




TRAINING OF TOP US MIDDLE DISTANCE SWIMMERS


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IM Training


IM is important part of development for future elite level middle distance swimmers (Phelps, Lochte, Hoff, etc.)
Most of swim clubs in U.S. train age group swimmers as IM-ers until 15-16 y.o.
Swimming all strokes develops better skills and technique
Using slightly different muscles for various strokes helps to avoid overloading muscles
Less injuries happen if athletes use various muscles when swimming all strokes



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Training Volumes and Performance Improvements


Increase in swimming volumes has positive correlation with improvements in swimming times for IM-ers and mid-distance swimmers
There is no correlation between increase in swimming volumes and improvements in swimming times for sprinters



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Physiology of IM Training

IM swimmers have similar aerobic capacity as distance swimmers
That is good for swimmers long-term career
Lower lactate peak and faster lactate clearance are typical for IM-ers, especially for 400 distance
IM-ers have lower physiological cost of performance due to good aerobic conditioning




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Lactate Peaks after IM Events

Distance, meters	50 FR	100 FR	200 FR	400 FR	1500 FR	10 KM
Lactate Peak, mmol/l	7.2 ± 1.1	12.3 ± 3.1	11.4 ± 2.0	10.3 ± 2.7	7.3 ± 1.3	3.6 ± 1.4

Distance, meters	200 IM	400 IM
Lactate Peak, mmol/l	10.2 ± 2.1	8.5 ± 1.6



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Relative Endurance for IM Swimmers

Ratio between 400 IM time / 200 IM time shows relative endurance in IM events

Top-10 female IM-ers:

- 2.110 for 200 IM
- 2.097 for 400 IM

Top-10 male IM-ers:

- 2.139 for 200 IM
- 2.113 for 400 IM



Changes of Relative Endurance Michael Phelps

	2004	2008	2011	2012	2016
400 IM	4:08.26	4:03.84		4:07.89	
200 IM	1:56.71	1:54.23	1:54.16	1:54.27	1:54.66
	2.127	2.135		2.169	



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Changes of Relative Endurance Ryan Lochte

	2004	2008	2011	2012	2016
400 IM	4:17.45	4:06.08	4:07.13	4:05.18	4:11.98
200 IM	1:58.78	1:55.22	1:54.00	1:54.90	1:56.22
	2.167	2.136	2.168	2.134	2.168



Changes of Relative Endurance Katie Hoff

	2004	2006	2007	2008	2010	2012
400 IM	4:37.67	4:35.82	4:32.89	4:31.12	4:37.52	4:39.74
200 IM	2:12.06	2:10.05	2:10.13	2:09.71	2:12.49	2:12.02
	2.103	2.121	2.097	2.090	2.095	2.119



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Primary Energy Zones for IM-ers

Aerobic development and mix energy zones are the most important for IM-ers

EN 1: HR 140-160 bpm or 75-80% from max

EN 2: HR 160-180 bpm or 80-90% from max

EN 3 (MIX): HR 180-Max bpm or 90-100% from max



Examples of Swim Sets in EN1

Same distance sets:

3 x 800 :45s, 3 x 500 :30s, 4 x 400 :60s, 6 x 300 :30s, 4 x 550 :45s, 15 x 200 :30s

Descending rest interval:

6 x 400 on 6:00-5:50-5:40-5:30-5:20, 15 x 200 (5 on 2:50, 5 on 2:45, 5 on 2:40)

Various distance sets:

1000 + 800 + 600 :60s, 2 x (500 + 400 + 300 + 200 :30s) :90s, 2 x (3 x 300 :30s + 3 x 200 :20s) :90s



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Examples of Swim Sets in EN2

Same distance sets:

2 x 450 :30s, 3 x 300 :60s, 8 x 150 :30s, 6 x 200 :30s

Descending rest interval:

5 x 200 :40-30-20-10s, 4 x 300 :60-45-30s, 7 x 200 :30-25-20-15-10-5s

Various distance sets:

400 + 300 + 200 :30s, 400 + 300 + 200 + 100 :30s, 2 x (300 + 200 + 100 :30s) :90s, 200 + 300 + 400 + 300 + 200 :30s, 500 + 400 + 300 + 200 + 100 :30s



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Examples of Swim Sets in EN3

Same distance sets with short rest interval:

10 x 50 :15s, 6 x 100 :20s, 4 x 150 :30s

Descending rest interval:

4 x 150 :30-20-10s, 4 x 200 :60-50-40s

Various distance sets:

50 + 100 + 200 + 100 + 50 :30s, 200 + 150 + 100 + 50 :30s, 300 + 200 + 100 :60s, 2 x 200 :60s + 2 x 100 :30s, 100 + 200 + 300 :60s,



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IM Training at NBAC (Michael Phelps)

IM aerobic training is essential at the NBAC

Coaches emphasize capacity training vs utilization

Long-term and general training takes longer to develop

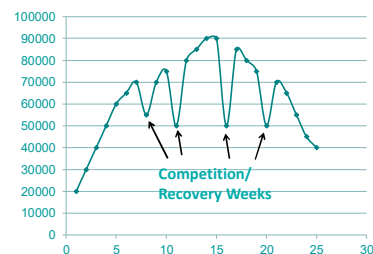
Sacrifices short-term gains for long-term goals

Widespread and less specific therefore less volatile



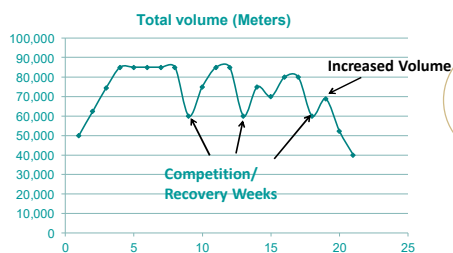
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NBAC Fall-Winter Season Training Plan



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NBAC Spring-Summer Season Training Plan



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IM Capacity Workout

100 FR	1:15	900 FR	11:15
200 FR/IM	2:50	800 IM	11:20
300 FR	3:45	700 FR	8:45
400 FR/IM	5:40	600 IM	8:30
500 FR	6:15	500 FR	6:15
600 FR/IM	8:30	400 IM	5:40
700 FR	8:45	300 FR	3:45
800 FR/IM	11:20	200 IM	2:50
900 FR	11:15	100 FR	1:15
1000 FR/IM	14:10		



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IM Capacity Workout

3 x (200 fr, 200 IM/kick, 200 pull, 200 IM/drills)
 12 x 50 :50s (fr, fr-bk, fr)
 5 x 200 3:00 + 8 x 50 :60s (2ez, 2 bk drills, 4 swim)
 4 x 200 2:55 + 8 x 50 :60s (2ez, 2 bk drills, 4 swim)
 3 x 200 2:50 + 8 x 50 :60s (2ez, 2 bk drills, 4 swim)
 2 x 200 2:45 + 8 x 50 :60s (2ez, 2 bk drills, 4 swim)
 1 x 200 2:40



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IM Capacity Workout

800 mixer
 800 kick mixer
 400 pull
 400 drill (100 IMs)
 12 x 50 :50s (fr, fr-fl, fl)
 30 x 50 :60s (kick, drill, swim fly)
 100+200+300+400+500 kick IM
 100+200+300+400+500 IM drill (100s)



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IM Utilization-Technique Workout

3 x (100 fr 3rd, 100 kick-drill fl, 100 fr 5th, 100 kick-drill bk, 100 fr 7th, 100 kick-drill br)
 24 x 50 :55s (2 kick, 2 drill, 2 swim)
 Fly or back: 16 x 50 :45s, 12 x 50 :50s, 8 x 50 :55s, 4 x 50 :60s
 5 x (200 fr, 200 IM drills) pull
 20 x 50 :50s kick w/fins (3 – 25 fast/25 ez, 1 – fast)



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IM Utilization Main Set in a Workout

5 x (50 fr, 50 bk, 50 fr, 50 br, 50 fr, 50 single arm fly)
 12 x 100 1:30 kick w/fins, desc 1-3
 12 x 100 1:30 (3 fr, 3 fr-bk)
 12 x 50 1:10 IM



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IM Utilization Workout

3 X [200 FR on 2:40/ 200 IM on 2:45 | 200 K on 3:15 | 200 STR DR on 3:00] (2,400)
 Two rounds: 2x100on1:20 50FR/50 FL, 1 x 200 on 2:30 FR/IM, 1 x 300 on 4:00 FL, 1 x 200 on 2:30 FR, 1 x 300 on 4:15 100BA | 100 BRST | 100 FR, 1 x 200 on 2:40 FL, 1 x 300 on 3:45 FR, 1 x 400 on 5:15 FR/IM, 3 x 100 on 1:30 FL, 1 x 200 on 2:40 FR
 24x50K: 2 on :55 MODERATE, 1 on :45 FAST
 200 SW DN
9,000 SCY



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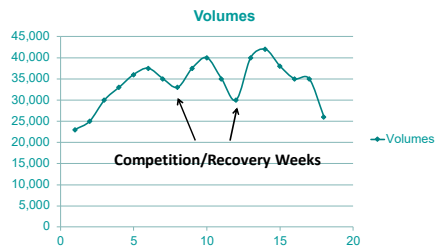
IM Utilization Workout

SCY:1200 = 100 FR (breathe 25 R/25 L), 100 BA (25 R/ 25 L), 100 IM (FL-BA-BRST-FL)
 8 x 100 K on 1:40 (2= 50 FL/50 BA), (2 50 BA/50 BRST, 2 50 BRST/50 FR, 2 50 FR/50 FL)
 8 x 50 on :45 (2 of each stroke reverse IM order)
 LCM: 3 x 100 on 1:30 (50 FR mod / 50 FL @ 400 IM speed), 3 x 200 on 3:00 (50 FR/50 FL + 100 BA @ IM speed), 3 x 300 on 4:30 (50FR/50FL/100BA + 100 BRST), 3 x 400 on 6:00 (50FR/50FL, 100BA/100BRST + 100 FR)
 SCY: 4 x 400 PAD, BAND on 5:00 (DESC 1-4.)
 24 x 25 on :30 (3-2-1-0 breaths per 25)
 7,600 SCY/LCM



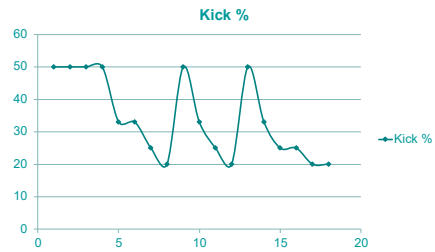
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Nitro Swim Team (13-14 y.o.) Spring-Summer Season Training Plan



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Nitro Swim Team (13-14 y.o.) Kicking Volumes



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Nitro IM Workout

Monday - Aerobic Recover After Meet

600 IM Drill (15)
 30x100 on 1:30
 1-10 Kick w/ fins and board Dec 1-5, 6-10
 11-20 IM Swim w/ fins Dec 1-5, 6-10
 21-30 O: 50 Catch up w/ over kick, 50 build to overkick
 E: 4, 3, 2, 1 breaths per 25 (50) 3600
 Meeting-Talk about meet, where we need to go from here (10)
 32x50 on :55 IM by 8, 3 Drill, 1 Drill/Swim (30) 5200
 800 Loco Pull
 25F-25EZ-50 F-50EZ-75F-75EZ-100F-100EZ-75F-75EZ-50F-50EZ-25F-25EZ
 (15) 6000 Yards



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Nitro IM Workout

Tuesday PM

20x50 on 1:00 5 Free w/ paddle on head
 5 Breast drill K-P-K-G
 5 Bk w/ paddle on head
 5 Fly Surf Drill (20) 1000
 10x150 Kick w/ fins
 3- Streamline w/ snorkel on 2:15, 2- 25 UWK/25 Bk Dolphin on 2:30 (25) 2500
 6x500 Odds: Free on 5:45, 6:15, or 6:45
 Evens: 50 IM FAST/75 Free Cruise on 6:15, 6:45, or 7:15 (40-45) 5500
 400-800 Pull 50 BK/150 Free (10-15) 6000-6300



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Nitro IM Workout

Wednesday PM

Main Set- IM Focus

4x (250 IM Progression by round 100fl/50bk/50br/50fr,
 50fl/100bk/50br/50fr... 3:30 or 3:45) + (150 Free 12 strokes or less
 per 25 on 2:10 or 2:15) + (50 IM FAST by round on 1:00)
 1:00 Break
 4x (125 IM Progression by round 50 fl/25bk/25br/25fr,
 25fl/50bk/25br/25fr... 1:40 or 1:50) + (75 Free 12 stroke or less per 25
 on 1:05 or 1:10) + (25 IM FAST by round on :30)(45) 5200
 30x25 Kick all out on :30 5 Fr, 5 Fly All with snorkel
 1 HL, 1 R Side, 1 L Side, 1 SL, 1 Superman (15) 6000



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Nitro IM Workout

Saturday AM- LCM

Main set either IM or Free

IM:
 3x400 IM w/ fins on 7:30, Dec 1-3 #3 be under Tags standard (30) 5500
 WD
 Free:
 800 w/ fins (under tags cuts 9:20/9:40) on 11:00
 7x100 ALL OUT w/ fins and paddles on 1:25(add up 800 and
 7x100 for mile time)
 WD (30) 5800



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IM Sets for Katie Hoff

Four rounds in SCY:

- 100 free on 1:20 (hold 58-59 sec)
- 150 on 1:55 (1:27-1:28)
- 200 IM drill
- 150 free on 1:50 (1:26-1:27)
- 100 free on 1:05 (descend 1-4, times 52.8, 52.7, 51.8, 50.6), keep the same number of stroke on every lap
- 6 x 50 on 45 sec (20 sec extra rest before beginning the next round)



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IM Sets for Katie Hoff

Four rounds in SCY:

- 500 on 5:30 (hold steady pace)
- 4 x 100 (fly on 1:20, back on 1:20, breast on 1:30, free on 1:20, add up to 400 IM goal and faster through the set)



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IM Sets for Katie Hoff

Three rounds in SCY:

- 150 on 2:20 (50 free, 25 breast kick, 50 breast drills, 25 breast kick)
- 3 x 50 on 50 sec breast descend 1-3
- 100 on 1:25 IM
- 2 x 25 on 30 sec breast descend 1-2
- 50 on 1:00 choice
- 50 on 40 sec breast fast



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IM Sets for Katie Hoff

In LCM:

- 32 x 100 free every 4th fast, every 8th very fast
- Katie's times: 1:01, 59.8, 1:01, 59.2, 1:01, 58.1, 1:02.1, 57.3
- 200 easy
- 16 x 50 free every 4th fast, every 8th very fast
- Katie's times: 29.2, 27.7, 29.1, 27.0



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IM Sets for Katie Hoff

Five rounds continuous in LCM:

- 50 back
- 50 drill (3 strokes/10 kicks for 25, 3 strokes/6 kicks for 25)
- 50 back build tempo
- 50 single arm with 8 kicks between strokes
- 50 kick
- 100 IM drills, rest 10-15-20-25-30 sec each round
- 50 back time trial



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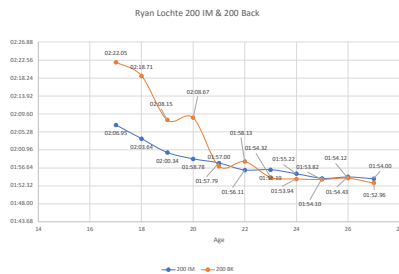
Ryan Lochte

- Unlike Michael Phelps, Ryan Lochte didn't make National Team until he was 19 y.o.
- First Olympic Games in 2004 at 21 y.o.
- Aerobic development by his dad, coach Steve Lochte, moderate volume swimming peaking at 6,000-7,000 per day
- Mostly single daily practices before college
- Gradual increase of swimming volumes in long-term development
- Ryan was a distance freestyler before college
- He swam 1500 at 2004 Olympic Trials



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Ryan Lochte's Performance Progression



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Ryan Lochte's Training

- Coach Greg Troy is a believer in high-volume training, even for sprinters (Caeleb Dressel)
- Ryan's volumes increased in college, especially during the altitude camps (100,000 m a week of aerobic training)
- Coach Troy designs two long training season a year – 26 weeks + 26 weeks
- Each training block has 4-week cycles, volumes increase for 3 weeks + 1 week for taper
- Team minimizes travel to competitions during the season, only at the end



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Ryan Lochte's Training

- The first week in every 4-week cycle is high-volume aerobic 70,000+ yards in 9-10 weekly practices
- 20-30% of volume done kicking, significant amount of pulling, a lot of underwater kick
- Three intense weekly dry-land practices
- Five really high-volume practices per week
- Two quality practices per week
- Long swimming sets with descending effort



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Ryan Lochte's Training

- The second week in every 4-week cycle has slightly lower volume of 60,000-65,000 yards in 9 weekly practices
- 30-40% of volume done kicking
- Three intense weekly dry-land practices
- Three really high-volume practices per week
- Four quality practices per week, sometimes back to back
- Long quality sets with focus on 400 IM



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Ryan Lochte's Training

- The third week in every 4-week cycle has slightly lower volume of 55,000-60,000 yards in 8-9 weekly practices
- 10-15% of volume done kicking
- Two weekly high-volume practices
- Two intense weekly dry-land practices
- Four-five quality practices per week
- Short anaerobic sets with focus on 200 IM



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Ryan Lochte's Training

- The fourth week in every 4-week cycle is recovery week with 45,000-50,000 yards in 7-8 weekly practices
- Training is based on ability to recover. If Ryan recovers fast, it may be 2 days of recovery only.
- Hard kicking sets about 20% of total volume
- Two weekly high-volume practices
- Three quality practices per week
- Four practices with focus on technique, dives, turns
- Longer rest intervals in anaerobic sets



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Ryan Lochte's Taper

- Weekly cycle remains the same
- Six weeks out volumes are dropped by 10-15%, drops weight training
- Maintains strength in the water (resistance swimming) entire taper
- Four weeks out volumes are dropped by 20-30% and one less practice
- Two weeks out volumes are dropped by 40% and one less practice



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Ryan Lochte's Weekly Plan

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
AM	FR Distance	BR – one hour set, Power work, stretch cords. Weight training	Off	BK – one hour set, Power work, stretch cords. Weight training	Off or distance swim, if 10 practices	Long IM set (min 5,000) or speed set at the end of the season. Weight training	Off
PM	Fitness. IM	Big kick	Fitness. Race quality	Big kick	Fitness. BT – 70-80% of entire practice		Off



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Race Sets for Ryan Lochte

- **3 rounds of 8 x 50 Backstroke, Butterfly or Breaststroke:**
- 8 x 50 on 2:00
- 8 x 50 on 1:30
- 8 x 50 on 1:00
- **Another example of set:**
- 4-10 x 100 from a dive on 2:00 or even 4:00
- **Broken swims:**
- 3 x (4 x 50 :10 sec) under personal record



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IM Sets for Ryan Lochte

4 rounds

- 2x100 butterfly from a dive all-out @1:30
- 2x50 backstroke, 1 all-out, 1 cruise @:50
- 100 freestyle @1:20
- 400 IM all-out @5 4:29, 4:29, 4:28, 4:27



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IM Sets for Ryan Lochte

6 x 100 @ 6 minutes from a dive, all out

1. 50.15 (freestyle)
2. 51.1 (freestyle)
3. 54.9 (butterfly)
4. 55.2 (butterfly)
5. Rest
6. 1:05 (breaststroke)



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IM Sets for Ryan Lochte

6 x 100 @ 6 minutes from a dive, all out

1. 50.15 (freestyle)
2. 51.1 (freestyle)
3. 54.9 (butterfly)
4. 55.2 (butterfly)
5. Rest
6. 1:05 (breaststroke)



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Anaerobic Mid-Distance Workout University of Texas

Warm up: 200 on 3:20, 4 x 50 drills, 150 on 2:30, 4 x 50 on drills 1:15, 100 on 1:40, 4 x 50 drills on 1:15

Main set: 50 on 50 sec, 2 x 100 on 1:30, 100 ez, 2 x 50 on 1:00, 200 on 3:30, 4 x 100 on 1:30, 100 ez, 4 x 50 on 1:00, 200 on 3:30, 6 x 100 on 1:30, 100 ez, 6 x 50 on 1:00, 200 on 3:30, 8 x 100 on 1:30, 100 ez, 8 x 50 on 1:00, 200 on 3:30

Cool down: 3 x 100 kick, 2 x 50 on 1:15

Total 6100 m



Kicking for Mid-Distance Swimmers

Future of fast swimming is underwater

Coaches use race analysis statistics to see improvements in underwater swimming (breakout times, turns)

Underwater training is done in short course pools

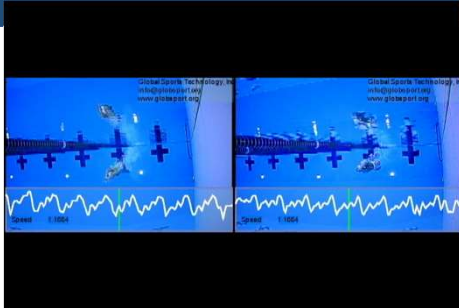
Emphasis on kicking with and without fins



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Underwater Kicking Videos



Drills to Improve Underwater Kick

- Kick in streamline position in the wall
- Kick with a small weight in the hands
- Kick with 360 degrees rotation
- Kick with fins, shoes, ankles weights
- Kick on the side
- Etc.



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Kicking Sets at University of Michigan

Kicking is a primary area of improvement in college

There are at least two kicking practices with 2000-3000 yd kicking sets:

- 20 x 100 kick, 10 x 50 kick + 10 x 100 kick + 10 x 50 kick, 2 x 400 + 2 x 300 + 2 x 200 + 2 x 100, etc

Kicking against resistance (cords, Power Racks)

Kicking with fins at the end of the practice



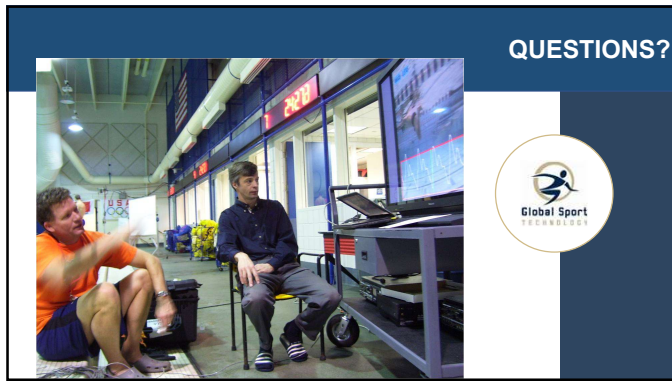
Kicking Sets at NBAC

- Swimmers at NBAC practice kicking 3-4 times a week.
- Good powerful kick improves body position. Kick is more important than pull.
- Kicking sets against resistance:
 - Vertical kick with and without weights
 - Kicking against stretch cord underwater and on the surface
 - Kicking against vertical kickboard



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