Specific Athletic Demands of Figure Skaters

by Edna Chang Grant

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Supramaximal Effort in a Cold Environment

1. Heart Rate during a skating program is normally 195 beats/minute. At its maximum is 200 beats/minute. Skaters will sustain this heart rate in a 3 – 4 minute skating program equal to an 800-meter runner.

2. VO2Max + measurement of oxygen consumption. A skater during this program will reach lactate at peak respiration and consume 40 – 50 units of oxygen. This equals maximal effort of a marathon runner (1 mile + 4 minutes).

3. Lactate in the blood measures the energy produced. A skater during the program, at their peak, will reach lactate and produce 7 – 15% or the same as a long distance runner at the end of a long distance run.

Athletic Demands

- Spins/jump rotation = 2 – 300 pounds of centrifugal force to hold your arms and legs in position.
- Jump force = 2-4 times the body weight (power to lift off of ice)
- Landing force = 8 – 14 times the body weight (impact on landing)
- Stroking force = 1 times the body weight

Jumping Facts for triples

- Air time is .6 - .7 of a second
- Turn rate in air 5 times per second
- Arms pull in at .1 of a second
- Feet cross at .08 of a second
- Jump height 22 – 32 inches
- All jumps landed on one leg as opposed to two legged landing in other sports
- All jumps land backward on a blade that is 1/8 inch wide

Example of volume of jumping

- 20 – 100 jumps/day = 500 jumps/5 day week
- Maximum force for .04 -.05 seconds/jump.
- 500 jumps = 2 – 2.5 seconds of 160 tons of cumulative weight for 100 pound skater

USFS programs address these issues for athletes and incorporate training in flexibility skills, symmetrical development, strength training, anaerobic and aerobic conditioning, plyometrics, and periodization.

Joint forces in Triple Toe loop Landing
Joint Loading and Torque (stress on body)

	Ankle	Knee	Hip
Force (body weight	7 – 14 times	8 – 14 times	8 – 14 times
Momentum (N-m) (Torque)	76	388	501

Injuries (High levels of force can cause injuries)

Effect is overuse injuries in 90% of cases due to muscle fatigue and increased loads.

Figure Skating Injury Type:

Acute	50%	vs	Chronic	50%
Non-serious	90%	vs	Serious	10%
Overuse	90%	vs	One-Time	10%

Cost of Injury:

Type	Off-ice	Full Skating	Competition Compatible
Strain	0 – 2 weeks	1 week	Yes
Tear	2 – 4 weeks	2 – 3 months	Yes/No*
Bone Contusion	0 – 2 weeks	1 – 2 months	Yes
Stress Fracture	2 – 4 weeks	2 – 3 months	Yes/No
Fracture	2 – 3 weeks	3 - 4 months	No

- Tear can be 2-3 months before they can compete

Purpose of training enables athlete to tolerate skating demands, i.e. jump forces, Max HR, VO2 Consumption, and High Lactate, and perform skills at maximal efforts.