

The Role of Nutrition for Performance and Health for Female XC Skiers.



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Format

- Body Composition
- Iron Status
- Female Athlete Triad



Body Composition

- @ Physical structure of cross-country skiers
- @ When do you test body composition?
- @ ISAK method



Nutritional Needs of Female X-C Skiers.

Micronutrients at risk:

- Iron
- Calcium
- Zinc

Risk Factors:

- Low-energy diets
- High carbohydrate diets
- Vegetarianism or other
- Disordered eating
- Poor lifestyle skills
- Traveling diet
- Times of growth
- Personality



Iron

Functions:

- Transport (hemoglobin) and storage (myoglobin) of oxygen
- Energy production
- Immune system
- Adaptation to altitude



Increased Iron Needs for Athletes:

Athlete's need is 30% greater than the general population, due to:

- ❖ Increased energy turnover
- ❖ Increased building, repair, and maintenance of tissues
- ❖ Increased oxidative stress
- ❖ Altitude adaptations



Iron Deficiency Symptoms

- ⊕ Fatigue
- ⊕ Delayed recovery
- ⊕ Breathlessness
- ⊕ Paleness
- ⊕ Impaired exercise capacity
- ⊕ Cold intolerance
- ⊕ Increased susceptibility to illness



STAGES OF IRON DEPLETION & DEFICIENCY

Ferritin
< 12 -15
µg/L



Transferrin Saturation
(serum iron/TIBC)



Hemoglobin
Female < 12 g/dL
Male < 13-14 g/dL



Iron depletion

**Iron Deficiency
w/o anemia**

Anemia

Stage 1

Stage 2

Stage 3



IRON SOURCES

Source	Serving Size (oz/g/cups)	Iron Content (g)
<i>Animal (~40% heme and 60% non-heme)</i>		
Liver	3 oz ~ 85g	9
Beef	3 oz ~ 85g	3
Chicken	3 oz ~ 85g	1
Fish	3 oz ~ 85g	1
Pork	3 oz ~ 85g	1
Eggs	1 whole	1
<i>Plant (100% non-heme)</i>		
Cereal, dry, fortified	1 oz ~ 28.4g	6
Spinach, cooked	½ cup	3
Sweet corn	½ cup	2
Pasta, cooked	1 cup	2
Rice, cooked	1 cup	2
Legumes, cooked	½ cup	2
Oats, cooked	1 cup	1.5
Raisins	¼ cup	1
Fruit	1 piece	0.5

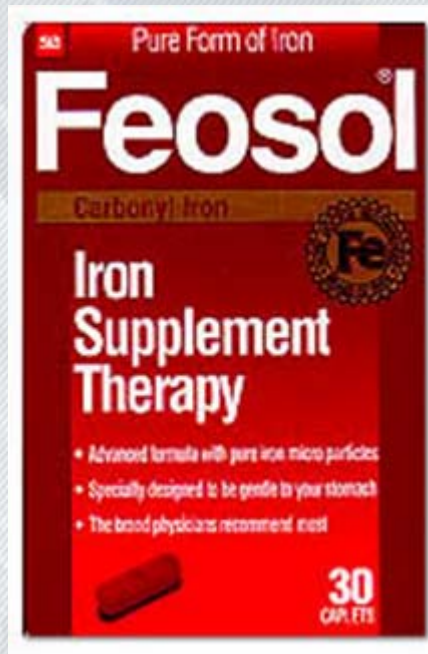


IRON ENHANCERS AND INHIBITORS

Iron Enhancers	Examples	Iron Inhibitors	Examples
Vitamin C rich foods	Citrus fruits and juices	Phytates	Cereal grains, legumes, soy products
Fermented Foods (low pH)	Miso, sauerkraut	Tannins	Tea, coffee, herb tea, cocoa
Heme Iron	Meat, fish or poultry foods	Calcium	Milk, cheese and yogurt
Organic acids	Citric acid and tartaric acid	Peptides from plant proteins	Soy protein, legumes, nuts
Alcohol	Beer, wine, liqueurs	Oxalic acids	Rhubarb, strawberries



TREATMENT



- **Supplementation**
 - ~60 mg elemental iron in ferrous sulfate form once to three times per day
 - Take with vitamin C or OJ
 - Take 30 min before or after meal
 - 6-8 weeks followed by retest
 - Side effects: constipation, dark stool

*Contains
65 mg elemental
In ferrous sulfate form



Female Athlete Triad

The Female Athlete Triad refers to three interrelated health problems seen in females. These problems include: low energy availability, menstrual disorders, and weak bones. In the extreme, these problems may be expressed as eating disorders, amenorrhea (loss of menstrual periods), and osteoporosis (an increased risk of fractures).

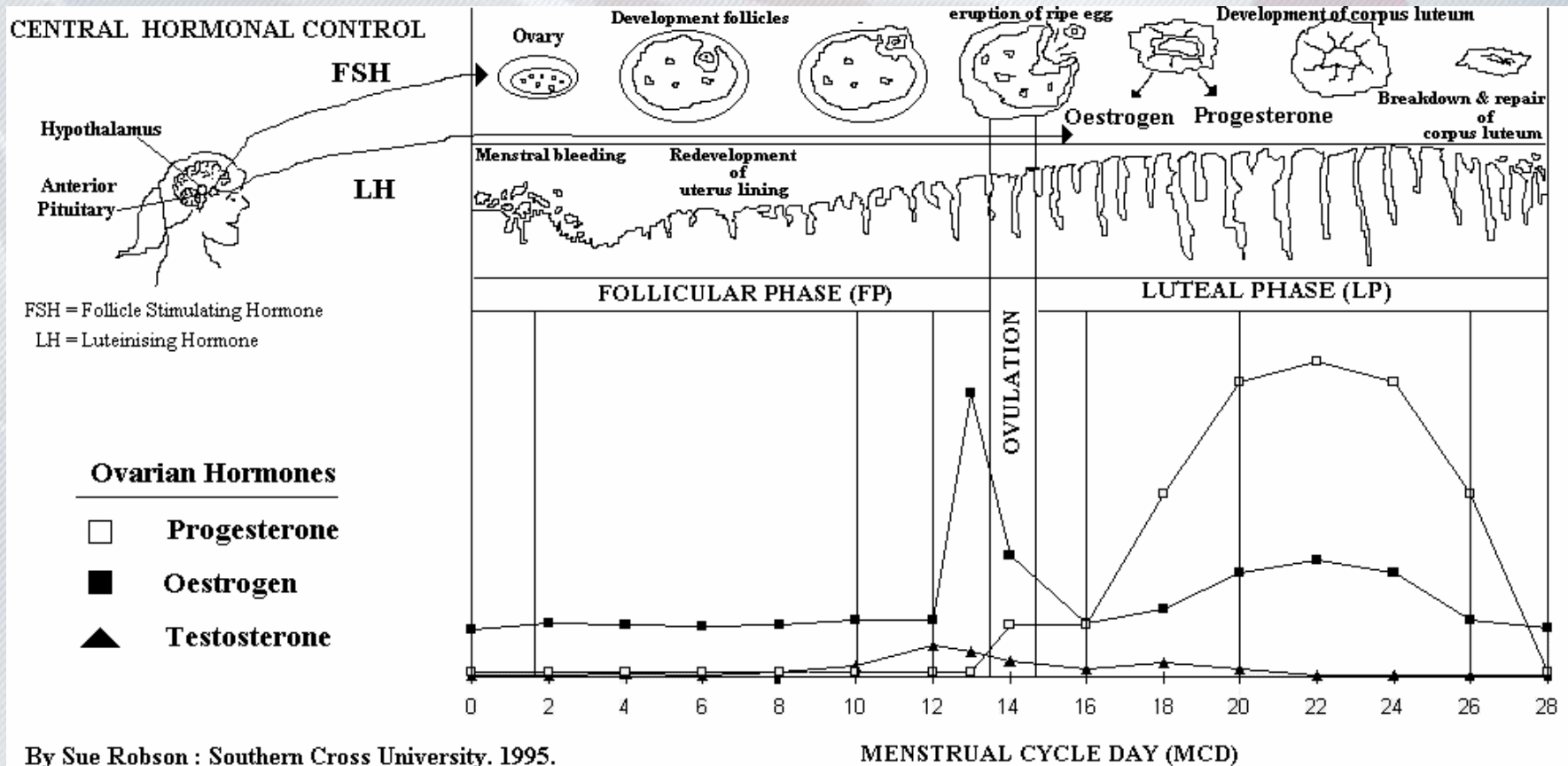


Low Energy Availability

- ➡ Drive for thinness predicts energy deficiency
- ➡ Age decreases susceptibility to low energy intake
- ➡ Menstrual disturbances, bone formation and resorption are linked to energy availability
- ➡ Severe cases: disordered eating, anorexia nervosa, bulimia nervosa, EDNOS



The Menstrual Cycle



Common Menstrual Cycle Abnormalities

- ⊕ 1^o Amenorrhea (delayed menarche)
- ⊕ 2^o Amenorrhea
- ⊕ Short luteal phase
- ⊕ Oligomenorrhoea



Possible Causes of Menstrual Cycle Abnormalities

- Family History
- Stress
- Environmental change
- Medical illnesses
- Sport



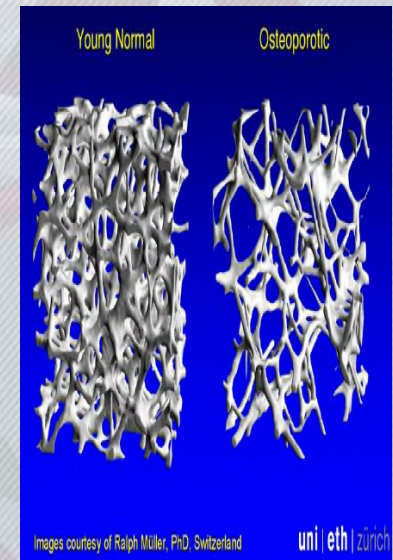
Menstrual Disorder

- After 3 – 6 months seek medical review
- Determine cause
- Determine impact on bone



Weak Bones

Restricted energy availability and Subsequent suppression of bone formation plus the decrease in estrogen associated with amenorrhea leads to a progressive decrease in bone mass.



What are the Warning Signs of the Triad?

- Prolonged / additional training
- Reduction in energy intake during training, decreased social eating etc.
- Weight loss
- Perfectionist personality trait
- Personality changes (introvert)
- Cold hands and feet
- Dry skin
- Increased rate of injury and delayed healing



What are the Consequences of the Triad?

- Impaired growth and development
- Increased risk of stress fractures and impaired bone health later in life
- Loss of reproductive function
- Not achieving performance goals
- Death



How is the Female Athlete Triad Treated?

- Treatment should include medical, nutritional and psychological intervention.
- Positive energy balance
- Normal menstruation is the goal
- Hormonal support e.g. oral contraceptive pill
- Training modification



How can you prevent the Triad?

- Annual screening
- Support a healthy body image in your team
- Nutrition and health education sessions for athletes, parents and staff
- Sport Dietitian as part of your team



Questions:

