

INTERGATED PROGRAM DESIGN

A New Look



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INTRODUCTION

Key Issue

- As technology continues to bring more advanced products, services and training trends to market, fitness professionals often lack the appropriate education that provides that essential “tool-box” to develop sequentially-appropriate training progressions.
- The pressure to remain competitive compels many trainers and coaches to adopt programs using equipment and strategies without comprehensively understanding timely applications and associated risks of misuse.
- In light of current technology, this session outlines a contemporary model for mesocycle and microcycle program design

TRAINING SUCCESS - A Sequential Approach

RAPPORT



INVESTIGATION



PLANNING



ACTION

INVESTIGATIVE STAGE

Physiological components should include the following in chronological order:

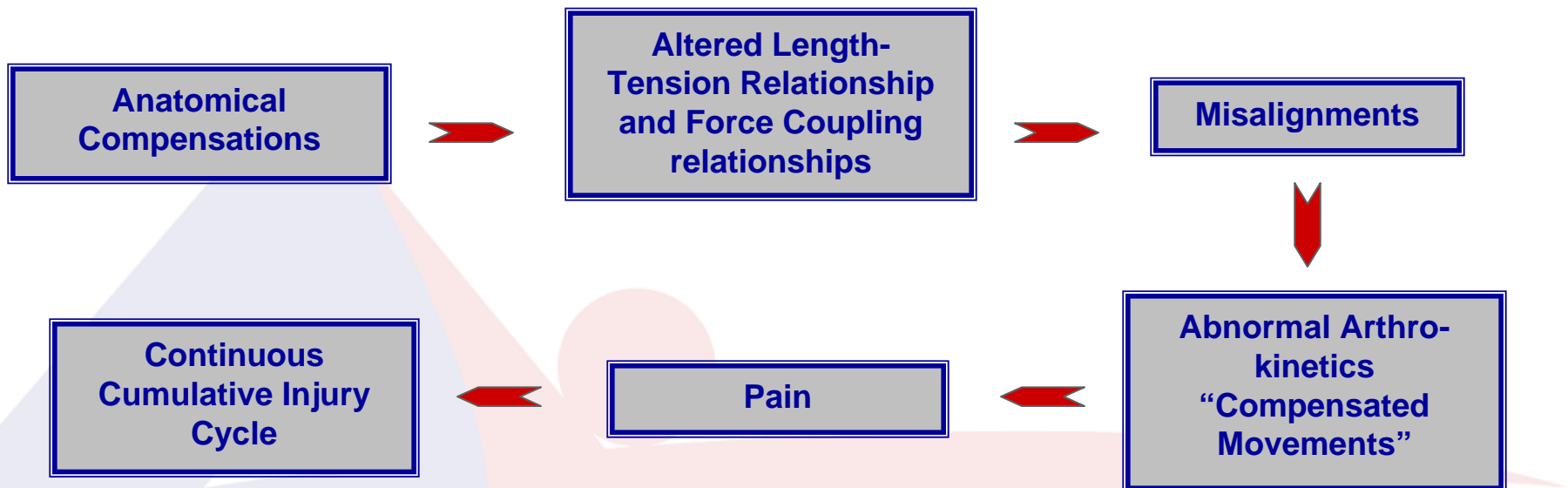
1. **Risk Assessment and Stratification**

- **Goal:** Evaluate risks versus benefits of participation

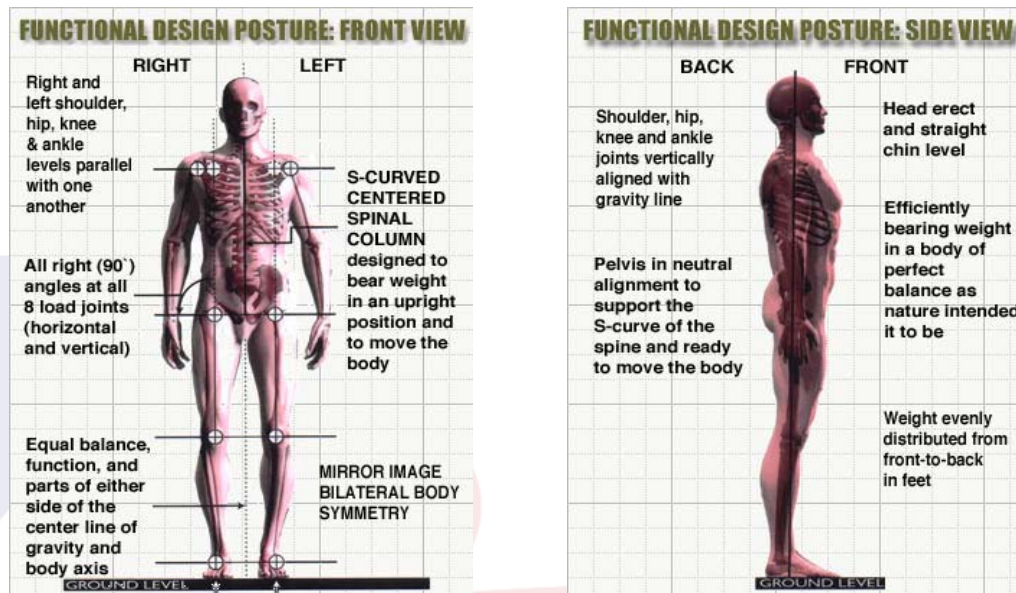
2. **Needs Analysis**

- **Goal:** Needs analysis is an evaluation of the desired activities and of the individual, and includes:
 1. Movement, physiological and injury analysis
 2. Consideration of current training status and exercise history
 3. Readiness to change behavior
 4. Current belief systems, obstacles and support systems

3. **Identification of Musculoskeletal Imbalances** (concurrent with the initial assessments deemed appropriate).
- **Goal:** Observe static postural compensations that deviate from the balanced right angle rule
 - The human body is designed to move
 - Effects of automation and repetitive motion
 - Abnormal arthrokinetics

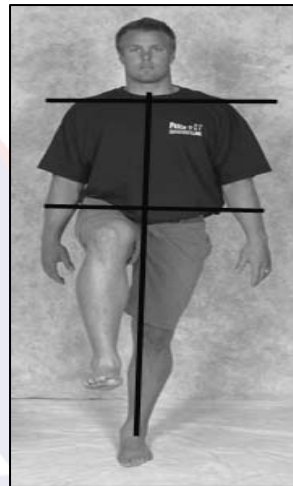


- A simplistic approach: The right angle rule is a tool to observe joint position at four locations (shoulder, hip, knee and ankle) relative to the floor and observes for symmetry in all three planes of motion.
- Respect scope of practice and need for referrals !!



4. Functional Movement Assessments

- **Goal:** Evaluate ability to perform basic movements and identify movement pattern weaknesses (“*weak links*”) and compensations. The brain favors recognition of movement patterns over isolated muscle action.
- Functional Movement Screens



5. **Determination of Correctible Compensation**
 - **Goal:** Differentiate correctable (muscle imbalance) from non-correctable posture (underlying congenital, skeletal, etc.)

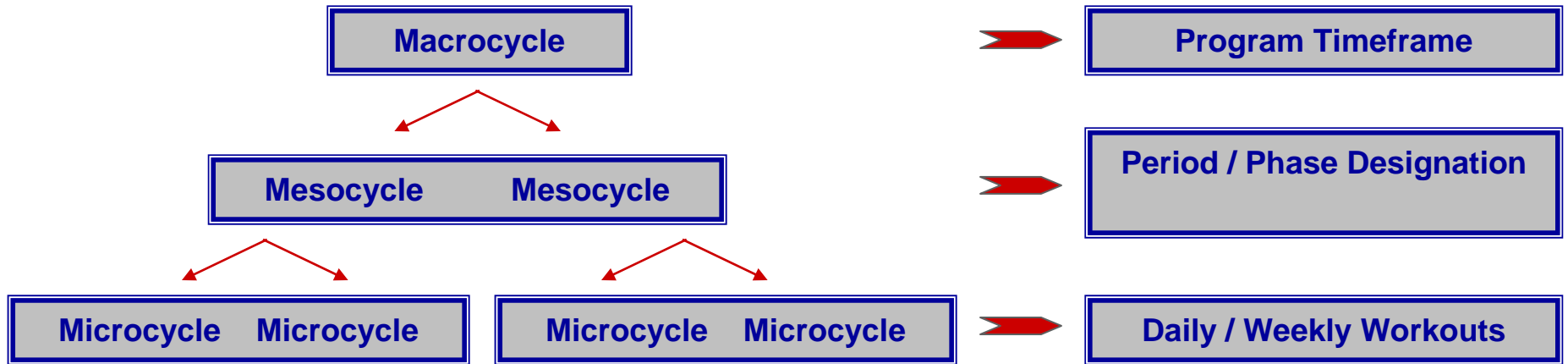
PLANNING STAGE

Traditional programming:

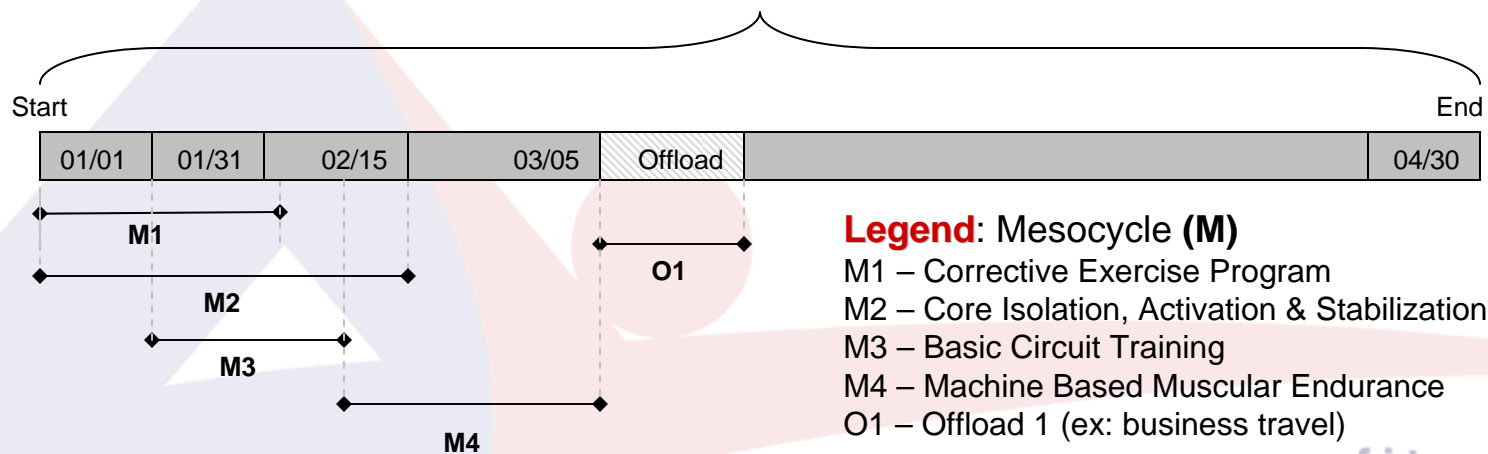
- Focus - techniques to enhance muscle strength and appearance
- Less emphasis - Integration into movement.

- Many activities of daily living (ADL's) are dynamic, occurring in multi-joint, multi-planar manners necessitating the transfer of forces between the two extremities via the core.

1. Macrocycle and Mesocycle Considerations



MACROCYCLE



2. Corrective Exercise Programming

- **Goal:** Restore optimal stability and mobility at muscle joints - exercises focused upon strengthening, stretching and positioning to correct imbalance *“straighten before strengthen”*
- Exercises place specific demands upon the body – facilitate return to normal muscle function by:
 1. *Strengthening latent* (weak and inactive) muscles
 2. *Stretching hypertonic* (tight and overactive) muscles

3. Core Muscle Isolation and Activation

- **Goal:** Improve the integrity, proprioceptive and reflexive abilities to activate and isolate core musculature
- Recruitment of local muscle systems versus global muscle systems and myofascial slings

Research: Kendall; McGill; Richardson, C., *et al.* - therapeutic exercise for spinal stabilization in low back pain)

- Trunk movements (flexion, extension); shoulder movements (flexion, extension, abduction); hip movements (flexion, extension, abduction) - Core musculature (local muscle system) pre-fire, stabilizes spine within 40 - 100 msec of the global muscle system
- Core musculature acts *reflexively* in response to actions and reactions to stabilize the spine.
- Core training (*Reactive Neuromuscular Training*) - use of exaggerated positions of imbalance (under neuromuscular control) to improve the integrity and proprioceptive abilities of the core and correct dysfunctional reflexive response.

De-conditioned core musculature:

- Loss of muscle activation
- Loss of stabilization and protection
- Loss of force transfer

Benefits of Core Training

- Minimized energy losses, improving the magnitude of force transfer between the extremities
- Increased dynamic postural strength and control
- Improved muscle balance and coordination
- Increased strength and flexibility across the lumbar, pelvic and sacro-iliac joint
- Enhanced efficiency of movement for performance and activities of daily living

Programming Objective:

- Restore reflexive function

Exercises:

- *“Hollowing”* and *“Bracing”*

Exercise Modalities:

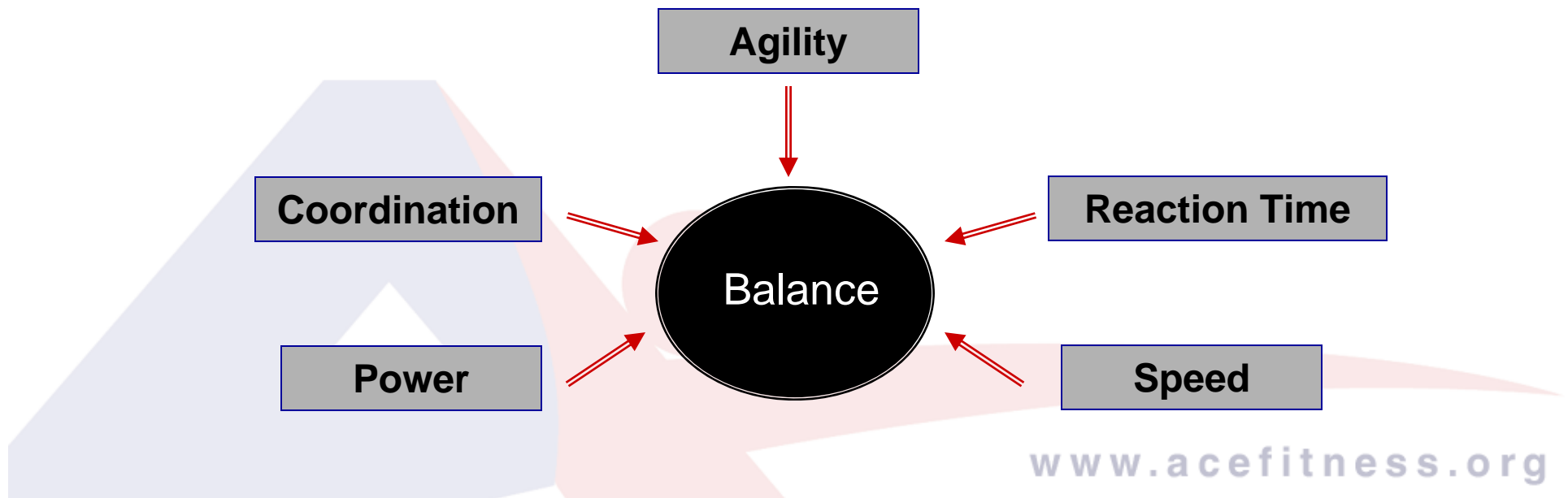
- Stable, supported environments (seated or supine)
- Uniplanar exercise and movement patterns



4. Core Stabilization and Balance Training

- **Goal:** Achieve effective spinal stabilization ability during loading, improve proprioceptive awareness and reflexive response of core musculature under progressive challenges of imbalance.

Balance Training is Core Training !!!



Programming Objectives:

- Local muscle systems

Exercises:

- Involves more static movements, holding positions for longer durations (5 – 20 sec)
- 3x/week, 10 – 20 minutes
- Progression to the strengthening phase: 2 – 4 weeks

Exercise Modalities:

- Progress from seated/supine to standing (close kinetic chain) and introduce challenge of balance (static balance prior to dynamic balance)
 1. Unloaded, conscious control (uniplanar)
 2. Unloaded, conscious control (multiplanar)
 3. Unloaded, unconscious control (multiplanar)
 4. Mild loading, unconscious control (multiplanar)

Programming Variables:

- Seated:
 - Base of support, points of contact, sensory input, center of gravity, duration, mechanical levers, task complexity, destabilizing contact surfaces
- Standing:
 - Progress from basic ball stances to ground based exercises incorporating functional foot positions



5. Core Strengthening

- **Goal:** Builds upon core stabilization to increase core strength under proprioceptive challenge to effectively tolerate increased loading and dynamic forces

Programming Objective:

- Global muscle systems

Exercises:

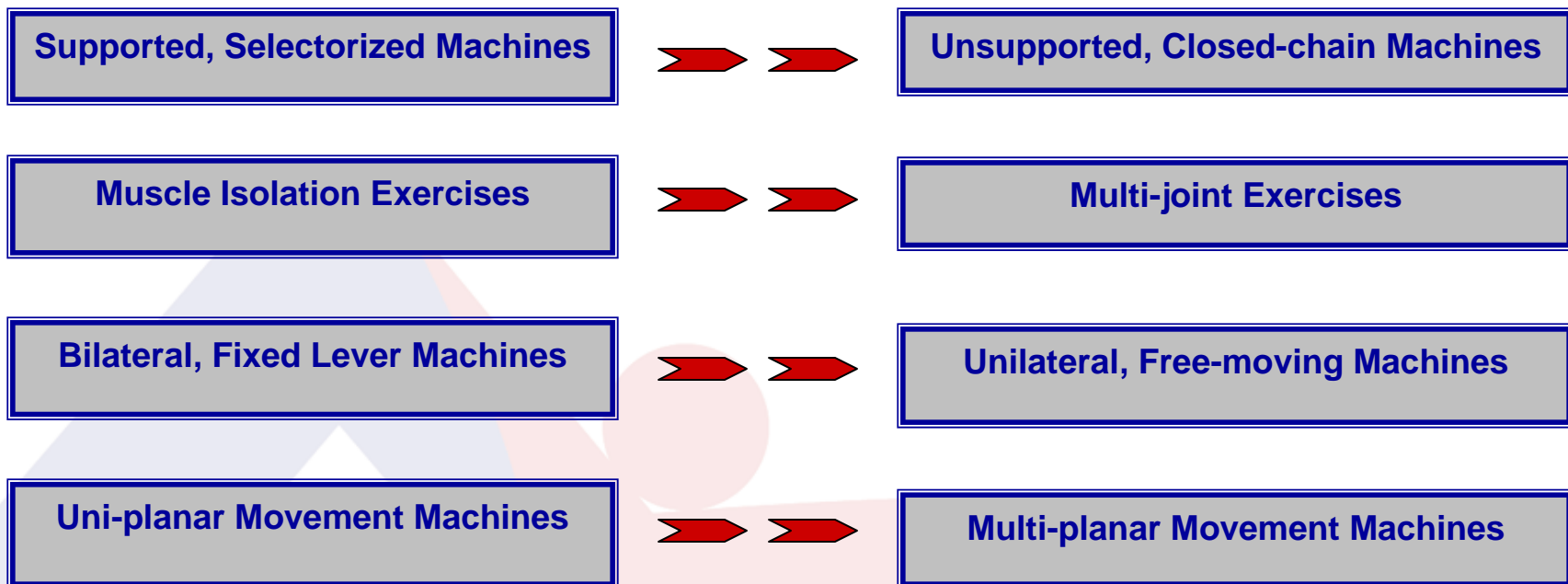
- More traditional strength programming (set-rep design)

Programming Variables:

- Dynamic movements, time under tension (TUT), tempo, force reduction (eccentric), loaded-conscious controlled (uniplanar and multiplanar)

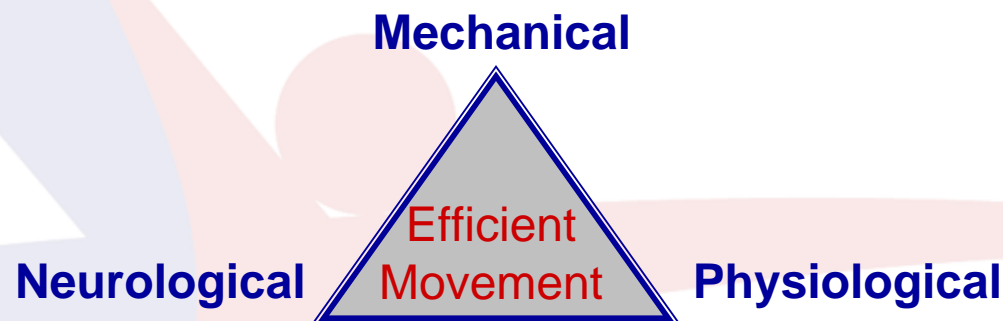


6. Program Design for Muscular Endurance and Strength
- **Goal:** Muscle overload to improve musculoskeletal fitness while maintaining joint mobility and stability (with transition into mimicking ADL's)
 - **Periodization: Principles of Overload and Specificity**

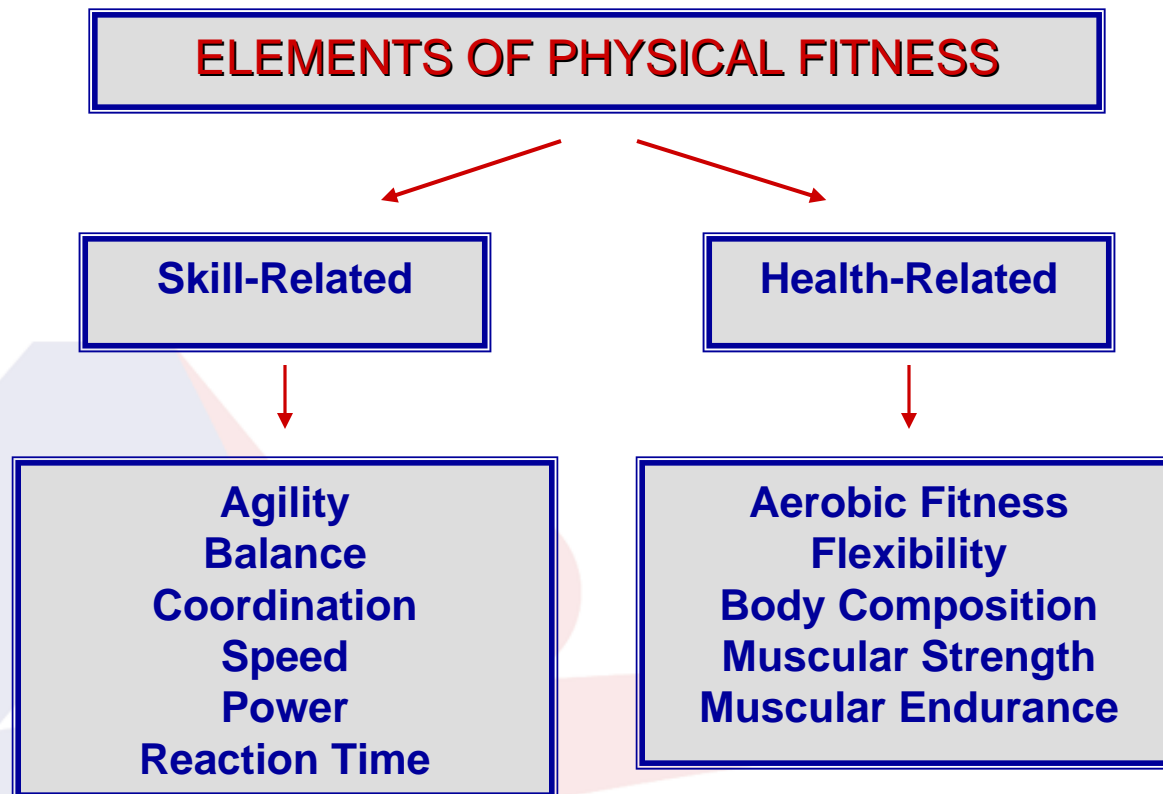


7. Functional Training

- **Goal:** Movement and person-specific exercise patterns (and movement preparation to improve ADL efficiency)
- Involves:
 1. Core integration into extremity movement
 2. Multi-joint, multiplanar movements that mimic ADL's
 3. Integration of neurological, physiological and biomechanical properties
 4. Improved neuromuscular control during force production and reduction, and joint stabilization during movement



- Traditional training models:
 - Focus: *health-related parameters* of physical fitness
 - Ignored: *skill-related components*

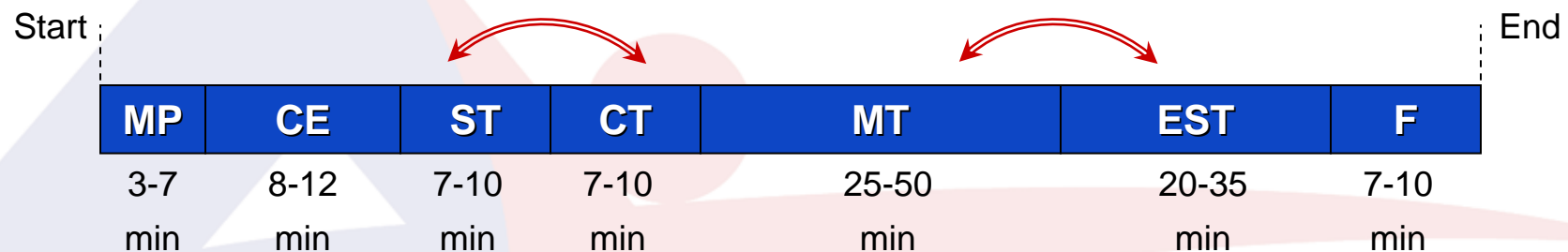


- **Training for Performance:**
 - Sport-specific needs
 - Development of dynamic balance; speed, agility and quickness; power (core power); plyometrics (stretch-shortening cycle); coordination, and reaction time

- **Prerequisites:** Given the dynamic nature of these closed chain exercises;
 - Joint integrity (mobility and stability)
 - Basic muscle strength
 - Core stabilization
 - Experience (CKC exercises)

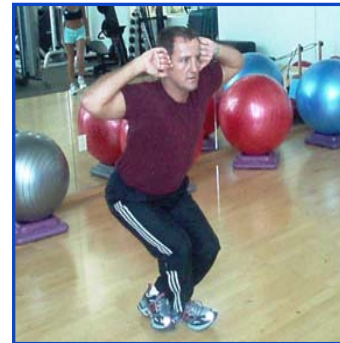
MICROCYCLE (TRAINING SESSION) DESIGN

1. Movement preparation / dynamic warm-up (MP)
2. Corrective exercises (CE)
3. Skill training (ST)
4. Core training (CT)
5. Muscular conditioning (MC)
6. Cardiovascular training (energy system training) (EST)
7. Flexibility (static, AIS, myofascial release (F))
8. Rest and recovery (DOMS, energy repletion, etc.)



○ *Movement Preparation:*

- Replaced traditional general warm up and static stretching
- Demonstrated decreased performance

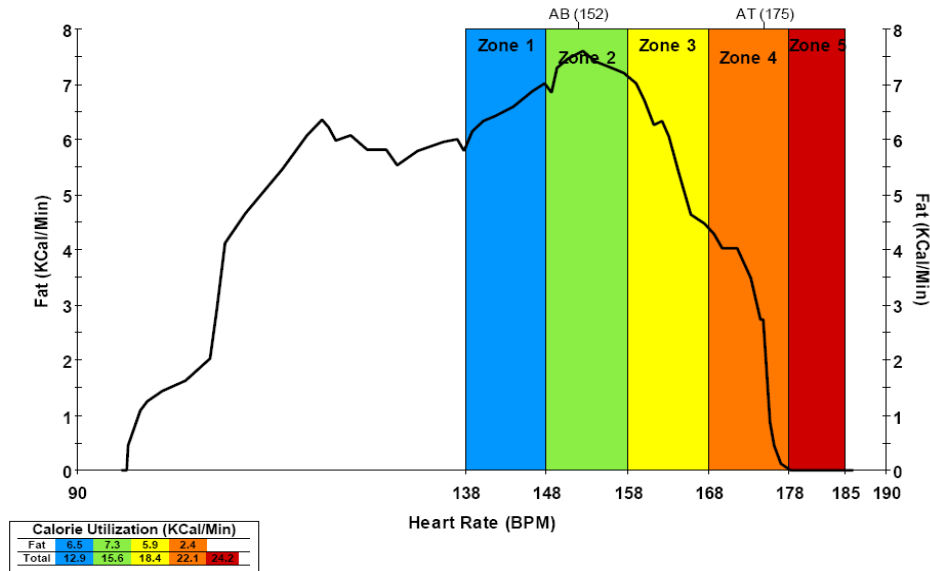


- **Energy Systems Training:**
 - Identify energy pathway to be trained
 - **Phosphagen system:** 1:12 – 1:20 (exercise to passive rest ratio) - physiological adaptations ideal with 1:5 – 1:6 ratios
 - **Lactate system:** 1:2 – 1:5 (exercise to active rest ratio)
 - **Oxidative system:** 1:1 – 1:1½ (exercise to rest ratio)
 - Understand limitations to estimates of intensity for oxidative pathway
 - MHR and HRR Formula - while convenient, MHR has 1 sd of 12 bpm, plus no account for RHR discrepancies
 - Alternatives:
 1. **208 – 0.7 (age)** - regression from 30 different MHR formulas (1 sd = 7.2 bpm)
 2. **205.8 – 0.685 (age)** – Inbar (1sd = 6.4 bpm)

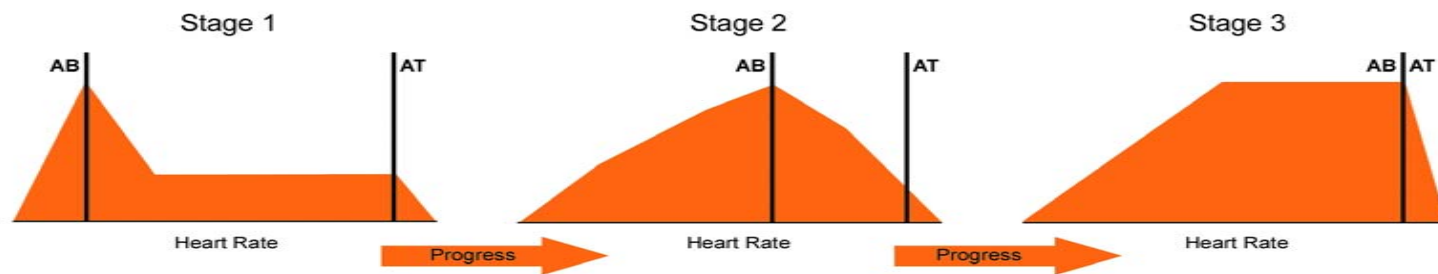
Legend:

AB: Aerobic Base

AT: Anaerobic Threshold



- *Aerobic Intervals:* - Improve aerobic base to increase fat burning efficiency
- *Anaerobic Intervals:* - Improve lactate thresholds to improve performance



Training Zone Methodology (5 Zone)

| <u>Zone</u> | <u>Intensity</u> | <u>Adaptations</u> |
|--------------------------------|--|--|
| 1 4 kcal/min | 50 – 60% MHR (35 – 48% VO ₂ max) | Improvements to lipid profile, blood pressure and other cardiovascular risk factors, small reductions in body fat, cardiovascular Minimal improvements in cardiovascular fitness, minimal improvements in lean body mass |
| 2 7 kcal/min | 60 – 70% MHR (48 – 60% VO ₂ max) | Weight loss with greater improvements to overall cardiovascular improvements and health. Region for utilizing greatest percentage (not amount) of fat |
| 3 10 kcal/min | 70 – 80% MHR (aerobic zone) (60 – 73% VO ₂ max) | Significant adaptations to cardiovascular and pulmonary systems, zone of greatest amount of fat utilization (in more conditioned individuals). |
| 4 13 kcal/min | 80 – 90% MHR (tempo zone) (73 – 86% VO ₂ max) | Peak sustainable performance zone, with cross over into anaerobic pathways. Some improvement in lactate thresholds and maximal fat burning in very conditioned individuals |
| 5 17 kcal/min | 90 – 100% MHR (interval zone) (86 – 100% VO ₂ max) | High-intensity, short-duration bouts, completely anaerobic zone, using intervals to push lactate thresholds. |

In Closing.....

- No one best periodization plan for everyone.
- Appropriate periodization requires:
 1. Knowledge and skill (to assess individual needs and performance)
 2. Understand physiological adaptations within the body
 3. Sensitivity to training experience, status, and individual goals
- In closing, regardless of the program designed, the objective of effective program design is to create programs that are comprehensive, sequentially planned, and directed towards the client's goals, yet functional in their application to daily living.