Effects on Performance

Effects on Performance

Glycogen depletion

Dehydration

Compromised thermoregulation

Loss of bone mineral density

Nutrient deficiency: zinc, iron, Ca+, B vitamins

Loss of lean mass

Decrease in metabolic rate

Cont.

Electrolyte imbalances

Early muscle fatigue and cramping

Cardiac arrhythmia

Staleness

Chronic fatigue

Depressed immune fx

Chronic illness

Overuse injuries

Initially Positive Effect

Initially increased performance - honeymoon effect

Up-regulates the hypothalamic-pituitary-adrenal axis

Fight or flight response

Cortisol, epinephrine and norepinephrine

Initial wt loss - if mostly fat - can increase efficiency of movement

Feel lighter giving a “psychological” boost

However, the longer the restricting, the more decrements in performance

Severe or Rapid Weight Loss

Glycogen depletion

Loss of lean mass via gluconeogenisis

“Wasting”

Protein can be a source of glucose via glucose-alanine cycle

Results in ↓ strength & endurance

Dehydration

Impaired thermoregulation

Impaired cardiac output

Iron Deficiency Anemia

Formation of RBCs & transportation of 02

Primary role in hemoglobin synthesis

Transports 02 from lungs body tissues

Aids myoglobin synthesis

Transports 02 from blood to mitochondria

Traditional thinking: Female athlete triad

Energy Availability (EA)

EA (kcal/kg) =

(kcals consumed – kcals expended through ex) LBM (kg)

Relative Energy Deficiency in Sports (RED-S)

Performance Effects

Dietary and serum Ca+

Bone Mineral Density

Adolescence is critical for achieving peak skeletal bone mass

Majority of mass acquired by middle of 2nd decade ~ 90% by 18 y.o.

3x more likely to have bone fractures later in life if AN as a teen

Impaired formation & increased resorption

Damage occurs w/ very short onset and impacted greatly by BMI & age at onset

Osteoporosis

Low bone mineral density and structural deterioration

Result of low estrogen concentration and low energy availability

Greater risk for stress fractures

Early intervention is important

Factors

Hypoestrogenemia

Low IGF-1

High cortisol

Physical activity

Poor nutrition, insufficient kcals

Low Ca+ & Vit D consumption

Low weight

Osteopenia: 90% of AN

Osteoporosis: 40% of AN

Treatment

1500 mg Ca+/d & 400 IU Vit.D

Weight recovery

Resumption of menses

Doubtful if HRT improves bone health in AN

\*\*Loss of BMD may not be fully regained\*\*

Tanya

40 y.o. white female, 68”, 98 lbs

h/o inpt ED programs since 16 y.o.

Tanya is an RN. Dad is a PE teacher

Dressed in very tight short-shorts and tight fitting tops

Ran “10.1 miles,” 7 days/week for past 8 years.

Proud to claim she never missed a day d/t weather or illness

Took in ~800 kcals/d, est. needs ~2800kcals/d

Couldn’t complete a thought: brain starved

Sent to us from outpt ED program. Very resistant to Tx. She was not allowed to work until she “was healthy”

Tanya’s goal: “to be in the best shape of my life & weigh 115 lbs”