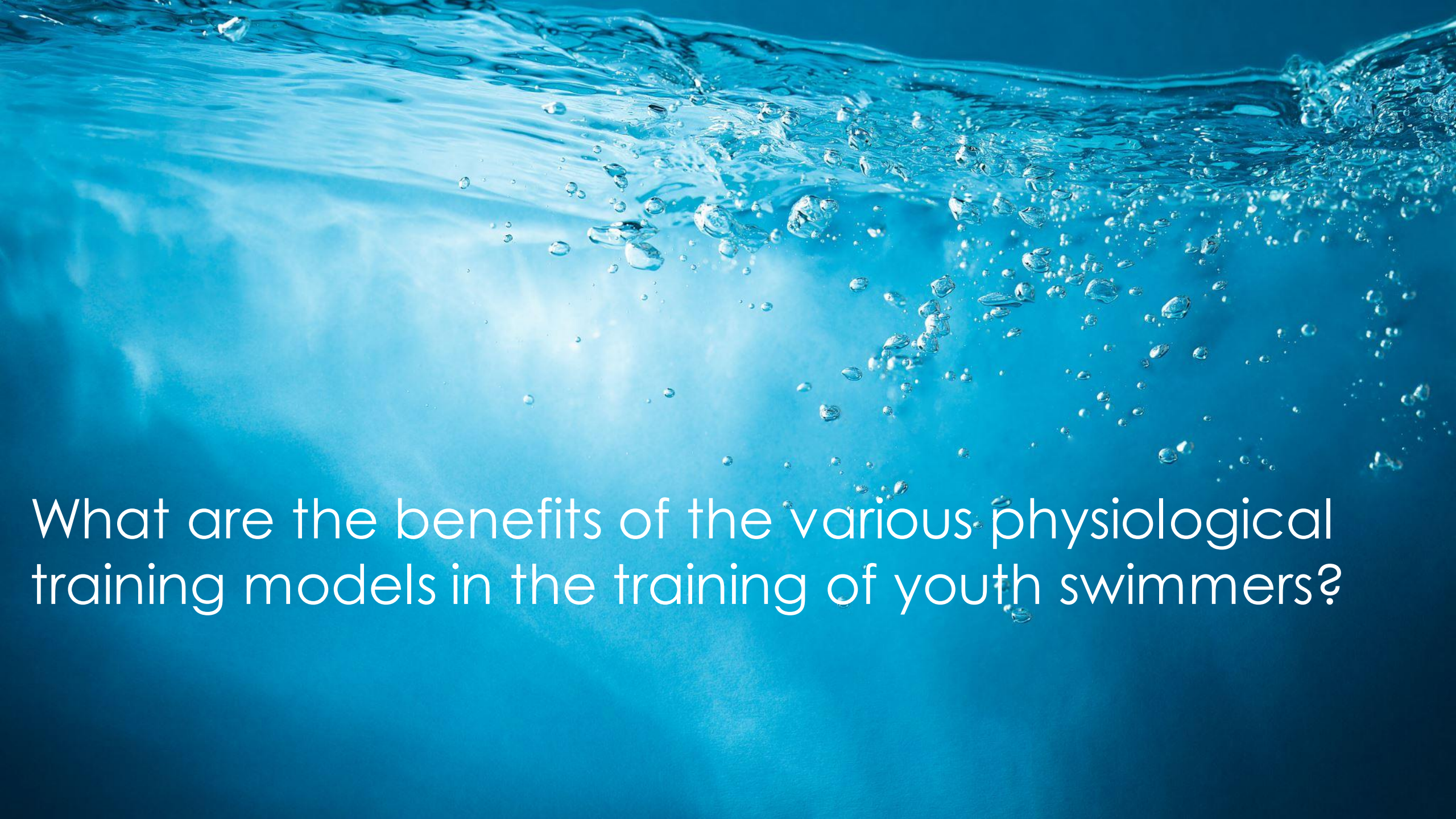


What are the benefits of the various physiological training models in the training of youth swimmers?

Presentation layout

Talk 1: Background to training Physiology & Models for Youth Swimmers part 1

Talk 2: Models for Youth Swimmers part 2 & How to build your training and further considerations

What is Training Physiology?

- Sport Physiology is the study of how exercise alters the function and structure of the body
- Science based and Research driven
- Usually used to prove what coaches are currently doing.

What isn't Training Physiology

Skill Development

Lifestyle Management (attendance)

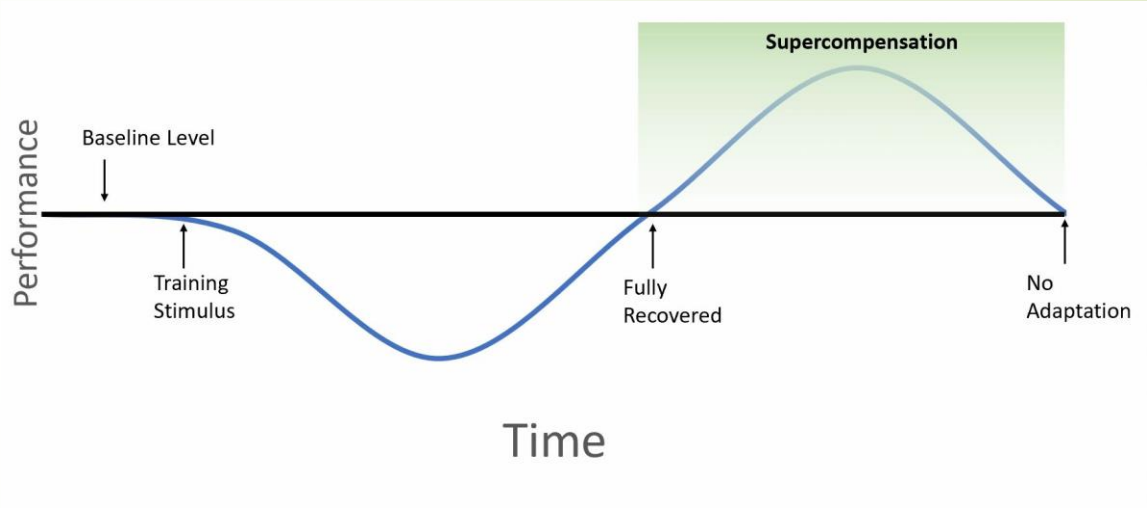
Nutrition

Psychological Development

THESE ARE ALL CRITICAL TO YOUR PROGRAMME AS WELL!

What is training adaptation?

- Training models are essentially looking at applying stress to the body for force adaptations in a particular sequence to achieve maximum performance at a specified time
- Supercompensation in its simplest form
- Different types of physiological stresses will be placed on the body depending on the type of work performed. (Energy System Classification)



The 3 Energy Systems used in energy production

- **ATP-PC:** Produces a large amount of energy very quickly (10 seconds)
- **Glycolytic System:** Breaks down Carbohydrates to produce energy (10 seconds to 2 minutes)
- **Aerobic System:** Produces energy with oxygen and glucose stores for up to 90 minutes.

Energy System Classification

Training Zones	British Swimming	Descriptions
1	A1	Aerobic Low Intensity
2	A2	Aerobic Maintenance
3	A3	Aerobic Threshold
4	AT	Anaerobic Threshold
5	VO2 / Critical Speed	Aerobic Overload
5	LP	Lactate Production
5	LT	Lactate Tolerance
5	Speed	Basic Speed

Energy System Classification

Training Zones	British Swimming	Descriptions	Heart Rate	RPE
1	A1	Aerobic Low Intensity	> 50	4 - 5
2	A2	Aerobic Maintenance	40 - 50	5 - 6
3	A3	Aerobic Threshold	30 - 40	6 - 7
4	AT	Anaerobic Threshold	20 - 30	7 - 8
5	VO2 / Critical Speed	Aerobic Overload	10 - 20	9 - 10
5	LP	Lactate Production	0 - 10	9 - 10
5	LT	Lactate Tolerance		
5	Speed	Basic Speed	0 - 10	9 - 10

Aerobic Targeted Adaptations

Training Zones	British Swimming	Descriptions	Adaptations
1	A1	Aerobic Low Intensity	Fat Metabolism & slow twitch recruitment
2	A2	Aerobic Maintainence	Improves cardio-respiratory system
3	A3	Aerobic Threshold	Enhances Lactate removal
4	AT	Anaerobic Threshold	Development of Aerobic metabolism
5	VO2 / Critical Speed	Aerobic Overload	Improves VO2max & aerobic power

Aerobic Sets

Training Zones	British Swimming	Sets
1	A1	10 x 300m at 50 bbm
2	A2	8 x 200m at 40 bbm on 3.00
3	A3	8 x 200m at 40 bbm on 2.50
4	AT	24 x 100m at 30 bbm on 1.25
5	VO2 / Critical Speed	24 x 100m at 20 bbm on 1.45

Glycolytic System Targeted Adaptations

Training Zones	British Swimming	Descriptions	Adaptations
5	LP	Lactate Production	Enhance rate of glycogen production
5	LT	Lactate Tolerance	Develop the ability to tolerate lactate (acidosis)

Glycolytic System Sets

Training Zones	British Swimming	Sets
5	LP	1 x 50m no.1 on 4.00 100m recovery X6
5	LT	8 x 100m no.1 max 6.00

ATP-PC Sets

Training Zones	British Swimming	Sets
5	Speed	8 x 25m no.1 max from a dive off 3.00 hitting 100m race pace

ATP-PC Sets

Training Zones	British Swimming	Sets
5	Speed	8 x 25m no.1 max from a dive off 3.00 hitting 100m race pace

Aerobic v Anaerobic training Considerations

Importantly the body draws on all three energy systems regardless of the type of effort. Percentage of each system is adjusted according to the intensity of the activity

Increased aerobic training will reduce anaerobic adaptations

Increased anaerobic training will reduce aerobic adaptaions

All training models are essentially a balance of these classification

They differ through:

How many types of modality are used	How much training is delivered within each modality	Timing of each modality within the cycle

Physiological Training Models

What models are we going to look at?

1. Linear Sequence
2. Block Periodization
3. Reverse Periodization
4. Concurrent Periodization

1. USRPT
2. Jan Olbrecht
3. John Urbancheck
4. Long Term Athlete Development

Linear Sequence

- Physiological Model
  - Progressive increase in load within the phases

1.	General Preparation Phase	5-6 weeks	(A1 to A3/AT)
2.	Specific Preparation Phase	4-5 weeks	(AT & VO2 Max)
3.	Pre-Competition Phase	3-4 weeks	(LP, LT & Speed)
4.	Taper	1-2 weeks	

Linear Sequence

- Season Progression
  - Progressive increase in training volume &/or intensity
  - 2 -3 cycles per season depending on athletes
  - Youth Swimmers would commonly be doing 3 cycles.
    - Sept to Dec, Dec to April, April to July
  - Senior Swimmers could be doing 3 to 4 depending on event

Linear Sequence

- Considerations
  - Develops all modalities of training
  - If monitored correctly it can reduce the chances of burnout and overuse injury
  - Psychologically good for an athlete to understand phases (long & slow to short and fast)
  - Helps inexperienced swimmers slowly progress into a cycle
  - Beneficial post-injury
  - Can lose aerobic gains towards the end of the cycle
  - Research suggest that this approach provides bigger adaptations than non-periodized approaches.

Block Periodization

- Physiological Model:
  - Specific periods of stress to force training adaptation
  - Accumulation Phase: 7-10 weeks (A1 to AT)
  - Transmutation Phase: 3-4 weeks (VO2 Max, LP, LT)
  - Realization Phase: 1-2 weeks (Speed)

Block Periodization

- Season Progression
  - Aim to maximize stress and therefore adaptation on specific blocks
  - Accumulation Phase: Aerobic Endurance, Basic Co-ordination & General Strength
  - Transmutation Phase: Strength Endurance, Power & Anaerobic Threshold
  - Realization Phase: Taper, Speed & Tactics
  - Always finish with a competition or testing
  - 2 -3 cycles of season depending on athletes
    - Sept to Dec, Dec to April, April to July

Block Periodization

- Considerations
  - Studies suggest this provides greater adaptation (USSR, Spain, Romania)
  - Research also suggest this type of training is beneficial for endurance athletes
  - Progressive intensity through phases can be helpful for less experienced swimmers
    - Accumulation 50-75%, Transmutation 75%-90%, Realization 90%+
  - Opportunity to focus on specific areas of training
  - Easy to deliver in a club environment

Reverse Periodization

- Physiological model
  - Based on the theory of developing speed from the start of the cycle with Aerobic work later
  - Phase 1: Speed Development (Basic Speed)
  - Phase 2: Lactate Production
  - Phase 3: Lactate Tolerance
  - Phase 4: Lactate Removal & Aerobic Conditioning (A2 – AT)
  - Phase 5: Race Simulation & Aerobic Conditioning (A2 – AT)
  - Phase 6: Taper

Reverse Periodization

- Season Progression

- Tethered training: 4 weeks (12km per week)
- Ultra-short training: 4 weeks (16km per week)
- Competitive training: 4 weeks (20km per week)
- Taper: 1-2 weeks (10km per week)

Reverse Periodization

- Considerations:
  - Useful if racing a lot throughout a cycle
  - Can be used when an athlete needs to peak again after a key event and doesn't have time for a complete cycle.
  - Can cause mental burnout through too much speed work too early
  - To develop speed early you will compromise aerobic development which can impact further through the cycle.

Concurrent Periodization

- Physiological model
  - Involves repetition of microcycles (week) that include all training modalities.

	Mon	Tues	Wed	Thurs	Fri	Sat
AM	AT	A2		AT	VO2	LP/LT
PM	BS	LP/LT	A3	BS	A2	

Concurrent Periodization

- Season Progression
  - Same week run throughout the season
  - Increase/decrease repetition distances
  - Increase/Decrease in volumes to match competition cycle

Concurrent Periodization

- Considerations:
  - Can be great for athletes who like routine
  - Ensures an athlete doesn't de-train any areas
  - When personalized can allow an athlete to recover one energy system while training another.
  - Can be terrible for athletes who like variety
  - Can risk burnout if the bodies metabolism is constantly overloaded.
  - Will any adaption be maximized?
    - Performance improvements can be incremental

Re-Cap

- What is Physiology
- What is training adaptation
- 3 Energy Systems & how they are stimulated through training classification

- Linear Sequence
- Block Periodization
- Reverse Periodization
- Concurrent Periodization

Next Week

- 20th May 8pm

1. USRPT
2. Jan Olbrecht
3. John Urbancheck
4. Long Term Athlete Development
5. Athlete considerations
6. Effects of coronavirus (Bowman & Troy)

Any Questions?