ADVANCED EXERCISE TECHNIQUES

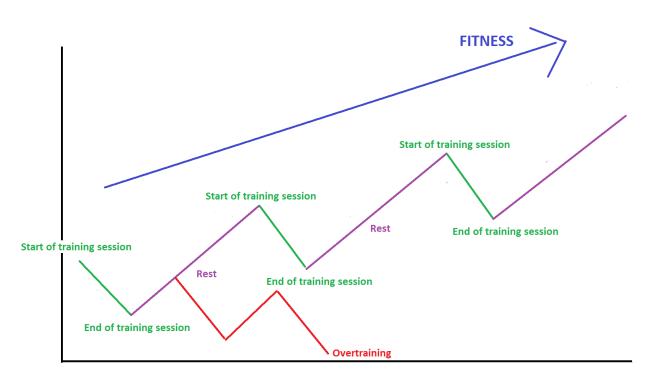
Practical Strategies to Help You Break Through Your Fitness Plateaus

WHO IS THIS SESSION FOR?

- Individuals who already exercise regularly
- People who are looking to go faster, farther or get stronger
- People who are bored
- This session is NOT intended for individuals who are currently inactive and are just looking to get started.

HOW TO GAIN FITNESS

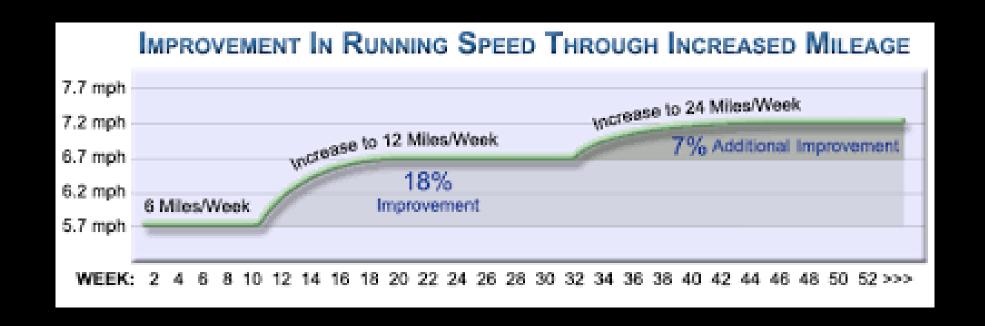
- The body breaks down during a training session
- During rest the body rebuilds and supercompensates
- GOAL: Next training session at the peak of supercompensation.
 - Too soon = overtraining
 - Too late = excessive soreness, limited fitness gains



Time

DIMINISHING RETURNS

- Body adapts to stimulus via supercompensation, over time this leads to diminishing returns and eventual plateau
 - The solution increase frequency/intensity, or introduce a different stimulus.



PERIODIZATION

- AKA as "muscle" confusion."
- Cycle the focus of your workouts so that the body needs to continually respond to a stimulus.
- Systematic planning of workouts to peak for a specific time frame or event.

Block periodization of strength and endurance training is superior to traditional periodization

Reference : Ronnestad STMSS 2018

Team sports like ice-hockey require high levels of performance in numerous physical characteristics such as strength, power and endurance Training is associated with a potential interference effect

16 well-trained ice-hockey players were randomized into



TRADITIONAL GROUP

Simultaneous focus of strength, power & endurance training every week

BLOCK PERIODIZATION

Development of either strength & power or endurance on a weekly, undulating basis

TRADITIONAL GROUP

Results

BLOCK PERIODIZATION

intensities of both

strength, power, and endurance training 6 weeks

-4.2 ± 6.3%

Knee extension peak torque at 180°/s

+6.6 ± 8.7%

-0.1 ± 2.5%

Peak torque in knee extension at 60°/s

+2.1 ± 2.5%*

+1.1±3.5%

Maximal oxygen uptake

+5.1±3.3%

-0.3 ± 5.9%

Power output during a 30-s cycling

+4.1 ± 2.5%*



These results suggests that block periodization of strength- and endurance training induce superior adaptations in both strength- and endurance capacities in well-trained ice-hockey players compared to traditional mixed organization, despite similar training volume and intensity

Designed by @YLMSportScience

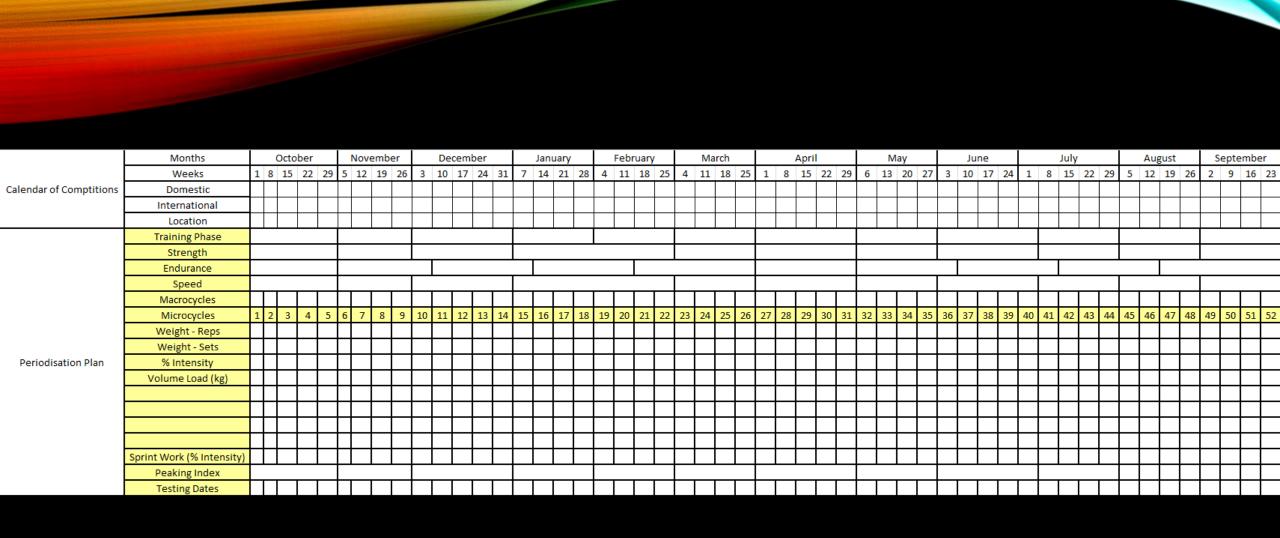
FITT PRINCIPLE

- Frequency
 - Sessions per week
- Intensity
 - % of maximum
- Time
 - Duration of exercise
- Type
 - Isometric, eccentric, ballistic
 - Machines, dumbbells, bands
- Manipulate variables to stimulate a response

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"I do weights for muscle health, cardio for heart health and chocolate for mental health."



Blank periodization template:

http://www.anb.ca/page.php?content=Yearly%20Periodization%20Templates

Annual Periodised Training Programme

Case Study Assignment February Month January March April May June July August September October November December 1 2 3 4 5 6 7 8 9 10 11 14 15 16 17 18 19 20 23 24 25 28 29 30 32 33 34 35 36 37 38 39 42 43 44 45 46 47 48 49 50 51 52 Week 12 13 21 22 26 27 31 40 41 Comp phase + Off-Season Pre-season Training In season phase macro 8 11 12 13 14 16 17 18 19 20 6 7 9 10 15 2 3 4 5 Meso Cycle 5 5 5 Intensity 1-5 1 1 1 1 1 1 3 Volume 1-5 3 1 1 1 1 1 1 Peaking 1-9 7 8 2 4 5 4 Testing Goals Implement Increase Short speed volume at Taper First major comp: Taper Second Final Low intensity High quality new drills to Competition in ncrease volume at intensity Taper Build aerobic fitness, lactate sets, focus on Low volume, low Assess down assess Speed sets down major major work, Increase Mild speed work order to gain improve from medium intensity, of sets, increase techincal ability down recover from In Pool threshold, for performance/gain working at for techincal ability comp, aim intensity, no technical volume of comp: aim across all four taper times/assess assess techincal for last season, build through drill work technical drills major for SB in and tactical for PB and training structure ability national race pace major previous sets medium sets ability/speed fitness strokes major speed qualification times performed at comp comp event pacing final competitions at low intensity comp work sneed Competition in Taper First major comp: Maintain Taper Second Taper Final major Low intensity Convert to Power & Maintain power & muscular Convert to powe Maintain power & Low volume, low 1RM & Mild down Muscular endurance order to gain assess power & down major comp: down comp, aim work, recover Anatomical Maximum Maximum endurance, 1 RM & Multiple RM In Gym Maximum strength & muscular muscular intensity, no training multiple RM taper for performance/gain for aim for SB in for for PB and Adaptation strength 1RM & Multiple RM times/assess muscular from previous strength tests endurance endurance structure tests, FMS major national qualification major fitness endurance major event final competitions tests comp times comp comp Taper period

Competion Training camp Recovery period Testing blocks

KEY PRINCIPLES

- Focus on one aspect at a time:
 - Volume (ie km/wk, sets, reps, sessions/wk)
 - Improves endurance
 - Less rest between sets (60-90s)
 - Intensity (ie intervals, %1RM)
 - Improves strength
 - More rest between sets (2-5min)
 - Power (ie hill sprints, box jumps)
 - Force over time
 - Technique/Specificity (ie race pace, race terrain, Olympic Lifts)
 - Prepare for competition, increase efficiency

VOLUME

- Max increase 10-15%/wk
 - Cardio Total distance or time/wk
 - Increase fat metabolism
 - Increase efficiency
 - Increase blood flow to muscles
 - Strengthen connective tissue
 - Resistance Total weight lifted, # of sets or # of reps
 - Increase blood flow to muscles. "Muscle pump"
 - Time under tension

VOLUME WORKOUT EXAMPLES

- Base building phase for runners.
 - 6-12 week easy build to max volume (distance/wk)
 - Include one faster workout per week, or at least add some strides.
- German Volume Training for body builders.
 - https://www.strengthsensei.com/german-volume-training-introduction/
 - 10x10, alternating opposing muscle groups
- Sheiko
 - 3x/wk, tons of sets.
 - https://www.powerliftingtowin.com/sheiko/

INTENSITY

- Over 80% of VO2max or HRmax
 - HR Zones 4 and 5
 - https://www.polar.com/blog/running-heart-rate-zones-basics/
 - Most people should limit to 20% of total training volume
 - Improves lactate clearance, running economy, speed endurance
- Increase %1RM
 - Less reps, higher weight
 - Muscle density, motor unit recruitment
- Rep Speed
 - Tempo training or eccentric training
 - Cross-bridge loading

INTENSITY WORKOUT EXAMPLES

Cardio

- 6x 3min hard, 2-3min easy
- 15x 1min fast, 1min jog
- 10x 400m @5km race pace, 200m jog recovery

Strength

- 5x5 program (Stronglifts app)
 - https://stronglifts.com/5x5/#gref
 - Crossover between volume and intensity, for intermediate lifters
- 5-3-1
 - http://www.powerliftingtowin.com/beyond-531/
 - https://exrx.net/WeightTraining/Powerlifting/531

POWER

- Force production over time
- Increase Type II recruitment, tendon stiffness, neuromuscular adaptations
- Closely linked to body weight
- Examples:
 - Acceleration
 - Jumping
 - Olympic Lifting

POWER WORKOUT EXAMPLES

- Hill Sprints (20s or less) with full recovery (2-5min)
- 40 yard dash
- Olympic Lifts
 - Highly technical so they also cross over into the technical/specificity phase
- Training for power
 - https://www.t-nation.com/training/how-to-train-for-power

TECHNIQUE/SPECIFICITY

- Incorporate more target race pace
- Simulate race terrain
- Simulate competition environment
 - Equipment
 - Nutrition/hydration
 - Climate
 - Trouble-shooting
- Focus on technique to become more efficient
- Be careful! Too much time in this phase will make you feel stale/flat

TECHNIQUE/SPECIFICITY EXAMPLES

- Training runs on the race course
- 30km run, with 2x 8km at race pace
- Integrate specific competition warm up sequence for power lifting or Olympic lifting competition
- Focus on nutrition/hydration
 - Before, during and recovery

SPORT NUTRITION

- Pre-Exercise
 - Goal: optimize performance and limit GI discomfort
- During Exercise
 - Goal: optimize performance and limit GI discomfort
- Post-Exercise
 - Goal: optimize training gains and reduce recovery time to enable higher training volume/intensity

NUTRITION FOR MUSCLE GROWTH

Nutritional interventions to augment resistance training-induced muscle hypertrophy

Designed by @YLMSportScience

Protein dose

Ingest 0.4 grams of protein per kg per meal to optimally stimulate muscle protein synthesis



Timing of Protein Ingestion



Ingest proteins throughout the day (e.g. 20 grams each 3-4h) and a larger dose presleep (40 grams casein or up to 0.6g/kg/meal) to augment both acute muscle protein synthesis and chronic muscle adaptations

Protein Quality

Post-exercise muscle protein synthesis is optimized by protein ingestion that contains a high leucine content where proteins are rapidly digested (i.e.,whey)

Zzzz

The ingestion of casein may be more effective at sustaining muscle protein synthesis and possibly at attenuating negative net protein balance over longer periods

Protein & Carbohydrate Co-ingestion



While ingestion of carbohydrates post-exercise would be necessary to replenish depleted glycogen stores, there is no strong need to recommend carbohydrates on top of protein to be consumed post-exercise to maximize muscle protein synthesis

Resistance Exercise Program Variables and Training

Instead of any particular medley of resistance exercise variables, muscular hypertrophy is fundamentally driven by maximal motor unit recruitment and exercising until contractile failure



Reference: Robert W Morton, Chris McGlory & Stuart Phillips, in Frontiers in Physiology, 2015



GUIDELINES FOR CARBOHYDRATE INTAKE DURING EXERCISE



Carbohydrate Intake ¶ **During Exercise**



By Asker Jeukendrup, Sports Medicine, 2014 Designed by @YLMSportScience



Exercise Duration

Recommendations for carbohydrate intake during exercise are dependent on exercise duration, the absolute exercise intensity, as well as the sport and its rules and regulations:

- ightharpoonup During exercise lasting \sim 1 h, a mouth rinse or small amounts of carbohydrate can result in a performance benefit,
- ► A single carbohydrate source can be oxidized at rates up to ~60 g/h and this is the recommendation for 2-3 h exercise,
- For ultra-endurance events, the recommendation is higher (90 g/h)

Athletes who perform at absolute intensities that are lower will have lower carbohydrate oxidation rates and the amounts presented in should be adjusted (downwards) accordingly.

Recommended Type of Carbohydrates Carbohydrate ingested at $>\!60$ g/h must be a multiple transportable carbohydrates (e.g. glucose + fructose) to



carbohydrate in the intestine.

Sources of carbohydrates

The recommended carbohydrate intake can be achieved by consuming drinks, gels, or low-fat, low-protein, and low-fiber solid foods (bars), and selection should be based on personal preference. Athletes can adopt a mix-andmatch strategy to achieve their carbohydrate

Carbohydrate intake should be balanced with a fluid intake plan based on fluid needs, and it must be noted that solid foods and highly concentrated carbohydrate solutions have been shown to reduce





It is highly recommended to train/practise the nutrition strategy for competition to reduce the chances of aastrointestinal discomfort and to increase the absorptive capacity of



POST-WORKOUT NUTRITION

https://www.bodybuilding.com/content/the-importance-of-post-workout-nutrition.html

- 1g CHO/kg of bodyweight
 - More for endurance athletes
- 0.4g PRO/kg of bodyweight
 - High leucine (whey)
- Goals
 - Reduce protein breakdown (catabolism)
 - Increase protein uptake (anabolism)
 - Refuel (liver and muscle glycogen stores)
 - Rehydrate (water and electrolytes)

RESOURCES

- Books
 - <u>Periodization</u> Tudor Bompa
 - <u>Daniels' Running Formula</u> Jack Daniels
- All Topics
 - YLM Sport Science infographics on all the latest sport studies
 - EXRX exercise library and educational resources.
- Nutrition
 - <u>Precision Nutrition</u> articles
- Weight Lifting
 - Power Lifting to Win programming
- Endurance Training
 - <u>Mcmillan Running</u> article library
 - Jason Koop with CTS blog posts on all things endurance