

**Sports Science
&
Medicine
Fact
Sheet**

Figure Skating - Power Sport – Explosion Sport

Detailed below are key findings from years of Sports Science and Medicine programming. Based on these findings complete educational programs for athletes and coaches will be developed and information disseminated at future workshops as well as through Skating Magazine, and the USFSA and PSA website.

Off Ice Training

- The number of athletes using off-ice training has increased enormously over the past five years. Based on placement, athletes who train off-ice: skate stronger, jump higher, have stronger jump landings, have stronger spins and are more confident on the ice.
- Preliminary or Intermediate athletes who learn off-ice training techniques incorporate these skills easier and use them throughout their career. More athletes are using personal trainers, therapists, and Pilates instructors.
- Periodization:
 1. Is understood and being used by athletes and coaches
 2. Is a realistic overview of the conditioning year (how to train in the off-season – in-season)
 3. Prevents over-training and decreases injuries
 4. Allows athletes to peak at the appropriate time of year
- Athletes are learning more about the difference between aerobic (training heart and lungs) and anaerobic conditioning. Athletes that do conditioning also have a mental edge in competition.
- Athletes who attend USFSA programs have more body awareness and training knowledge.

Musculo-Skeletal

- Coaches and athletes appreciate the individual attention they receive as it pertains to their treatment of injuries and injury prevention.
- Core weakness/balance is strongly correlated with skating level. Core (abdominal/trunk stability) is the key for take-off, landing and rotation.
- Lower abdominal weakness and hip tightness is present in 80% of our high-performance athletes. This primarily affects air positions, landing, and spins (travelling on the ice).
- Hip instability (weakness) is present in more than 50% of our high performance athletes. This assessment evaluates dynamic (moving) balance, and checks for muscle coordination of the whole core (glutes, hip stabilizers, and abdominal muscles).
- Issues due to boot and blade are present in nearly all skaters. Young skaters have bursa sacks, calluses, and other foot problems caused by rigid boot design.

Musculo-Skeletal (continued)

- Lower extremity alignment problems are present in roughly 50% of the evaluated athletes. Correcting alignment problems is paramount for injury prevention.
- Tight hip flexors are very common thus decreasing the maximal jump height in our athletes. Stretching is used to address this issue.
- Dynamic balance is asymmetrical. (Usually better with landing leg)

Nutrition

- Female athletes tend not to eat enough calories for their metabolic demands.
- There is a low calcium intake among male and female athletes.
- Athletes are not well hydrated and therefore need to drink more water.
- Eating disorders/disordered eating are increasing.

Biomechanics

- For male athletes, attempting triple or quads, a jump height of 40 cm (16 inches) appears to be minimum required jump height. Also jump heights greater than 50 cm (23 inches) add little to the athlete's ability to land a jump. Consequently, more effort should be directed toward achieving an optimal body position in the air.
- For female athletes, attempting triple jumps, a jump height of 30 (12 inches) to 40 cm (16 inches) is required to land a jump. Again, putting effort into jumping higher than 40 cm (16 inches for females) will not likely benefit the athlete.
- A vast majority of athletes fail to land multiple revolution jumps or triple, triples because they are:
 1. Either not getting tight enough in the air or
 2. More likely taking too long (mid-flight or later) to achieve the tight position in the air. On average, most athletes can achieve at least a $\frac{1}{4}$ revolution on a triple jump by adjusting their position in air. This means either achieving a tighter position or getting into their tightest position earlier. Both of these changes will increase an athlete's spin rate which translates into more revolutions in the air.
 3. When attempting to achieve a tight body position in the air, the athlete's head should align with the trunk. It turns out that tilting as opposed to turning the head forward, backward or to the side has substantial impact on the athlete's spin rate in the air.
 4. Coaches education on these findings is paramount to allow coaches to adjust their teaching techniques.

Psychology

- Almost every athlete uses visualization and imagery. These are major training components of all sports at the Olympic level.
- Addressing the psychological impact of an injury is very important in recovery process.
- 85% or higher of our top six placements at Nationals use mental skills training to achieve success.

Psychology (continued)

- Awareness of mental skills training is important but consistent use and application of skills is associated with better performance. That is why we use faculty-created mental training workbooks.
- Communication skills and conflict resolution can be helpful in improving pair and dance teams. Similar skills are taught in marriage counseling.
- The older the athlete, the more important mental skills training is in achieving success.
- It is important to athletes learn life balancing (balancing an unbalanced life) and time management skills.
- Mental concentration and ability to refocus is a major predictor of how well athletes will perform. Athlete's self-talk is a crucial factor influencing feelings of control, concentration and confidence.
- Mental skill training must be done all year long. Program participants love to talk to our psychologists.

Physiology

- Four minutes at maximal heart rate is very demanding physiologically.
- In 2002, our on-ice heart rate revealed that all but one athlete had an on-ice peak heart rate that was lower (average 16 beats per minute) than age predicted max. This means our athletes aerobic (cardiovascular) fitness was the best we have ever seen.
- VO₂ max (oxygen consumption) measurements are significantly higher since we have started off-ice training. We are now dealing with better conditioned athletes.
- Exercise-induced asthma incidents are between 30 and 50% depending on the year and the rink tested. If asthma is treated correctly, there is a tremendous impact in increased performance.

General

- Evaluations have been much more functionally oriented and individualized. Each athlete takes home his/her off-ice training program the day of the evaluation.
- Athletes look forward to attending the evaluation programs. They feel lucky to be part of the "select" or "elite" group and appreciate the individual attention and education.
- We need to stay progressive or other countries like China or Japan are going to out skate us. The fact that we have great numbers of athletes participating in the sport is not enough any more. Many sports organizations make a greater commitment to sports science and medicine than the USFSA does.
- A mentorship program was started two years ago and has been a great success. Mentoring between our envelope athletes and Drs. Bradley, LaLonde, Yu and Kruse was very helpful to our Olympic Team.

- The Sports Sciences and Medicine Committee realizes that 2-3 keys training points should be taught each year as not to overload and confuse the athletes or coaches. Balance and Core will be the focus for 2003.

Synchronized Skating

- Team Sport – potential benefit from Team Training Camps
- Totally different sport
- Different injuries – shoulder, arm, lacerations
- Have started performance testing

Summary

- The committee has developed short-term and long-range goals. These will allow us to be accountable as well as move forward by turning these findings into complete educational programs for athletes, coaches and parents.
- Long-Term Goals:
 1. Biomechanics – Additional research on women’s triple axels, pair throws, fundamentals in single jumps/throws (Achieved through USOC grant)
 2. Boot and Blade – Roundtable discussion with manufacturers and scientists into the redesign of boots and blades (Planning roundtable to be funded by USOC grant)
 3. Core – Education at all ADC, SSM and Coaches programs
 4. Accountability to Executive Committee – Publish research findings, create resource center
 5. Improving High Performance Programs – Continue to adapt to the changing demands of the sport
 6. Mentoring of Athletes – one-on-one training advice for injury prevention.

We need your help for our future direction. We realize the best sources of feedback are the coaches and athletes. Together we can formulate programs and services that will ensure continued U.S. Figure Skating medal success.