) (2 x 24 weeks) Triple (m. dist) (3 x 15 weeks) Multiple (spr)

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Priorities


Training of age group swimmers
SHOULD BE FOCUSED ON

SKILL TRAINING and
development of Endurance

i.e. - **Power, Capacity and Efficiency** of the
energy delivery systems



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Priorities

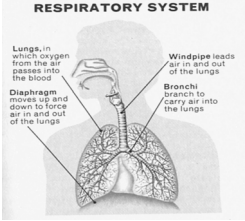
Athlete Rate of Improvement and Variables				
	UNDER 15	15-18	18-21	Over 22
Growth and Development	65%	50%	25%	10%
Training and Skill Acquisition	35%	50%	75%	90%
Rate of Improvement	5 - 10 %	2-5%	1-2%	1%

Source: Jan Olbrecht / Jim Fowlie

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Aerobic Development



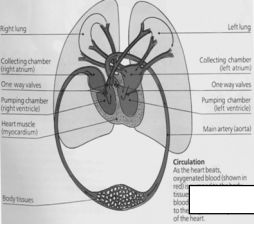
RESPIRATORY SYSTEM

Lungs, in which oxygen from the air passes into the blood.

Windpipe leads air in and out of the lungs.

Branches branch to carry air into the lungs.

Diaphragm moves up and down to force air in and out of the lungs.



Right lung Left lung

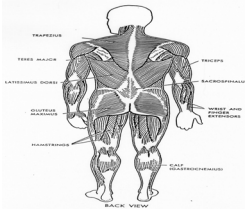
Collecting chamber (right atrium) Collecting chamber (left atrium)

One way valves One way valves

Pumping chamber (right ventricle) Pumping chamber (left ventricle)

Heart muscle (myocardium) Main artery (aorta)

Circulation: As the heart beats, oxygenated blood (shown in red) flows to the body tissues.



TRAPEZIUS

TRAPES BACULI

LATISSIMUS DORSI

PECTORALIS MAJOR

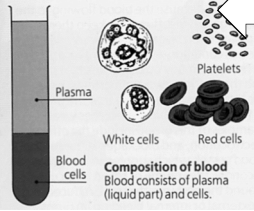
SCAPULA

SPINE AND RIBS

ARM AND FOREARM

SHOULDER

BACK VIEW



Plasma


White cells

Red cells

Platelets

Composition of blood
Blood consists of plasma (liquid part) and cells.

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Aerobic Development

Cardiovascular changes brought about by Aerobic training include:

- An increase in the thickness of heart muscle
- An increase in the diameter of the heart chambers.
- Increased stroke volume
- Decrease in the heart rate
- Lowering of the blood pressure


SO HOW DO WE DO IT!

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GUIDELINES FOR AGE GROUP TRAINING- FINA2002

AGE	7-10			11-12			13-14			15-OVER		
PRACTICES/DAY	1			1			1 - 2			1 - 2		
PRACTICES/WEEK	2 - 3	3 - 4		4 - 6			6 - 10			6 - 12		
LENGTH/PRACTICE	45 Mn-1 Hr	1-1.5 Hr		1 - 2 Hr			1.5 - 2 Hr			1.5 - 2 Hr		
YARDS/HOUR	300-500	1000-1500		1200-2500			1500-3500			2000-4000		
SEASON LENGTH	8 - 9 Mos/Year						10 Mos/year			10 - 11 Mos/Yr		
DRYLAND	Other Sports			Flexibility Calisthenics			Tubing/Paddles			Weights/Tubing Flexibility		
DISTANCES SWUM COMP/YEAR	10-25	Hrs	# EV	50/ 100	Hrs	# EV	100/2 00	Hr	# EV	100/1 650	Hr	# EV
LOCAL	10	1.5	2 - 3	8	2	4	10	2	4	10	2	4 - 8
REGIONAL	0	0	0	7	4	4	10	6	5	10	6	5
NATIONAL	0	0	0	0	0	0	2	4	3	2	4	3
INTENSITY %/PRACTICE												
AEROBIC	>35			>60			>60			>50		
ANAEROBIC	5 (Alactic)			10 (Alactic)			>15			25		
TECHNIQUE	60			30			25			25		



Type of Training	Pace	H/R (bpm)	BBM	Dist per set	Mid Dist per set	Sprint per Set	SR Free	SR B/c	SR B/R	SR FLY	% Of PB	100 PB+	Race Pace	Scale off Eff 1-10
REC	Easy swim, should feel easy	100-120	50/60	5,000+	4,000+	3,000+	23	24	17	22	60%+	15-20sec	N/A	3 to 4
EN-1	2 to 4sec slower than Threshold pace	120-150	40/30	5,000+	4,000+	3,000+	30	28	22	26	65-75%	10-12sec	10k	5 to 6
EN-2	Anaerobic Threshold somewhat hard	160-170	25/30	4,000+	3,200+	2,400+	34	31	25	29	70-85%	7-10sec	2000+	6 to 7
EN-3	1 to 2 sec faster than threshold pace	180-190	20/10.	2,000+	1,600+	1,200+	45	41	37	39	85%+	4-7sec	400+	7 to 8
SP-1	As fast as possible	190-MAX	MAX	600+	600+	600+	52	48	48	47	90%+	MAX	200+	10
SP-2	As fast as possible	190-MAX	MAX	400+	400+	400+	56	53	55	53	95%+	MAX	100+	10
SP-3	Maximum Speed	160-180	5 TO 10	100+	100+	100+	60	59	63	59	N/A	MAX	50+	8/10.

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Rick Benner (American Swimming Magazine, 5, 2002)
“eight levels of our program”:


- Novice: 3 times per week x 30 min
- Developmental: 3 x week x 45 min
- Pre-Age Group: 5 x week x 45 min
- Age Group: 6 x week x 90 min
- Pre-Senior: 8 x week x 120 min [2 doubles]
- Senior: 9 x week x 120-180 min [3 doubles]
- National: 11 x week x 90-180 min [5 doubles]
- Olympic: 14 x week x 120-180 min [2 triples]



Progression

WK one – 12x100 free @ 1:45
WK two – 12x100 free @ 1:40
WK three – 12x100 free @ 1:35
WK four – 12x100 @ 1:30
THEN
WK's Five to Eight same go times- 16x100
THEN
WK's 9-12 Back to 12x100 start on 1:40/35? And repeat
THEN
WK's 13-16 20x100 start @ 1:30 DEC go time


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Example

Warm-up: 5x200 @ 4:15 1-3 Free, 4-5 as 50 form Build
100free SC 50 form build
Set 1 10x100 @ 2:30 as 1 dive PB+5 1 MOD
Set 2 10x100 b/r @ 2:15 as 1-6
25 pullout 25, 2sec glide, 25 heal to hands, 25 2k 1p
7-10 as 25 EXP 50 MOD 25 FAST
Set 3 6x50 kick BEST TIME @ 1:30
2x200 warm-down @ 4:15 SKILL WORK
DIST:- 4000


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Example- Evaluation

SESSION EVALUATION											
Actual Dist:		3700				Target Dist:		3700			
Energy system						Stroke and Skills					
	Meters	%		Meters	%		Meters	%		Meters	%
REC	900	24.32	Sp-1	0	0.00	Free	1800	48.65	No 1	600	16.22
En-1	1800	48.65	Sp-2	0	0.00	Back	0	0.00	IM	0	0.00
En-2	300	8.11	Sp-3	200	5.41	Breast	1000	27.03	Kick	300	8.11
En-3	500	13.51				Fly	0	0.00	Pull	0	0.00


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Progression

400 Free- women						
	FAST TRACK		MIDDLE TRACK		SLOW TRACK	
AGE	TIME	% to goal	TIME	% to goal	TIME	% to goal
10	05:13.9	79.00%	05:54.3	70.00%	06:46.6	61.00%
11	04:48.7	85.89%	05:09.8	80.05%	05:34.2	74.21%
12	04:32.7	90.95%	04:44.5	87.16%	04:57.5	83.37%
13	04:24.0	93.95%	04:30.6	91.66%	04:37.5	89.37%
14	04:16.6	96.63%	04:20.5	95.21%	04:24.4	93.79%
15	04:11.8	98.49%	04:13.4	97.87%	04:15.0	97.26%
16	04:09.3	99.46%	04:09.7	99.31%	04:10.1	99.16%
17	04:08.0	100.00%	04:08.0	100.00%	04:08.0	100.00%

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Bob Bowman: Progression of Michael PHELPS

9-10 years of age:

4 sessions a week x 75 min → 5 session x 90 min
Aged 10 – ranked 1st In 200 IM and 200 fly


11-12 years of age:

5 sessions a week x 120 min Trained with 13-14 years old swimmers.
Stroke development → BR, Fly and free. Age 12 – ranked 1st In 50 fly/100 fly/200 IM.

13-14 years:

6 sessions a week x 120 min + 2 session x 90 min
1999 – still 13 years old - ranked 1st In 200 fly, 400 IM, 1500 free -2.04.68/ 4.31.86/ 16.00.4

BREAKTHROUGH: at the age of 14-15 –
7 sessions a week x 150 min + 2 sessions x 90 min
Summer time - 10 sessions per week x 120-150 min



Bob Bowman: Progression of Michael PHELPS

2000 Spring Nationals – **Still 14 years old –**
 200 fly = **1.59.6** → final → **1.57.66**/ 200 IM **2.05.54** / 400 IM **4.23.86**

2000 aged 15 – Olympic Trials → focus on 200 fly (still did IM).
 Fly = **1.58.61-1.58.24-1.57.48** Failed IM


Aftermath preparation to Sydney Olympics:

Planning → day after swimming: Refocusing → back to water in Sydney → flight home/camp in Australia: **1.57.30-1.57.00-1.56.50**

High Performance Stage – 15-16 years of age/7 days a week

Winter 6 sessions x 180 min + 5 sessions x 120 min

Year 2001 – turned to pro




Summary

To optimise aerobic development you must:

- 1st – concern yourself with your workout density
- 2nd – lower repeat times
- 3rd – increase volume of session

Think about the bigger picture
SKILLS 1st Speed 2nd

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Summary

*“He who controls the present, controls the past,
He who controls the past, controls the future”*

Feedback?
Questions?
Comments?
Arguments?

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