CARDIO TRAINING ROADMAP

Build endurance. Improve health.
Move for life.

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

The Evidence-Based

Cardiovascular Training Roadmap

A practical guide to training intensity, zones, and 16-week periodized plans — built on what the research actually shows

Dr. Lyall Ashberg, MD, FAAOS
Board-Certified Orthopedic Surgeon
healthnex.us

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Introduction

This guide is the practical companion to the Health Nexus Evidence-Based Cardiovascular Training Roadmap video series. It distills the same material — the same physiology, the same evidence base, the same training plans — into a reference document you can use daily.

It is written for two audiences. The first is **the recreational athlete** just getting started and looking for a structured way to build cardiovascular fitness without injury or burnout. The second is **the experienced athlete** who has been training for years and feels that their training has plateaued — and wants a more rigorous framework for thinking about intensity, periodization, and progression.

Both audiences share a common problem. Most recreational training literature is either too vague ("do some easy work and some hard work") or too prescriptive ("do exactly this 12-week program for marathon improvement"). Neither helps you make decisions when life, your body or your goals change. What you need is the framework — the principles — that let you build and adjust your own plan over time.

That's what this document is.

How to use this guide

Read it once front to back. Then come back to the parts you need: the field tests when it's time to recalibrate your zones, the four 16-week plans when you're ready to start a training block, the monitoring section when something feels off.

The training plans are the heart of the document. If you take nothing else away, refer to the plan that matches your honest current fitness level and start implementing it next week.

A note on the evidence

Everything in this guide is anchored to peer-reviewed research. Where the evidence is strong and consistent, the recommendations are confident. Where the evidence is genuinely contested — for example, the optimal proportion of low-intensity training for time-limited recreational athletes — this guide says so plainly rather than picking a side.

This guide does not replace medical advice or a personalized assessment. If you have known cardiovascular disease, joint problems that limit training, metabolic conditions, or you're returning to exercise after a long absence, talk to a qualified physician before starting any structured training program. The Health Nexus practice is built around exactly this kind of integration — orthopedic, metabolic, and longevity assessment — and there's information at the back of this guide if that's relevant to you.

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Part 1: The Three Zones, Anchored to Two Thresholds

Every legitimate training zone system in exercise physiology — research models, San-Millán's lactate-based framework, the Coggan seven-zone cycling model, running zones, walking zones — is anchored to the same two physiological thresholds. Once you understand them, the zone terminology stops being confusing.

The first threshold: LT1

Also known as the gas exchange threshold, ventilatory threshold 1 (VT1), or aerobic threshold.

LT1 is the intensity at which blood lactate first rises above its resting baseline — typically around 2 millimoles per liter. Below LT1, the body is fully aerobic, can sustain the effort for hours, fat is the dominant fuel, and a comfortable conversation is possible.

This is where most of your training time should live.

The second threshold: LT2

Also known as VT2, maximal lactate steady state (MLSS), or — for cyclists — Functional Threshold Power (FTP).

LT2 is the highest intensity at which lactate production and clearance remain in equilibrium — typically around 4 mmol/L. Above LT2, lactate accumulates progressively, and the effort becomes unsustainable within minutes to tens of minutes.

The three zones

These two thresholds divide the training intensity spectrum into three zones:

Zone	Boundary	Feel	Physiology
Zone 1 (Easy)	Below LT1 (<~2 mmol/L lactate)	Comfortable Full conversation Could go for hours	Aerobic Fat-oxidation dominant Mitochondrial biogenesis
Zone 2 (Threshold)	Between LT1 and LT2 (~2-4 mmol/L)	Effortful Short phrases only Sustainable 20-60 min	The "gray zone" Mixed fuel use Increasing lactate
Zone 3 (Hard)	Above LT2 (>4 mmol/L)	Hard Cannot speak Sustainable for minutes	VO_2 max territory Glycolytic dominant Progressive fatigue

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Part 2: Why "Zone 2" Is Confusing

Different communities use different names for the same physiological zones. This is the single biggest source of confusion in recreational training literature, so it's worth being clear about it once and never having to re-learn it.

The cycling "Zone 2"

In the Coggan seven-zone cycling model — which dominates cycling training apps and software — "Zone 2" is the endurance zone, ridden at 56% to 75% of FTP. This is below LT1. So, a cyclist saying "I'm doing Zone 2 work" usually means easy aerobic riding, equivalent to the research model's Zone 1.

San-Millán's "Zone 2"

Iñigo San-Millán uses "Zone 2" to mean training at or just below LT1 — the intensity that maximizes mitochondrial fat oxidation. This is also below the first lactate threshold. So, San-Millán's "Zone 2" and the cyclist's "Zone 2" are pointing at roughly the same physiological territory: below LT1.

The research "Zone 2"

In the three-zone research model — used in most peer-reviewed exercise physiology — "Zone 2" is the threshold zone, between LT1 and LT2. This is the "gray zone" the polarized training literature wants you to minimize.

The translation

Physiology	Research 3-Zone	Cycling (Coggan)	San-Millán
Below LT1	Zone 1	Z1 (Recovery) + Z2 (Endurance)	"Zone 2"
Between LT1 & LT2	Zone 2	Z3 (Tempo) + Z4 (Threshold)	"Gray zone"
Above LT2	Zone 3	Z5 (VO_2max) Z6 (Anaerobic) Z7 (Neuromuscular)	High-intensity intervals

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

The Coggan seven-zone cycling model in detail

Cyclists arriving at this guide are usually mentally anchored in the seven-zone Coggan model — it's the standard taught by every cycling power-meter app, by Training Peaks, by Strava and Wahoo and by most cycling coaches. Because Plan 3 in this guide is built using Coggan zones, it's worth laying out the full model in one place.

All seven zones are anchored to FTP (Functional Threshold Power) — the highest sustainable power for approximately one hour. FTP approximates LT2.

Zone	Name	% of FTP	% Max HR	Duration	Purpose	Maps To
Z1	Active Recovery ("spinning")	<55%	<68%	Recovery rides	Recovery between hard sessions; promotes blood flow	**Below LT1**
Z2	Endurance (aerobic / base)	56-75%	69-83%	1-6+ hours	Aerobic base, fat oxidation, mitochondrial biogenesis — the foundation	**Below LT1**
Z3	Tempo	76-90%	84-94%	30-90 min	Sub-threshold endurance; bridge between aerobic base and threshold	**LT1 to LT2**
Z4	Threshold (FTP zone)	91-105%	95-105%	10-60 min	Maximal lactate steady state; ~LT2	**LT1 to LT2**
Z5	VO_2 max	106-120%	>106% (max)	3-8 min	Maximal aerobic power; develops VO_2 max ceiling	**Above LT2**
Z6	Anaerobic	121-150%	N/A	30 sec - 2 min	Anaerobic capacity; race attacks, short climbs	**Above LT2**
Z7	Neuromuscular	N/A (power)	N/A	5-30 sec	Maximal sprint power; top-end speed and bike handling	**Above LT2**

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

How Coggan zones bridge to the research three-zone model

- Coggan Z1 + Z2 (active recovery + endurance) = Below LT1 in the research model — where 75-80% of training time should live.
- Coggan Z3 + Z4 (tempo + threshold) = Between LT1 and LT2 — the gray zone the research recommends minimizing.
- Coggan Z5 + Z6 + Z7 (VO_2max + anaerobic + neuromuscular) = Above LT2 — high-intensity work, ~5-15% of training time.

Practical takeaway

Anchor to the thresholds, not the labels. "Below LT1," "between LT1 and LT2," and "above LT2" describe the same physiological territory regardless of which zone naming system you encounter. This guide uses the research three-zone language throughout, with Coggan-specific references in Plan 3 for cyclists working with power-meter apps.

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Part 3: What the Research Shows

Across two decades of exercise physiology research, seven findings have emerged with consistent support. These are the load-bearing principles that any evidence-based training plan needs to honor.

Finding 1: Most amateur training lives in the gray zone — and that's a problem

Studies of recreational athletes consistently find that approximately half of their training time is spent in the threshold zone, between LT1 and LT2. This is the worst place to spend most training time because it generates significant fatigue without driving meaningful adaptation in either the aerobic base or the high-intensity ceiling. Successful endurance training — at every level from beginner to elite — pushes time out of the gray zone and into either the easy zone or the hard zone.

Finding 2: At least 70% of training volume should be Zone 1

This finding is remarkably consistent across pyramidal training, polarized training, elite athlete observation studies, and recreational training studies. The exact proportion above 70% varies — some elite athletes train at 80% or 85% Zone 1 — but the floor is consistent. Below 70% Zone 1, recreational athletes consistently underperform their potential and accumulate fatigue faster than they adapt.

Finding 3: Pyramidal and polarized both work — context matters

Two distribution models have strong support. Pyramidal training (75% Zone 1 / 15-20% Zone 2 / 5-10% Zone 3) tends to work better for athletes at intermediate experience levels and moderate weekly volumes. Polarized training (80% Zone 1 / ~5% Zone 2 / 15% Zone 3) tends to work better for advanced athletes at high weekly volumes. The PYR-to-POL sequence — pyramidal base for 8 weeks, polarized intensification for 8 weeks — has produced the largest improvements in published research on well-trained recreational runners.

Finding 4: Threshold-dominant training is consistently inferior

The threshold training model — most time in Zone 2, gray zone dominant — produces meaningfully worse outcomes than either pyramidal or polarized training in head-to-head comparisons. This is the model amateur athletes accidentally fall into. Whatever else you do, don't do this on purpose.

Finding 5: 2-3 high-intensity sessions per week is the practical ceiling

Above 3 hard sessions per week, recreational athletes accumulate fatigue faster than they recover, and training quality drops. Below 1 hard session per week, the high-intensity stimulus is too sparse to drive maximal adaptation. The sweet spot for almost all recreational athletes is 2 hard sessions per week, separated by at least 48 hours, with the rest of the week filled with easy aerobic volume.

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Finding 6: HIIT and Zone 1 endurance produce similar mitochondrial gains

The 2025 meta-regression of 353 studies and ~6,000 participants found mitochondrial content increased similarly across endurance training (~23%), HIIT (~27%), and sprint interval training (~27%). Sprint interval training was about 3.9× more time-efficient per training hour. For time-limited recreational athletes, this means properly-dosed high-intensity work is not optional — it's how you get more adaptation per available training hour.

Finding 7: Resistance training 2× per week supports cardiovascular outcomes

This finding extends beyond cardiovascular training itself but is universally recommended in exercise physiology consensus statements. Resistance training 2× per week supports musculoskeletal health, injury prevention, and — through mechanisms including improved insulin sensitivity, body composition, and movement economy — cardiovascular and metabolic health outcomes. It is complementary to cardiovascular training, not a substitute.

On the San-Millán framework specifically

The honest synthesis on Zone 2 / sub-LT1 training

San-Millán's research showing strong inverse correlation between blood lactate and fat oxidation capacity is well-supported. Training at or just below LT1 does drive mitochondrial fat oxidation adaptations.

However, the popularized claim that sub-LT1 training is uniquely optimal for everyone, regardless of training volume, runs ahead of the evidence. A 2025 narrative review and the meta-regression cited above directly challenge this stronger claim.

The honest synthesis: For high-volume athletes (>7 hrs/week), a large foundation of sub-LT1 work is well-supported. For time-limited athletes (<5 hrs/week), *exclusive* reliance on sub-LT1 training leaves adaptation on the table. The sub-LT1 base is essential at every level — it's the foundation, but not the whole house.

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Part 4: Finding Your Zones Without a Lab

Lab-based threshold testing is the gold standard, but it's expensive, often inaccessible, and not necessary for setting up a basic training plan. The field-based methods below have been validated against lab testing and are entirely sufficient for recreational athletes.

Method 1: The talk test (universal)

The single most practical tool for finding LT1. **Validated** against ventilatory threshold testing in published research.

Protocol: while exercising at a steady effort for at least 3-5 minutes, attempt to recite a complete sentence of 8-10 words — a memorized poem verse, song lyric, or paragraph works. Or talk to a training partner.

Then assess:

- If the speech is fully comfortable with no breath management — you're below LT1 (Zone 1, easy).
- If you can speak in short phrases but full sentences are difficult — you're between LT1 and LT2 (Zone 2, threshold).
- If you can barely produce more than a word or two between breaths — you're above LT2 (Zone 3, hard).

The talk test works best on continuous, steady efforts. Don't try to use it for single-second windows during interval work.

Method 2: The 20-minute power test (cyclists)

If you have a power meter, this is the gold-standard self-assessment for cycling.

1. Warm up thoroughly: 15-20 minutes including some short, hard openers to fully open the legs.
2. Ride as hard as you can sustain for exactly 20 minutes. Pace it — the goal is highest sustainable average power, *not a fast start that crashes*.
3. Record your average power across the full 20 minutes.
4. Multiply by 0.95. That number is your estimated FTP, which approximates LT2.

Example: 250W average × 0.95 = 237W FTP.

Once you have FTP, your zones cascade:

- Below LT1 (easy zone): below ~75% of FTP.
- Between LT1 and LT2 (threshold): roughly 76% to 105% of FTP.
- Above LT2 (hard zone): above 105% of FTP.

Without a power meter: a 20-minute time trial on a flat or rolling course, all-out effort. Your average heart rate during those 20 minutes approximates your heart rate at LT2.

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Method 3: The 30-minute time trial (runners)

The running equivalent of the 20-minute power test.

5. Thorough warmup (15-20 minutes easy plus 4-6 short strides).
6. Run as hard as you can sustain for exactly 30 minutes. True effort, not a tempo.
7. Record average pace and average heart rate across the 30 minutes.
8. Both numbers approximate your second threshold (LT2).

Easy running (below LT1) corresponds to a pace meaningfully slower than your 30-min time trial pace — typically 30-60 seconds per kilometer slower for most recreational runners. The talk test is your ground truth: if you can't comfortably hold a conversation, *slow down*.

Method 4: The Karvonen heart rate reserve method (any modality)

If you don't want to time-trial and just want a heart-rate-based starting point, the Karvonen method is the best of the simple shortcuts. More accurate than fixed percentages of estimated max heart rate.

9. Find your resting heart rate. Take it for several mornings in bed before getting up; average them.
10. Estimate your max heart rate. The Tanaka formula (208 - 0.7 × age) is slightly more accurate than "220 - age" for adults over 40.
11. Calculate your heart rate reserve (HRR): max HR - resting HR.
12. Zone boundary = (% of HRR) + resting HR.

Example for a 50-year-old with resting HR of 60:

- Max HR estimate: 208 - (0.7 × 50) = 173 bpm.
- HRR: 173 - 60 = 113 bpm.
- LT1 boundary (~60% HRR): 60 + (113 × 0.60) = 128 bpm.
- LT2 boundary (~85% HRR): 60 + (113 × 0.85) = 156 bpm.

So this person's Zone 1 ceiling is approximately 128 bpm; their Zone 2 ceiling is approximately 156 bpm; everything above is Zone 3. These are *starting estimates* — calibrate over time using the talk test.

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Equipment: what's worth buying

Worth Buying	Skip For Now
Chest-strap heart rate monitor (Polar H10, Garmin HRM-Pro) ~$80-100. Pays for itself in training quality.	Lactate meters Field tests give you what you need.
Power meter (cyclists) Single-sided meters from $300-400 are sufficient. The accuracy gap between cheap and expensive ones is small for amateur use.	Premium auto-zone wearables Algorithms are proprietary and often wrong until calibrated.
	CGM for training intensity Useful for metabolic insight but doesn't give zone data.

Reassessment cadence

Your zones change as you get fitter. This is the point of training. But it also means your zones from 12 weeks ago are no longer accurate.

Recommended cadence: retest every 8 to 12 weeks. Same protocol, same conditions, same warmup. Recalculate your zones from the new test result. The discipline of regular reassessment is one of the highest-leverage habits in long-term training.

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Part 5: The Four 16-Week Plans

This is the practical heart of the document. Four periodized 16-week plans, built on the evidence reviewed in the previous sections. Pick the plan that matches your honest current fitness level.

How to choose

Where you are	Plan
Currently exercising less than 2 hrs./week or starting from sedentary. Goal is *habit + aerobic base*, not performance.	**Plan 1**
Running consistently for 6-24 months at 3-5 hrs./week. Want structured progression.	**Plan 2**
Cycling consistently at 4-7 hrs./week with a power meter or HR monitor. Want structured progression.	**Plan 3**
Multi-year training experience, 7-12+ hrs./week. Optimizing performance with periodization.	**Plan 4**

Be honest. Most recreational athletes overestimate their starting fitness. The cost of starting too aggressive is injury, burnout, and a high probability of quitting. The cost of starting too conservative is slower progress — and you can graduate up after one mesocycle if it's clearly too easy.

The mesocycle structure (used in all plans)

All four plans are built as four sequential mesocycles — 4-week training blocks consisting of three weeks of progressive load followed by one deload week (~30% reduction in volume and intensity). Deload weeks are not optional. They're where adaptation consolidates. Skipping deloads is one of the most common ways recreational athletes sabotage their progress.

Plan 1: First-Time Exerciser (Walking → Walk-Jog)

Goal: build the habit of regular movement, develop a basic aerobic base, *gradually* meet the physical activity guidelines (≥150 min/week moderate intensity).

All training is below LT1 — comfortable conversational pace. There is no high-intensity work in the first 12 weeks. None. The risk-benefit at this fitness level does not support it.

If you're over 50 and starting from a long sedentary period, talk to your doctor before starting any structured exercise plan. *Sedentary individuals are at greatest risk for cardiac events with sudden vigorous exertion.*

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Plan 1 Mesocycle Breakdown

Mesocycle	Phase	Weekly Structure
1 **Wks. 1-4**	Habit 60-120 min/week	3-4 sessions/week of comfortable walking Wk. 1: 3× 15-20 min walks Wk. 2: 3-4× 20-25 min walks Wk. 3: 4× 25-30 min walks Wk. 4 (deload): 3× 20 min walks Pace: easy, conversational. Talk test: full sentences comfortable. RPE 2-3.
2 **Wks. 5-8**	Build 100-200 min/week	4-5 sessions/week of brisk walking Wk. 5: 4× 25-30 min, 1 brisk Wk. 6: 4× 30-35 min, 2 brisk Wk. 7: 5× 30-40 min, 3 brisk Wk. 8 (deload): 4× 25 min comfortable Pace: brisk (~3-3.5 mph). Still below LT1. RPE 3-4.
3 **Wks. 9-12**	Progress 150-225 min/week	4-5 sessions/week, gradual introduction of walk-jog Wk. 9: 4× 30-40 min brisk + 1 walk-jog (1 min jog / 4 min walk × 5) Wk. 10: 4× brisk + 1 walk-jog (2/3 × 5) Wk. 11: 4× brisk + 1 walk-jog (3/2 × 5) Wk. 12 (deload): 4× 25-30 min comfortable Walk-jog stays below LT1; jogging segments should still allow speech.
4 **Wks. 13-16**	Consolidate 150-250 min/week	5 sessions/week Wk. 13: 4× brisk walks (35-45 min) + 1 walk-jog interval Wk. 14: 3× brisk + 2 walk-jog (alternate days) Wk. 15: 3× brisk (45 min) + 2 walk-jog Wk. 16: Reassessment — record longest comfortable continuous walk-jog duration. Choose Plan 2 if running becomes the goal or repeat with progression.

Plan 1 key principles

Increase total weekly duration by no more than 10% per week — the rule that prevents most overuse injuries in beginners.

Use the talk test as your only intensity check. Comfortable conversation = correct intensity.

Even 10-minute walking bouts have meaningful physiological value. Three 10-min walks across a day count.

Sleep 7+ hours/night. Recovery is part of the program, not a luxury.

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Plan 2: Intermediate Runner (3-5 hrs./week)

For runners with 6-24 months of consistent training, looking for structured progression. Uses pyramidal training intensity distribution: ~75% Zone 1 / ~15-20% Zone 2 / ~5-10% Zone 3.

Plan 2 Mesocycle Breakdown

Mesocycle	Phase / TID	Weekly Structure
1 **Wks. 1-4**	Base 85/15/0 3.5-5 hrs.	4 runs/week • 3 easy runs (40-50 min, conversational, below LT1) • 1 steady run (30-40 min at upper Z1, just below talk-test crossover) • Wk. 4 deload: reduce all runs by 30%
2 **Wks. 5-8**	Build 75/20/5 4-6 hrs.	4-5 runs/week • 3 easy runs (40-60 min, below LT1) • 1 long run (60-80 min, easy) • 1 tempo session: 2× 12 min at threshold pace (LT1-LT2), 3 min jog recovery between • Wk. 8 deload: drop tempo, reduce volume 30%
3 **Wks. 9-12**	Develop 75/15/10 5-7 hrs.	5 runs/week • 3 easy runs (45-60 min, below LT1) • 1 long run (75-90 min, easy) • 1 tempo: 3× 10 min at threshold, 2-3 min recovery • 1 VO_2 max interval session: 5× 3 min at hard interval pace (above LT2), with equal jog recovery • Wk. 12 deload: drop intervals, reduce 30%
4 **Wks. 13-16**	Sharpen 75/15/10 5-7 hrs.	5 runs/week • 3 easy runs (45-60 min) • 1 long run (90-100 min, easy) • 1 sustained tempo: 25-30 min continuous at threshold • 1 VO_2 max session: 6× 3 min above LT2 • Wk. 16: 5K time trial OR repeat 30-min time trial. Recalculate zones.

Plan 2 zone anchors (running)

Easy (below LT1): comfortable conversation • ~60-70% HRR • ~lactate <2 mmol/L

Tempo (LT1-LT2): short phrases only • ~75-85% HRR • lactate 2-4 mmol/L

Intervals (above LT2): cannot speak • ~88-95% HRR • lactate >4 mmol/L

30-min time trial avg pace ≈ threshold pace (LT2) for zone calibration.

Health Nexus Orthopedics
& Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Plan 3: Intermediate Cyclist (4-7 hrs./week)

For cyclists at the intermediate level using Coggan zones (anchored to FTP). Pyramidal TID. Power-meter optional but helpful — heart rate alternatives noted.

Plan 3 Mesocycle Breakdown

Mesocycle	Phase / TID	Weekly Structure
1 **Wks. 1-4**	Base 80/20/0 4-5.5 hrs.	4 rides/week • 3 endurance rides (60-90 min at Coggan Z2 / 56-75% FTP / below LT1) • 1 tempo ride (45-60 min with 20-30 min at Z3 / 76-90% FTP) • Wk. 4 deload: all easy, -30% volume
2 **Wks. 5-8**	Build 75/20/5 5-7 hrs.	4-5 rides/week • 3 endurance rides (Z2) • 1 long ride (2-3 hours easy, Z2) • 1 sweet-spot session: 3× 12 min at 88-94% FTP, 5 min easy between • Wk. 8 deload: drop sweet-spot, -30%
3 **Wks. 9-12**	Develop 75/15/10 6-8 hrs.	5 rides/week • 3 endurances (Z2, including 1 long ride 2.5-3.5 hrs) • 1 threshold session: 2× 20 min at FTP (95-105%), 5 min easy between • 1 VO_2 max session: 5× 4 min at 106-120% FTP, 4 min easy between • Wk. 12 deload: drop intervals, -30%
4 **Wks. 13-16**	Sharpen 75/15/10 6-8 hrs.	5 rides/week • 3 endurance rides (Z2) • 1 sustained threshold: 2× 25 min at FTP • 1 VO_2 max session: 6× 4 min above 106% FTP • Wk. 16: FTP retest (20-min test). Recalculate all zones from new value.

Plan 3 zone anchors (cycling, anchored to FTP)

FTP estimation: 20-min test × 0.95 (approximates LT2)

LT1 estimation: ~75-80% of FTP (upper Coggan Z2)

Coggan Z1 + Z2 (≤75% FTP) = below LT1 = where 75-80% of training time belongs

Re-test FTP every 8-12 weeks; recalibrate all zones from new value.

Health Nexus Orthopedics
& Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Plan 4: Advanced Athlete (PYR → POL Sequence)

For multi-year athletes training 7-12+ hrs./week. Uses the PYR-to-POL periodization sequence — pyramidal base for 8 weeks, polarized intensification for 8 weeks. In published research on well-trained recreational runners, this sequence produced significantly larger improvements than either model alone: ~3.0% relative VO_2 peak, ~1.7% velocity at LT1, ~1.5% at LT2, ~1.5% in 5K time trial performance.

Plan 4 Phase Breakdown

Phase	Weeks / TID	Weekly Structure
Pyramidal Base	Wks. 1-8 PYR 75/20/5 7-10 hrs.	Build the broad aerobic foundation • 4-5 easy sessions (60-120 min each, below LT1 / Coggan Z2) • 1-2 tempo or threshold sessions (Coggan Z3-Z4 cycling, running tempo at LT2) • 0-1 short interval sessions (e.g., 4× 3 min at Z5 / above LT2) • Deloads in Wks. 4 and 8: reduce intensity and volume by ~30%
Polarized Intensification	Wks. 9-16 POL 80/5/15 7-10 hrs.	Sharpen the high-intensity peak • 4-5 easy sessions (continue at below LT1) • Minimize tempo / threshold work (avoid the gray zone) • 2 high-intensity sessions per week, separated by ≥48 hours • Example sessions: 4-6× 4 min at 106-120% FTP (cycling) or VO_2 max pace (running), with equal recovery; or 6× 3 min at hard interval pace • Deloads in Wks. 12 and 15. Wk. 16 = race / time trial / FTP retest

Plan 4 principle

Build aerobic base first. Sharpen the peak second. Don't try to do both simultaneously — that's the gray zone trap, the most common amateur failure mode at this experience level. The sequencing is what makes the PYR-to-POL approach work.

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Part 6: Monitoring, Progression, and Common Mistakes

Daily monitoring — three simple tools

You don't need a sophisticated monitoring system. The talk test, RPE, and heart rate (when relevant) cover most of what matters.

The talk test, covered in Part 4, is your primary daily intensity check. Easy days should allow comfortable conversation; hard intervals should not.

RPE — Rating of Perceived Exertion — is a 1-10 scale of how hard the effort feels.

- RPE 3-4 is easy aerobic work.
- RPE 5-6 is moderate.
- RPE 7-8 is genuinely hard.
- RPE 9-10 is near maximal.

RPE is calibrated to your own perception; honesty matters more than precision.

Heart rate is useful for confirming intensity over time, watching for cardiovascular drift, and tracking trends. Because it's so variable, *it's not the primary daily tool* — the talk test and RPE are.

Reassessment — every 8 to 12 weeks

Same field test you used initially. Same protocol, same conditions, same warmup. Compare result to baseline.

Improvement = recalculate all zones from the new test value. Plateau = examine recovery, sleep, and adherence before changing the plan. A plateau is information, not failure.

The five most common training mistakes

In rough order of how badly they damage long-term progress:

13. Living in the gray zone. Easy training that isn't easy enough, hard training that isn't hard enough. The fix: deliberately make easy days easier than feels productive, and make hard days hard enough to be genuinely uncomfortable.
14. Skipping deload weeks. Three weeks of progressive load, one week of reduced load. Adaptation happens during the deload. Skipping deloads consistently produces stagnation and overtraining.
15. Never reassessing. Setting zones once and training in them for a year. Test every 8-12 weeks. Recalibrate.
16. Ignoring sleep and recovery. Training is a stress; adaptation requires recovery; sleep is the foundation. The unsexiest, highest-leverage piece of the entire system.
17. Chasing variety over consistency. Switching plans every 6 weeks because of a podcast or article. Pick a plan. Run it 16 weeks. Reassess. Choose what's next based on what worked.

Health Nexus Orthopedics
& Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Part 7: Glossary of Terms

Brief definitions of the core terminology used in this guide. Useful as a reference when you encounter these terms in other training literature.

Term	Definition
Aerobic threshold	Same as LT1 / VT1 — the intensity at which blood lactate first rises above resting baseline (~2 mmol/L). Below this, training is fully aerobic and sustainable for hours.
Coggan zones	A seven-zone cycling model anchored to FTP. Z1=Recovery, Z2=Endurance, Z3=Tempo, Z4=Threshold, Z5=VO_2 max, Z6=Anaerobic, Z7=Neuromuscular.
Deload	A planned reduction (typically ~30%) in training volume and/or intensity, usually in the fourth week of a 4-week mesocycle. The period during which adaptation consolidates.
FTP	Functional Threshold Power. The highest power a cyclist can sustain for ~1 hour. Approximates LT2. Estimated via 20-min test (avg power × 0.95).
HIIT	High-Intensity Interval Training. Repeated bouts of high-intensity exercise (typically above LT2) interspersed with recovery.
HR / HRmax / HR-rest	Heart rate / maximum heart rate / resting heart rate. Used to define heart rate reserve (HRR) and to anchor training zones.
HRR	Heart Rate Reserve. Difference between max HR and resting HR. Used in the Karvonen formula: Target HR = HR-rest + (% × HRR).
Karvonen formula	Method for setting heart-rate-based training zones using heart rate reserve. More accurate than fixed % of HRmax.
LT1	First Lactate Threshold. Intensity at which lactate first rises above baseline (~2 mmol/L). Same physiological territory as VT1 / aerobic threshold.
LT2	Second Lactate Threshold. Intensity at which lactate production exceeds clearance (~4 mmol/L). Approximates MLSS and FTP.
Mesocycle	A 4-week training block, typically structured as 3 weeks load + 1-week deload.
MLSS	Maximal Lactate Steady State. Highest exercise intensity at which lactate concentration remains stable. Functionally equivalent to LT2.
Pyramidal (PYR)	A TID model: ~75% Zone 1 / ~15-20% Zone 2 / ~5-10% Zone 3. Volume decreases as intensity increases.
Polarized (POL)	A TID model: ~80% Zone 1 / ~5% Zone 2 / ~15% Zone 3. Emphasizes easy + hard while minimizing the gray zone.
RPE	Rating of Perceived Exertion. A subjective 1-10 (or 6-20) scale of how hard exercise feels. RPE 3 = easy; RPE 7-8 = hard; RPE 9-10 = maximal.

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Sprint Interval Training (SIT)	Very short (typically ≤30 sec), all-out efforts with relatively long recoveries. A subtype of HIIT, with strong evidence for time-efficient adaptation.
Talk test	Field-based intensity check. Comfortable conversation = below LT1. Short phrases only = between LT1-LT2. Cannot speak = above LT2.
Tanaka formula	Estimate of max heart rate: 208 - (0.7 × age). Slightly more accurate than "220 - age" for adults over 40.
Threshold model	A TID model with most training time in the gray zone (between LT1 and LT2). Consistently inferior to PYR or POL in head-to-head comparisons.
TID	Training Intensity Distribution. The proportion of training time spent in each of the three physiological zones.
VO_2 max	Maximum rate of oxygen uptake during exercise. A primary determinant of endurance performance and a strong correlate of all-cause mortality.
VT1 / VT2	Ventilatory Threshold 1 and 2. Breathing-based markers that closely correspond to LT1 and LT2 respectively.
Zone (Z1, Z2, Z3)	When used in this guide without further qualification: the research three-zone model. Z1 = below LT1. Z2 = between LT1 and LT2. Z3 = above LT2.

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

About Health Nexus & The IPLS Framework

Health Nexus Orthopedics & Wellness is a telehealth-enabled practice based in Stuart, Florida, founded by Dr. Lyall Ashberg, a board-certified orthopedic surgeon. The practice operates on what we call the Whole Human Health Model — an integrated approach that recognizes joint health, metabolic health, and longevity as parts of a single physiological system rather than separate silos.

Cardiovascular fitness — the subject of this guide — is one of four interconnected domains we work with in our Integrated Performance and Longevity System (IPLS) program. The other three are metabolic health (including the metabolic-musculoskeletal disease bridge), body composition, and resistance training. The reason an orthopedic surgeon is the one walking you through cardiovascular training is that joint disease, metabolic dysfunction, and cardiovascular fitness are deeply interconnected — and treating any of them in isolation tends to produce inferior results.

If you'd like a personalized version of this work

This guide gives you a framework that can take you a long way on your own. But if you want a program built around your specific physiology, your existing joint or orthopedic concerns, your metabolic context, and your goals, that's what the IPLS framework at Health Nexus is built for.

A free 15-minute IPLS Discovery Call (“Fit call”) is available to discuss whether the framework is a fit for your situation. No commitment, no pricing pressure — just a conversation.

Telehealth means the practice serves patients regardless of geography. Most of what IPLS involves can be done remotely, including bloodwork (through any local lab), exercise prescription, body composition tracking, and ongoing program management.

Next steps

- Watch the full Cardiovascular Training Roadmap video series at healthnex.us
- Subscribe at healthnex.us for new content, including the upcoming Resistance Training Roadmap series
- Book a free IPLS Discovery Call to discuss your personalized program — healthnex.us
- Follow Dr. Ashberg on YouTube, Instagram, and Facebook

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

References

References cited in the text are listed below in order of first appearance. All entries are peer-reviewed primary sources, systematic reviews, meta-analyses, or society-level consensus statements.

1. Bishop DJ, Beck B, Biddle SJH, et al. Physical Activity and Exercise Intensity Terminology: A Joint American College of Sports Medicine (ACSM) Expert Statement and Exercise and Sport Science Australia (ESSA) Consensus Statement. Med Sci Sports Exerc. 2025;57(11):2599-2613. doi:10.1249/MSS.0000000000003795.
2. Tucker WJ, Fegers-Wustrow I, Halle M, et al. Exercise for Primary and Secondary Prevention of Cardiovascular Disease: JACC Focus Seminar 1/4. J Am Coll Cardiol. 2022;80(11):1091-1106. doi:10.1016/j.jacc.2022.07.004.
3. Buchheit M, Laursen PB. High-Intensity Interval Training, Solutions to the Programming Puzzle. Part II: Anaerobic Energy, Neuromuscular Load and Practical Applications. Sports Med. 2013;43(10):927-954. doi:10.1007/s40279-013-0066-5.
4. Hofmann P, Tschakert G. Intensity- and Duration-Based Options to Regulate Endurance Training. Front Physiol. 2017;8:337. doi:10.3389/fphys.2017.00337.
5. Casado A, Foster C, Bakken M, Tjelta LI. Does Lactate-Guided Threshold Interval Training Within a High-Volume Low-Intensity Approach Represent the “Next Step” in the Evolution of Distance Running Training? Int J Environ Res Public Health. 2023;20(5):3782. doi:10.3390/ijerph20053782.
6. Hydren JR, Cohen BS. Current Scientific Evidence for a Polarized Cardiovascular Endurance Training Model. J Strength Cond Res. 2015;29(12):3523-3530. doi:10.1519/JSC.0000000000001197.
7. Rosenblat MA, Perrotta AS, Vicenzino B. Polarized vs. Threshold Training Intensity Distribution on Endurance Sport Performance: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. J Strength Cond Res. 2019;33(12):3491-3500. doi:10.1519/JSC.0000000000002618.
8. Silva Oliveira P, Boppre G, Fonseca H. Comparison of Polarized Versus Other Types of Endurance Training Intensity Distribution on Athletes’ Endurance Performance: A Systematic Review With Meta-Analysis. Sports Med. 2024;54(8):2071-2095. doi:10.1007/s40279-024-02034-z.
9. Campos Y, Casado A, Vieira JG, et al. Training-Intensity Distribution on Middle- and Long-Distance Runners: A Systematic Review. Int J Sports Med. 2022;43(4):305-316. doi:10.1055/a-1559-3623.
10. Rivera-Köfler T, Varela-Sanz A, Padrón-Cabo A, Giráldez-García MA, Muñoz-Pérez I. Effects of Polarized Training vs. Other Training Intensity Distribution Models on Physiological Variables and Endurance Performance in Different-Level Endurance Athletes: A Scoping Review. J Strength Cond Res. 2025;39(3):373-385. doi:10.1519/JSC.0000000000005033.
11. Coates AM, Joyner MJ, Little JP, Jones AM, Gibala MJ. A Perspective on High-Intensity Interval Training for Performance and Health. Sports Med. 2023;53(Suppl 1):85-96. doi:10.1007/s40279-023-01938-6.
12. Filipas L, Bonato M, Gallo G, Codella R. Effects of 16 Weeks of Pyramidal and Polarized Training Intensity Distributions in Well-Trained Endurance Runners. Scand J Med Sci Sports. 2022;32(3):498-511. doi:10.1111/sms.14101.
13. Stavrinou PS, Bogdanis GC, Giannaki CD, Terzis G, Hadjicharalambous M. Effects of High-Intensity Interval Training Frequency on Perceptual Responses and Future Physical Activity Participation. Appl Physiol Nutr Metab. 2019;44(9):952-957. doi:10.1139/apnm-2018-0707.

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

14. Mølmen KS, Almquist NW, Skattebo Ø. Effects of Exercise Training on Mitochondrial and Capillary Growth in Human Skeletal Muscle: A Systematic Review and Meta-Regression. Sports Med. 2025;55(1):115-144. doi:10.1007/s40279-024-02120-2.
15. Fletcher GF, Ades PA, Kligfield P, et al. Exercise Standards for Testing and Training: A Scientific Statement From the American Heart Association. Circulation. 2013;128(8):873-934. doi:10.1161/CIR.0b013e31829b5b44.
16. Bok D, Rakovac M, Foster C. An Examination and Critique of Subjective Methods to Determine Exercise Intensity: The Talk Test, Feeling Scale, and Rating of Perceived Exertion. Sports Med. 2022;52(9):2085-2109. doi:10.1007/s40279-022-01690-3.
17. Reed JL, Pipe AL. The Talk Test: A Useful Tool for Prescribing and Monitoring Exercise Intensity. Curr Opin Cardiol. 2014;29(5):475-480. doi:10.1097/HCO.0000000000000097.
18. Persinger R, Foster C, Gibson M, Fater DC, Porcari JP. Consistency of the Talk Test for Exercise Prescription. Med Sci Sports Exerc. 2004;36(9):1632-1636.
19. Keir DA, Iannetta D, Mattioni Maturana F, Kowalchuk JM, Murias JM. Identification of Non-Invasive Exercise Thresholds: Methods, Strategies, and an Online App. Sports Med. 2022;52(2):237-255. doi:10.1007/s40279-021-01581-z.
20. Bradbury DG, Landers GJ, Benjanuvatra N, Goods PSR. Comparison of Linear and Reverse Linear Periodized Programs With Equated Volume and Intensity for Endurance Running Performance. J Strength Cond Res. 2020;34(5):1345-1353. doi:10.1519/JSC.0000000000002805.
21. Sun Q, Yu Y, Cui J, et al. Recent Advances in Training Intensity Distribution Theory for Cyclic Endurance Sports: Theoretical Foundations, Model Comparisons, and Periodization Characteristics. Front Physiol. 2025;16:1657892. doi:10.3389/fphys.2025.1657892.
22. Vincent HK, Vincent KR. Considerations for Initiating and Progressing Running Programs in Obese Individuals. PM R. 2013;5(6):513-519. doi:10.1016/j.pmrj.2013.03.008.
23. Jones AM. The Fourth Dimension: Physiological Resilience as an Independent Determinant of Endurance Exercise Performance. J Physiol. 2024;602(17):4113-4128. doi:10.1113/JP284205.

Health Nexus Orthopedics & Wellness

Lyall J. Ashberg, MD
https://healthnex.us
info@healthnex.us
Ph: (561) 510 1514

Disclaimer

This document is provided for educational and informational purposes only. It is not medical advice and is not intended to diagnose, treat, cure, or prevent any disease or condition. The training principles and plans described herein are general guidance and may not be appropriate for every individual.

Before starting any new exercise program — particularly if you are over 50, have known cardiovascular disease, joint or orthopedic conditions, metabolic conditions, are returning to exercise after a long absence, or are pregnant — consult a qualified physician or healthcare provider for individualized assessment.

The practical recommendations in this guide are anchored to peer-reviewed exercise physiology research current as of the document's publication date. Exercise science continues to evolve, and recommendations may be updated as new evidence emerges.

Health Nexus and Dr. Lyall Ashberg make no warranty, express or implied, regarding outcomes from following the guidance in this document. Use of this material is at the reader's own risk.