



# Strategies to Reduce Disordered Eating among Female Athletes

## A Working Paper

From the Women's Issues in Sport Medicine Committee of the Canadian Academy of Sport Medicine.

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## Position Statement

The Female Athlete Triad of disordered eating, amenorrhea and osteoporosis is a syndrome of related medical disorders, which can sequentially affect female athletes. There are no studies which confirm that either mandatory weigh-ins or body composition assessment have led either directly or indirectly to the Female Athlete Triad. However, there is a strong suspicion that for certain groups of female athletes, performing a mandatory weigh-in, performing a body composition assessment, or conveying her body composition result can be triggering factors.

It is the position of the of the Women's Issues in Sport Medicine Committee of the Canadian Academy of Sport Medicine that mandatory weigh-ins and body composition assessments be abandoned for all female athletes. This can be a valuable strategy toward reduction of the incidence of the Female Athlete Triad, when supplemented with prevention programs aimed at disordered eating and comprehensive nutritional counseling to athletes at risk. This position statement is based on a comprehensive review and interpretation of scientific literature concerning body composition assessment, disordered eating and the Female Athlete Triad. Because this is a work-in-progress **this draft position statement has not yet been submitted to nor endorsed by the board of the Canadian Academy of Sport Medicine.** \*

Based on available evidence, the Women's Issues in Sport Medicine Committee of the Canadian Academy of Sport Medicine makes the following general and specific recommendations:

It is recommended that we build a better support structure for female athletes. This recommendation includes an expanded education role for both sport medicine physicians and sports dietitians with a large de-emphasis upon any correlation between weight, body composition and performance.

We believe that a culture and attitude change will encourage and enable all sports organizations to:

- ❑ Equate mandatory weigh-ins with harassment
- ❑ Abandon body composition testing as a routine assessment
- ❑ Provide prevention programs aimed at disordered eating, starting at the youngest age levels
- ❑ Provide comprehensive nutritional counseling to their athletes at risk
- ❑ Provide monitoring programs to better identify and support athletes with subclinical eating disorders

Women are at greatest risk of disordered eating if they participate in aesthetic or visual sports where subjective judging is a measure of performance, or if they train in sports in which low body weight is emphasized for athletic activity or appearance. (1) We believe

that a culture and attitude change will encourage and enable aesthetic sports organizations to:

- Re-evaluate and de-emphasize the aesthetic value to their athlete's performance
- Address the need to alter rigorous weight standards

We believe that a culture and attitude change will encourage and enable sports organizations with weight classifications to:

- Support efforts that will minimize weight cycling and disordered eating

We believe that a culture and attitude change will encourage and enable all health care providers, coaches, executives and officials of sports organizations to:

- Encourage further study of the risks for subclinical eating disorders
- Continue to develop alternative methods of performance assessment and nutrition education to minimize disordered eating

It is recommended that individuals working with female athletes examine the reasons for performing mandatory weigh-ins and body composition assessment. What are the objectives of determining percent body fat? Are these objectives legitimate or well founded? Are the tools accurate enough to provide these measurements? It is recommended that individuals working with female athletes examine the cultural influence on women to be thin, our own interactions with these women and the messages they receive from us. We must examine our actions both overt and covert that may influence a female athlete toward a disordered eating pattern. Once an elite athlete has reached that level, she has already demonstrated her performance capabilities. There is no evidence to suggest that further reduction in body fat will further improve her performance. In fact, few if any scientific studies have related improved performance to body composition assessment. The elite athlete will usually have a lower than average body fat (depending upon the sport and age of the athlete) and a deliberate attempt to lose more fat may result in a drop in performance (usually due to loss of lean tissue). In most cases, the reasons for seeking body fat determination are not compelling.

We need a more cautious use of body composition assessment initially, as there is a need to acknowledge the difficulty of any transition. Abandoning mandatory weigh-ins and body composition assessment will not rid us of the Female Athlete Triad nor undue "competitive" concern over body weight. However, it should not be the scales and calipers that guide us – at least not until new evidence tells us that these measures do improve performance. We recommend a national conference of exercise scientists, coaches, physicians and dietitians to be convened to address the following points:

- Abandoning mandatory weigh-ins and body composition assessment for all female athletes must be re-evaluated on a periodic basis. How often should this be? How can we monitor the consequences? How much of an exception for research should be allowed?

- ❑ When research on body composition assessment is performed a clear definition of S.E.E. (Standard Error of Estimate) is required so that the public and not just the researchers are aware of the true errors involved.
- ❑ No female athlete with disordered eating should slip through the cracks. How can this be prevented?
- ❑ Teachings should be implemented into coaching certification programs.
- ❑ Sport medicine physicians and/or sport dietitians should be consulted if there is any concern for disordered eating in a female athlete.

## **Introduction**

The Canadian Academy of Sport Medicine (CASM) is the organization of physicians committed to excellence in the practice of medicine, including health promotion and disease prevention, as it applies to all aspects of physical activity. Our mission is to be the leader in advancing the art and science of sport medicine for the benefit of all Canadians through programs of education, research and service. CASM's Women's Issues in Sport Medicine (WIISM) committee promotes and disseminates information with regards to the specific needs of the physically active woman. We believe that mandatory weigh-ins and body composition assessments are negative stressors for female athletes. We believe that current recommendations have been inadequate in changing the underlying culture and beliefs that trigger the disordered eating that feeds the Female Athlete Triad. A detailed description of the evolution of this Working Paper is included in Appendix A. CASM is interested in preventing the Female Athlete Triad and must act to protect athletes' health and best interests, based on all the information available.

There is a significant mortality risk associated with both eating disorders and the Female Athlete Triad. (2,3) The severity of these disorders demand that intervention be instituted and monitored. Therefore in this Working Paper we will address these concerns in a forthright manner and we will offer alternatives for the optimum training of female athletes. When this topic was presented recently at conferences, support from both sport medicine physicians and exercise physiologists was overwhelming for a dramatic change. We believe that considerable thought, reflection and discussion will serve to strengthen our position. The enormous emotional, physical and monetary costs of both disordered eating and the full Female Athlete Triad requires us as physicians to first understand the issues and then to consider all methods of prevention.

## **Understanding the problem**

### ***Subclinical Eating Disorders***

Disordered eating is often a hidden practice and difficult to diagnose with certainty, as denial is a prominent feature. Therefore those at risk for, and those with subclinical symptoms of the Female Athlete Triad may be far greater in number than we anticipate. The pressure on female athletes to improve their performances and physiques, coupled with the general sociocultural demand placed on all women to be thin, often results in attempts to achieve unrealistic body size and body weight goals. (4) Though there have been many different classifications and questionnaires used, recent data support a continuum model of the eating disorders. (5) There is a progression in some individuals from less to more severe disturbances in eating behavior. (6) An attempt has been made to identify the group of athletes who show significant symptoms of eating disorders, but who do not meet the DSM-III-R criteria for anorexia nervosa, bulimia nervosa, or eating disorder not otherwise specified. These athletes have been classified as having a subclinical eating disorder termed anorexia athletica. (7) Readers should

consult the Oxford Textbook (see Recommended Reading) for diagnostic criteria for each of the above eating disorders.

### ***Eating Disorders & Society***

Dealing with these issues is complex because female athletes are subject to contradictory cultural influences and expectations, including pressure to conform to an accepted norm. Our society has created a gap; an urge to get thin, but with limited advice how to do so safely. In a study of 497 randomly selected adolescents who were in their senior year in high school, two thirds of female adolescents were preoccupied with weight and dieting compared with 15% of male adolescents. The fairly common fear of being overweight and thoughts about dieting experienced by contemporary female adolescents, in part, seem to reflect the greater aesthetic value that contemporary society places on thinness for women. (8) In a study of 869 Australian schoolgirls aged 14-16 years, a self-report questionnaire was administered. The prevalences of disordered eating, unhealthy dieting and distorted body image were 33, 57, and 12%, respectively. (9) Statistics on eating disorders are equally sobering. In another Australian study, they concluded that dieting is the most important predictor of new eating disorders. The rate of development of new eating disorder per 1000 person years of observation was 21.8 in female subjects and 6.0 in male subjects. Female subjects who dieted at a severe level were 18 times more likely to develop an eating disorder than those who did not diet. In adolescents, controlling weight by exercise rather than diet restriction seems to carry less risk of development of eating disorders. (10) In a recent sample, the lifetime prevalence of bulimia nervosa was 1.1% for female subjects and 0.1% for male subjects. (11) However, in a Swedish study of 1157 women randomly selected from the general population of females aged 18-30 years, the lifetime and point prevalences of 7.8% and 2.6%, respectively, were reported for eating disorders. (12)

### ***Female Athlete Triad***

The Female Athlete Triad is a syndrome comprising disordered eating, amenorrhea and osteoporosis in physically active women. It is a serious problem whose clinical presentation varies. It can decrease athletic performance (1,13) and features a high morbidity often requiring hospitalization, plus some mortality. It can be secretive and is usually easy to hide, though when it presents as a fracture the diagnosis becomes more obvious. Often signs and symptoms of eating disorders are ignored or trivialized until serious medical damage has occurred. (14) There may be valuable training time lost. The roots of the problem may originate at an early age but does extend into all age groups. The American College of Sports Medicine (ACSM) position stand on The Female Athlete Triad recommends that women with one component of the Triad should be screened for the others. (15) Discussion of the individual components of this Triad is as follows:

### ***Disordered Eating and Athletes***

It appears that women training in dance or sports in which low body weight is emphasized for athletic activity or subjective appearance are at greatest risk of developing the Female Athlete Triad. Researchers have suggested that activities that

emphasize or require a small body size, thin shape or low weight tend to increase the likelihood or prevalence of eating disorders. (16,17). However, several studies dispute this.

For example, a study found that the drive for thinness and body dissatisfaction subscales in the Eating Disorders Inventory was higher in female controls than in endurance athletes. (18) Another study did not indicate a greater amount of disordered eating in female athletes compared to non-athlete controls. (19) Sundgot-Borgen attributes some of this discrepancy to underreporting. People with bulimia, whose weight is within normal limits, may not realize they have an eating disorder and do not report it. Underreporting by athletes may also be due to the fear of being discovered by their coach or other people important to their athletic career. (7) Sundgot-Borgen compared results from a screening study to those from the interviews and clinical examinations, and found that a significant underreporting of disordered eating among athletes was demonstrated. A significantly higher number of athletes (18%) than controls (5%) were found to actually suffer from disordered eating, particularly athletes competing in sports in which leanness or a specific weight were considered important. Non-athletes more correctly reported the use of pathogenic methods but over reported the prevalence of disordered eating. (20)

Disordered eating can include one or more abnormal weight control behaviors. A study showed from fifteen to sixty-two percent of female athletes engaged in at least one of: fasting; vomiting; diet pills; laxatives or diuretics. (21) Again, the quality of reporting has been questioned for many of these studies. (7) For example, under-reporting by athletes on questionnaires may be the reason for a decreased prevalence of eating disorders in the following study. 1,445 student athletes from 11 Division 1 (USA) schools were surveyed using a 133-item questionnaire. The results indicated that only 1.1% of the females met DSM-IV criteria for bulimia nervosa versus 0% for males. Surprisingly, only 5.52% of the females reported purging behavior (vomiting, laxatives, and diuretics) on a weekly or greater basis versus 2.04% for the males. (22)

A significant number of anorexia athletica athletes have diets too low in energy and nutrients. A study of Norwegian female elite athletes suffering from eating disorders revealed that the mean intake for energy and carbohydrates was lower than recommended for active females. A significant number did not reach the protein level recommended for athletes. In addition, there were low intakes of several micronutrients, most notably calcium, vitamin D, and iron. (23) In another study, the group with subclinical eating disorders had significantly lower mean protein and fat intakes compared with the control group; mean micronutrient intakes were not significantly different. Mean status measures for iron, zinc, magnesium, vitamin B12 and folate were within the normal ranges for both groups and no differences were noted between the groups. A similar number of athletes within each group used vitamin/mineral supplements < or = 4 times per week. The authors concluded that although female athletes with subclinical eating disorders had dietary intakes of energy, protein, carbohydrate, and certain micronutrients that were below recommended levels, the micronutrient status appeared relatively unaffected, probably due to their use of supplements. (24)

Yet, disordered eating is not limited to females. In a study of rowers, Eating Disorder Inventory profiles of 11% of the athletes suggested the presence of a subclinical eating disorder. Fifty-two percent of the athletes reported the occurrence of bingeing. These figures are clearly elevated compared with the normal male population. Low-weight wrestlers and rowers should be considered a high-risk male population for subclinical eating disorders. (25) We have included a separate article on wrestling in British Columbia in Appendix F to address these issues.

### ***Amenorrhea***

There may still be considerable ignorance about amenorrhea in athletes and the often-subsequent osteoporosis. Many involved in coaching or advising athletes do not regard amenorrhea as abnormal. (26) The ACSM Position Stand affirms that amenorrhea is not a “natural” or “expected” accompaniment to vigorous exercise but rather a pathological condition that deserves investigation, treatment and further research. (15) A Finnish study found the prevalence of menstrual disturbances was 27-37% in aesthetic, endurance, and weight- class athletes, and 5% in controls. (18) There appears to be a connection between menstrual dysfunction, athletic training, and disordered eating, but how they relate is not fully understood. Low calorie intakes, nutritional inadequacies, vegetarianism, low body fat stores, and specific training behaviors may contribute to the abnormal menstrual patterns. (27)

### ***Osteoporosis***

Bone mineral density never fully recovers after bone loss occurs in amenorrheic athletes. (28) The critical years for the attainment of peak bone mass occur in later adolescence (12-16 years of age) as opposed to in the later twenties. (29) The most rapid rate of bone loss (approximately 4% per year) occurs early on cessation of menses, thus emphasizing the importance of early management in preventing bone loss occurring in young amenorrheic athletes. (30) A delay in menses due to exercise may result in a lower potential peak bone mass which appears to be a major predictor of the rate of postmenopausal bone loss. (31) There are serious consequences of osteoporosis in this setting. Osteoporosis in young athletes often manifests for the first time as a stress fracture. However, a study showed that bone density in female ballet dancers was relatively high. High levels of weight-bearing physical activity probably caused these high values. (32) Thus osteoporosis in this setting is likely an even larger drop in bone density and reflects marked physiological changes.

### ***Consequences of Testing***

Although the testing procedure is rarely harmful, it is the consequences of both the testing and conferring the results to the athlete that may cause harm. Young athletes are psychologically at risk when they view themselves as anything other than a well-proportioned and confident winner. (33) Our society has put tremendous value in certain body shapes and peer pressure can be difficult to change. The ACSM position stand on The Female Athlete Triad stated that: “Pressure placed on young women to achieve or maintain unrealistically low body weight underlies development of the Triad.” (15)

Because disordered eating is so well hidden, we will never know the true incidence of the Female Athlete Triad caused directly or indirectly as a result of a mandatory weigh-in or a body composition assessment.

### ***Treatment***

Athletes with eating disorders usually resist treatment until they reach a point of despair, at which time they are more willing to accept help. The success of the treatment plan must be based upon establishing a trusting relationship between the athlete and a team of care providers. (7) Readers should consult the Oxford Textbook (see Recommended Reading) for more information regarding the treatment of eating disorders.

### **Assessing the Risks**

#### ***Risk Factors***

Under certain circumstances, female athletes become more at risk of developing disordered eating. In looking at college students in general, and female athletes in particular, interesting observations have been made. Female college students tended to perceive themselves as overweight when they were not, failed to see themselves as underweight when they were, and many of those who did not see themselves as even slightly overweight wanted to lose weight. (34) Yet, athletes may be shielded to some degree. In one study 318 high school athletes were randomly matched to 360 non-athletes. Comparisons revealed that athletes did not have higher levels of disordered eating behaviors and attitudes than their non-athletic counterparts. Athletes had less negative views of life than non-athletes. However, perfectionistic tendencies may put some athletes at risk. They concluded that athlete's positive outlook on life and high self-efficacy may serve as protective factors. Alternatively, athletes may not be at risk until they train for one particular sport in a highly competitive environment. (35)

Some researchers have had a clinical hunch that members of high-risk groups, such as athletes, have psychological traits similar to persons with eating disorders. (36) In theory, the competitiveness, perfectionism, intensive exercise and ability to restrict food intake might predispose a person to success in athletics. (37) One author stated that the nature of competitive sport plays into the doubts of those with low self-esteem or self-image who have to constantly prove to others and to themselves that they are competent and worthy of respect. (38) One study found female athletes in thin-build sports to have greater diet and weight concerns, dissatisfaction and more emotional lability than athletes in normal-build sports, even though they were actually thinner. (39) However, a study that tested this hunch found that eating-disordered females had the poorest self-images while athletes were the best adjusted of all three groups. Eating-disordered subjects exhibited extremely low scores on emotional tone and social relationships, suggesting that these dimensions of self-image may be characteristic which clearly distinguish the eating-disordered from so-called high-risk persons. (36)

Athletes at risk of disordered eating are not necessarily easy to identify. The risks of triggering disordered eating are greater with the aesthetic sports, but are not limited to these sports. This is why coaches of all female athletes must be wary. In a study of

female field hockey players, 17.1% of the players demonstrated increased body dissatisfaction. (40) In a study conducted at the British National Rowing Championships, there was further evidence that the risk of eating disorders among elite rowers is moderated by age, gender and weight category. Further, they suggest that measures of mood may help identify athletes at risk from eating disorders. (41)

### ***Triggers***

Prevention of disordered eating must identify the triggers as well as those at increased risk. A study which included all of the elite female athletes in Norway, ages 12-35 years, found the prevalence of eating disorders was higher in sports emphasizing leanness or a specific weight than in sports where these are less important. Trigger factors associated with the onset of eating disorders were prolonged periods of dieting, frequent weight fluctuations, a sudden increase in training volume, and traumatic events such as injury or loss of a coach. (42) The reasons given by athletes who developed eating disorders included 30% who stated “new coach” and 19% who stated “casual comments”. (42) The results of another study suggested that the interaction of sociocultural pressure for thinness, athletic performance anxiety, and negative self-appraisal of athletic achievement significantly influence eating disorder symptoms in college athletes. If these risk factors lead to over-concern with body size and shape, then the emergence of an eating disorder is more probable. (43) Mandatory weigh-ins and body composition assessments in this setting may thus precipitate disordered eating. Yet, until recently, there was no proof. However, in a soon to be published study, athletes gave their opinion on possible reasons for the development of their eating disorders. A significant number of female athletes referred to a specific test such as the VO<sub>2</sub> max or caliper measurement. (Personal communication J Sundgot-Borgen)

## **Context for Body Composition Assessment Concerns**

### ***Improving Performance?***

The implicit assumption behind body composition assessment is that the knowledge gained in the assessment will be useful in either directly or indirectly enhancing athletic performance or physical fitness. (44) Over 15 years ago, long before the Female Athlete Triad was fully recognized, Wilmore advised that we should be able to identify an ideal body fat range for a given athlete if that athlete is tested using accurate equipment by experienced personnel using the correct regression equation for that athlete. (45) In a 1983 study, 298 female athletes participating in 15 Olympic events underwent determination of body fat percentage (% fat) and lean body mass (LBM) via hydrostatic weighing and / or anthropometric methods. All groups of athletes were below the average values for % fat of college age women of 25%. In general, athletes involved in a sport where their body weight is supported, such as canoe and kayak (females 22.2 +/- 4.6%) and swimming (females 19.5 +/- 2.8%), tended to have higher % fat values. Athletes involved in events such as the 100, 200, and 400 meters (female, 13.7 +/- 3.6%) that are very anaerobic in nature demonstrated lower % fat values. Athletes involved in sports where body size is a definite advantage, such as basketball (females,

55.3 $\pm$  4.9 kg) and volleyball (females, 58.4  $\pm$ 4.5 kg) tended to have a larger LBM. (46)

It has been recently suggested that a preseason estimation of body composition may be useful for assigning a safe minimal body weight for female gymnasts. (47) In theory, optimum competitive body composition plays an important role in virtually all sports by influencing an athlete's speed, endurance and power. It has been proposed to individualize weight and body fat target levels. (48) By this practice it might be possible to observe individual relationships between body weight, body composition and performance. A significant increase (beyond methodological error) in body weight and/or body fat may warrant gradual body weight or body fat reduction (with professional guidance) towards the level earlier associated with maximal performance. (48) However, strength increases, age, season and hormone related fluid retention must be considered. Therefore assessment of body composition could potentially contribute significant information to determine an athlete's training and nutritional programs. (49)

To continue offering body composition assessment, even in a limited manner, we believe that it behooves all professionals providing such assessments to be certain that they are useful, valid and safe. We interviewed Dr. Norm Gledhill in 1997. At that time his York University lab was one of 9 accredited centres across Canada, measuring body composition using the same technique year after year, and measuring athletes frequently to get continuous feedback. (Personal communication N. Gledhill) Thus in limited settings, the error may be lowered into a useful and valid range. However, this expertise is not so widely available and we must not forget that now a considerable downside risk has been recognized.

Are there motivation benefits that outweigh the risks? Surprisingly, body composition assessment may not even be a good motivator for women. A study showed that frame size, particularly in the lower trunk, is a more important predictor of female weight management decision-making, than their levels of fatness. For males, fatness appears to drive their weight management decision-making processes to a greater extent. (50)

Can a change in body composition lead to improved performance? There is a large inter-individual variation within athletes of similar standard and consequently an overlap in body composition between elite and above average performing athletes. The optimum body fat range for physical performance and for appearance are not necessarily identical, though in one study only gymnasts achieving both physical requirements and aesthetic norms are successful at the international elite level. (48) While average values for body composition clearly differ among sports, for elite athletes within a particular sport there is rarely a close relationship between body composition and performance. (44) Clearly, data are not currently available to indicate that manipulation of body composition, independent of other factors, leads to anticipate changes in performance. In fact, there is no evidence showing that only by decreasing body weight and body fat to a recommended range will a good athlete become an elite athlete. Genetic endowment, proper nutrition, good coaching, and strenuous training are the main reasons for both low body fat levels and athletic success. (44)

### ***Triggered by the Coach?***

What objectives generate assessment of body mass or body composition? Often an ill-informed coach prompts it. Unfortunately, there are many examples of athletes in whom disordered eating was triggered by a coach's inference, however well intentioned, that weight loss would enhance performance. (33,38,44) Coaches from all sports must be careful. It appears that disturbances in eating behaviors are not limited to sports that emphasize leanness. (52) A study of collegiate gymnasts indicated that 76% of the gymnasts surveyed had been told by coaches that they were too heavy. 75% of the gymnasts in the study used pathogenic weight control methods which indicates that some athletes are willing to do whatever is necessary to please coaches in this regard. (53) Athletes with anorexia athletica usually indicate that they need to lose weight because of the requirements of their sport, often motivated by directions from their coach. (7) Since there is no link to performance and an absence of recognizable benefits attributed to these assessments, coaches should justify how the assessments will effect training changes.

### ***Body Composition Assessment Concerns***

The quest to identify an ideal percent body fat range is difficult. There is a lack of consensus with regard to what reference values should be used for a particular sport. The literature is filled with denials of the existence of ideal percent body fat due to the lack of precision of the many different measuring techniques. In theory, weight goals in any sport are inappropriate unless they are derived from a valid estimate of adiposity or muscularity. This ensures that athletes are not compromising lean tissue, health or performance in an effort to arrive at a weight established arbitrarily by a coach or by the sport. (44) This issue is further complicated by the fact that many health care professionals have a vested financial interest in performing these assessments. Body composition assessment is unregulated and can be performed by a wide variety of allied health professionals with wide levels of training and expertise. Therefore experience with the actual assessment, calculation of the results and especially tactfulness communicating the results can vary greatly. There are several methods currently available for assessing body fat levels. These can vary widely in cost, practicality, availability, and ease of use and accuracy. These methods including explanation of abbreviations (e.g. BIA, NIR, and DEXA) are discussed in greater detail in Appendix B. The assumptions underlying a given technique influence its validity, whereas the equipment and skill of the individual using the technique can influence reliability. (54) Current levels of estimation for most methods of body fat assessment would anticipate a compound error of 3-4%. (55) Concerns regarding the validity of these methods are discussed in Appendix C.

### **Considering Solutions**

#### ***Culture and Attitude Change***

Would a recommendation for abandoning mandatory weigh-ins and body composition assessment have any impact in decreasing the incidence of the Female Athlete Triad? This triad has only been brought to our attention via an ACSM task force in 1992. (1,13) Any effective approach to prevention must include a major shift in attitude, which

addresses the practices of coaches, physicians, trainers, parents, dietitians, media, as well as of the athletes themselves. Awareness of the problem is not nearly enough to stop it. Our committee has gathered protocols for early identification and treatment of disordered eating in student athletes. One such guideline from the University of Tennessee Women's Athletic Department Performance Team goes to great lengths to manage this problem yet still emphasizes weight and body composition measurement every 6-8 weeks. Also the coaches, strength coaches and athletic trainers determine the frequency of measurement.

How easy is it to change coaches' attitudes? In recent discussions with a national sport coach, one of our contributors was told exactly what the current culture entails. "The coach has been able to modify training programs and make nutritional suggestions over parts of the season or over different seasons based on changes in body composition within a particular athlete combined with other physiological measures. She also stated that with the trend to move toward centralized training sites, there is a growing concern about the nutritional habits of athletes – are they eating as well away from home compared to being at a national training site?" (Personal communication V. Harber) Based upon the arguments presented in this working paper, this type of coaching approach should be considered obsolete.

Another national team coach gave this story: "We did do body composition twice this spring using the Jackson Pollack method using 7 skinfolds. We used this test only as a personal feedback for athletes as one of many tools. It was not used on its own, and was not used in comparison with other athletes on the team. It was not used as a qualification criteria test. Its main purpose was to give feedback regarding areas of strength and conditioning work. However, we will not use skinfolds this fall as there are 2 new members on the team who may react negatively with this kind of information. (Query eating disorder behaviors, or distorted body image perceptions) Just as long as it's kept in perspective, I think it can be valuable but the coach really needs to be in tune with each individual. I have seen in the past where this information has been used very negatively and this is really scary. For some of our athletes we need to ensure that they do not have too little body fat so it works both ways. At the national level, we were discouraging its use as we feel it could not be utilized with any precision, and in the right context across the nation, due mainly to the varying skill and coaches' levels of understanding." (Personal communication M. Mountjoy)

### ***Actions Thus Far***

The 1992 Task Force and the 1997 American College of Sports Medicine (ACSM) position stand on The Female Athlete Triad have heralded a new era. (15) Abandoning mandatory weigh-ins and body composition assessment of female athletes can signal a further change in attitude. An example of progress is the Penn State Athletics Student-Athlete Handbook which states that "Weighing athletes, punishment for lack of weight control, and linking weight to performance can lead to pathogenic weight control behaviors, and ultimately eating disorders." Their weight control and eating disorder policy takes much of the responsibility for monitoring weight control of athletes away

from coaches and shares this responsibility among the nutrition and sport medicine staff. (56)

A member of our committee, Connie Lebrun, developed an excellent slide series on the Female Athlete Triad that has been used in countless presentations by many physicians over the past several years. Our WIISM committee conducted a survey of Canadian national sports organizations. The results, shown in Appendix D, reveal an across the board inconsistency, from one sport to another, in terms of policies and methods of body composition assessment.

At the University of Florida, they have finalized and have had approved by the athletic director the "UAA policy regarding weighing / body composition measurement of female athletes". This policy outlines "do's and don'ts" regarding weight and body composition issues; it prohibits measurements of weight or body composition by any coach: head, assistant, strength, or volunteer. It also addresses what the coach, trainers, etc. should do with any concern re weight issues. It is very specific. It took a lot of work to complete and get approval, but is a major accomplishment. (Personal communication A. Grooms) Some other excellent programs are highlighted below and in Appendix E.

#### ***Equate Mandatory Weigh-ins With Harassment***

The impact of mandatory weigh-ins and body composition assessment may be negative upon individuals at risk of disordered eating. In a focus group, female athletes themselves have told the authors that they found the testing degrading and potentially harmful. They told us that they felt the Female Athlete Triad might be initiated and propagated by worrying about these tests. Harassment takes many forms but can generally be defined as comment, conduct, or gesture directed toward an individual or group of individuals, which is insulting, intimidating, humiliating, malicious, degrading, or offensive. In most cases harassment is an attempt by one person to inappropriately exert power over another person. Harassment occurs over a continuum that ranges from mild conduct such as gestures or comments to conduct which may be more physical, forceful, or violent. In the absence of proven benefits, a mandatory weigh-in can be equated with harassment. (57)

#### ***Abandon Body Composition Testing as a Routine Assessment***

We believe that the risks far outweigh the benefits, as outlined within this Working Paper and its appendices.

#### ***Provide Prevention Programs Aimed at Disordered Eating, Starting at the Youngest Age Levels***

The prevalence of disordered eating and dieting behaviors among adolescent females suggests the need for preventive programs encouraging appropriate eating and dieting behaviors. (9) "Girls in the 90s" is an eating disorder prevention program for pre-adolescent/adolescent girls which operationalizes contemporary theories of female development. Set right at the beginning of the continuum of food and weight preoccupation, the program teaches girls to recognize when they feel fat and encourages them to tell the

stories that lie underneath. The program validates girls' experiences and feelings, reframes them in terms of female development and provides girls with an understanding of the societal pressures that they face. (58)

***Provide Comprehensive Nutritional Counseling to their Athletes at Risk***

All individuals, including coaches and parents, who are working with physically active girls and women should be educated about these disorders, and they should develop strategies to prevent, recognize and treat the female athlete triad. (59) Strategies for helping active women get off the dieting "bandwagon" requires the identification of an appropriate and healthy body weight, good eating and exercise habits, and techniques for maintaining these habits throughout life. (60) The Husky Sport Nutrition Program at the University of Washington is an example of the successful integration of a sport nutrition program which requires an understanding of the athletic culture, physiological milestones, and life stressors faced by college athletes. The sport nutritionist functions as an educator, counselor, and administrator. Team presentations and individual nutrition counseling provide athletes with accurate information on healthy eating behaviors for optimal performance. For women's sports, a multidisciplinary team including the sport nutritionist, team physician, clinical psychologist, and athletic trainer work to prevent and treat eating disorders. (61) Although we do not condone telling an athlete to lose weight, the value of comprehensive nutritional counseling is uncontested. A study compared athletes with eating disorders with those not suffering from eating disorders. The results showed that among those who had been told to lose weight, but had not developed eating disorders, 75 per cent had received guidance during the weight loss, compared with 10 per cent of those who had developed eating disorders. (42)

***Provide Monitoring Programs to Better Identify and Support Athletes with Subclinical Eating Disorders***

Early identification of potentially harmful eating patterns is critical in the effective remediation of such behaviors. (62) Even when mild variants of eating disorders are observed in athletes, they should be given immediate attention because they may severely compromise health and performance. (63) This is an important area where sport medicine physicians can play a pivotal role. Practical strategies are vital. An example of such a strategy for use by sport medicine physicians can be found in Appendix G. The University of Tennessee Women's Athletic Department has implemented a program to identify high risk profiles for eating disorders among their athletes by utilizing a questionnaire when they first enter school. They also utilize the faculty in the nutrition and exercise science departments to provide informal discussions, formal programs, and undergraduate classes to help educate and illuminate peers as to high-risk behaviors. (Personal communication K Bielak)

***Re-evaluate and De-emphasize the Aesthetic Value to their Athlete's Performance***

Women who exercise to excess, who are highly preoccupied with weight, and whom perfectionism and an obsessive-compulsive personality characterize are at risk for

eating disorders. When body weight and shape are kept in perspective and realistic goals are set, the physical, psychological, and financial costs of achieving or maintaining a healthy weight may be minimized. (64) At the start of a new millenium, we have a long road ahead to envision the aesthetic sports undergoing significant change.

### ***Address the Need to Alter Rigorous Weight Standards***

Teaching coaches and athletes about the dangers of eating disorders and the importance of good nutrition, without addressing the need to alter rigorous weight standards imposed on them, is almost worthless. Eating disorders will always be a problem in young athletes involved in sports where weight and leanness are considered important for performance. (7)

### ***Support Efforts that will Minimize Weight Cycling and Disordered Eating***

See Appendix F.

### ***Encourage Further Study of the Risks for Subclinical Eating Disorders***

Results of some studies indicate that athletes are more likely than non-athletes are to possess certain behavioral and psychological correlates of eating disorders. (51) Yet, this hypothesis requires further study.

Suggestions of the possible sport specific risk factors associated with the development of eating disorders in athletes exist, but large-scale longitudinal studies are needed to learn more about risk factors and the etiology of eating disorders in athletes at different competitive levels and within different sports. Further studies are required on the short and long term effects of eating disorders on athletes' health and athletic performance. (65)

## **Appendices**

### **Appendix A – The journey toward a position statement**

CASM's WIISM committee felt strongly that we should attempt to decrease the incidence of disordered eating and the Female Athlete Triad. We performed an extensive literature search and consulted prominent authors by email and in person. We presented 5 workshops at the 1997 Annual Conference of the Canadian Academy of Sport Medicine near Vernon, B.C. and at Women's College Hospital in Toronto, Ontario. We organized simulated debates among the participants to discuss the "test or don't test dilemma." Finally in December 1997, our draft recommendations were presented at the University of Toronto School of Physical Education's "Women's Health and Physical Activity" conference. A round table discussion followed.

The following thoughts were presented that evening:

- The solution to this "test or don't test dilemma" is to state unequivocally who should be tested, how often, under what circumstances and how will they be counseled and followed.
- Addressing this issue only half way may be actually contributing to a greater problem by encouraging the athlete to seek other sources of weight management information, whether they are reliable and accurate or not.

- ❑ Any coach or organization that actively encourages body fat testing or encourages athletes to have a body fat or body mass within a specific range, should have in place a mechanism for counseling to support athletes' healthy nutritional practices. They should have in place programs to assist athletes and be able to detect early, any pattern of disordered eating.
- ❑ What has been previously recommended as an ideal body fat for an athlete may be suspect because of methodological errors and because researchers were unable to select large heterogeneous samples (49,67).
- ❑ Comprehensive nutritional counseling must be made available to any athlete or performer who is encouraged to change or maintain a specific body composition or body mass.

However, the response from the audience and panel was unequivocal. Coaches told how they had abandoned body fat testing. A national team physician explained that some national teams have dropped body composition assessment. Some exercise physiologists also felt that body composition assessment should be abandoned. In general, the audience wanted no part of any compromise and was very adamant that because most testing methods are of questionable validity and performance is rarely influenced by body composition assessment, the entire process may endanger the athlete's health. The conference delegates felt that CASM in no uncertain terms should recommend abandoning body composition assessment for athletes. Thus Dr. A. Pipe was consulted about the logistics of such a change in direction.

Releasing this document as a "Working Paper" along with an editorial in the Clinical Journal of Sport Medicine, as recommended by Dr. Pipe, communicates that stakeholders are invited to give comments and criticisms. This is a work-in-progress because we don't know all the answers. We want this to be a process of thought and reflection that is more easily seen as being ongoing and an aid to discussion rather than something, which has an air of finality. Giving all stakeholders an opportunity to comment will give a position statement more strength, as consultation will be more complete. However, we feel that a time limit of 6 months for comments, feedback and discussion after releasing this Working Paper will prevent the process from dragging on indefinitely.

## **Appendix B – Body composition assessment methods**

A distinction should be made between tools used commonly in clinical assessment (see below) and the following methods, which are of practical use only in a research setting: Though it is considered the "gold standard" method against which the accuracy of other methods are compared, the use of **hydrostatic (underwater) weighing** to determine body density is limited by the size of the tank and the time, expense and equipment required. (68-70) Newer **densitometry** units are similarly bulky and expensive. (71) Similarly, TOBEC, which measures total body electrical conductivity, requires a bulky expensive unit. (68,72) Apart from other X-ray techniques (including computerized tomography) which have been used only for research, **Dual Electron X-ray Absorptiometry** (DEXA) shows some promise as a clinical tool. (73) This is largely due to improvements in software. In addition, no radiation shielding is required and the same

machine is now commonly used to measure bone density in many community and teaching hospitals. Cost and time are a significant drawback with each test taking 20 to 30 minutes and costing approximately \$200. Technician training is another factor.

However, hand held devices with low cost are still preferable for clinical assessment: Using a measuring tape and spreading or sliding calipers, **anthropometry** can estimate body composition. Measuring the size and proportions of the human body, ratios of body weight to height can be used to represent body proportion. Circumferences, selected girths, skeletal breadths, and segmental lengths are useful especially for obese patients. (74) In clinical settings, many physicians are using Body Mass Index (BMI) tables along with measurements of height and weight to give some indication of health risk. (75) Waist-to-hip circumference ratios (WHR) are used in fitness assessments to identify individuals at higher risk of cardiovascular disease. Other tools, such as the “O-scale” use computer software to generate a report based upon anthropometry calculations. **Skinfold thicknesses** are measured with calipers and are used more often with athletes than other anthropometry techniques. Calipers to measure skinfold thicknesses come in a variety of designs, degree of accuracy and therefore cost. Numerous regression equations have been developed to determine percent body fat from the sum of a number of selected skinfold thickness measurements. This technique has been used for decades and remains the most popular method for the assessment of athletes due to affordability of the equipment. Applying principles of light absorption and reflection, **Near Infrared Interactance** (NIR) measures the optical density of the underlying tissues and extrapolates that measurement to percent body fat. This electronic device uses a light wand applied to the midline of the biceps brachii muscle, but it is of questionable accuracy and offers no advantage over skinfolds except ease of use. (44,74,76) **Bioelectric Impedance Assessment** (BIA) measures the resistance of the body’s tissues to a weak electrical current. Though there are newer variations including one that looks like a bathroom scale, the typical BIA device has wires, which connect electrodes from the ankle and wrist to a portable central unit. Because they are preprogrammed electronic devices, they are significantly more expensive than calipers, yet they are fairly reliable, quick, safe and easy to use. This makes BIA popular with dietitians, fitness clubs and health spas that have a higher volume of clients and can justify the expense. When population specific equations are derived, BIA may prove to be of considerable value in body composition analysis. (55,74)

### **Appendix C – Body composition assessment validity concerns**

The dangers inherent in depending on invalid and/or unreliable measures of body composition include misdiagnosis of excess adiposity, inappropriate prescription of weight or fat loss and the inability to measure changes that may occur over time. (44,69) Assessment of body composition is indirectly measured with one of the methods described in Appendix B and a calculated mathematical regression equation. Assumptions for the equation used accounts for some of the error. (77) Generalizing these equations among a diverse population can lead to significant errors. (74,78-80) Depending upon the selected subjects, the resultant equation may only be useful, however, for only one type of athlete of particular gender, race, age and body shape.

For example, recent research tested the relationship between fat-free mass and fat mass calculated in elite female runners with 12 different BIA (bioelectric impedance assessment) formulas reported in the literature and measured by dual-energy x-ray absorptiometry (DEXA). Though the study showed that body composition by BIA is indeed valid in female runners, those formulas that performed well in the controls gave poor results in the female runner and vice versa. The authors concluded that further research is necessary to validate BIA prediction formulas in other athletes. (81) Another investigation examined the validity of 11 skinfold equations for predicting percent body fat (%fat) in high school female gymnasts by comparing the values with those obtained from underwater weighing. Only 7 of the 11 equations resulted in total error values that were  $\leq 3.9\%$ fat (range, 3.3-3.9%fat). (47) Another study looked at the validity of 16 skinfold equations for predicting body density in youth wrestlers. The total error values were too large to provide accurate estimates of body composition. (82)

There are several sources of systematic error in estimates of body fat. (44,83). Along with skinfold thickness measurements, BIA and NIR yield doubly indirect estimates of body composition, as the assumptions upon which each is based are added to those assumptions relied upon by hydrostatic (underwater) weighing. These assumptions have been challenged, particularly the theoretical constancy of the fat-free compartment, which is problematic in women, athletes, non-whites, children, adolescents, and the elderly who may have different levels of tissue hydration and/or a significantly different range of bone density. Many equations assume a constant body density, which particularly in female athletes may be an incorrect assumption. Amenorrhea may initiate osteopenic changes, decreasing bone mineral content and density. Lohman estimated differences as great as 8% in relative fatness with only a 2% difference in the body's bone mineral content. (78)

For the performance of an accurate test with skinfold thickness measurement, perfect technique is crucial. (55,78,84) Error can occur unless you use the same calipers for measurements over time. (74) In a recent study, small decreases in fat mass were significant over time only when measured by hydrostatic (underwater) weighing. Indeed, along with anthropometry and BIA, even DEXA was not precise enough to detect these small changes. (85) This imprecision is magnified if there is a weight change, especially a rapid weight loss. (73,74,86). Other significant concerns include comparing one instrument to the next. In a study designed to evaluate the range of body composition in elite heavyweight oarswomen, there was a large variability between various measurement methods. (87)

There are also concerns with BIA and NIR, which have become popular because they provide readily reproducible results with few operational or computational skills demanded of the user. (68,74). However, a study found that BIA and NIR appeared not to be appropriate measurement tools for tracking body composition changes in endurance and resistance training individuals respectively. (88) BIA results have been challenged when attempts are made to repeat the assessment over time. The validity and reliability have been challenged particularly when regression equations provided in manufacturer's software are used. (80,89) The weaknesses of BIA are an assumption of

a fixed level of hydration and an assumption of a relatively cylindrical body configuration. In fact, there is a daily fluctuation in water content from exercise, dehydration, eating and drinking. Therefore hydration needs to be standardized to obtain optimum impedance results. (55) Similar concerns are found after intravenous fluid administration, premenstrual syndrome and after exercise. (74) Critics suggest that current regression equations are less precise at extremes of adiposity because impedance overestimated percent body fat in thin subjects and underestimated body fat in fatter subjects. (55) In one study, the use of BIA with the manufacturer's regression equation to estimate body fat in young female gymnasts resulted in a dramatic overestimation of percent body fat; an average of 19.9%, compared with 10.3% as estimated by age-appropriate skinfold thicknesses. (80)

Although DEXA holds great promise in becoming the criterion method of assessing body composition, and has been promoted as such by some investigators, available data indicate that this endorsement is premature. (90) Contributing to the uncertainty regarding validity is the variability among manufacturers of DEXA instruments in the methods of calibration, data acquisition, and data analysis. Indeed DEXA may not become the next "gold standard." One study did not regard DEXA as superior to skinfolds or BIA to assess body fat percentage based on a significant mean difference from the 3 compartment model, and a large standard error of the estimate. (91) Comparing contra-lateral body regions may result in markedly different results if the technician lacks the training to properly demarcate identical locations on each limb or if the subject is unable to lie flat and still. (79,92) Another study claimed that the error associated with using DEXA alone to estimate percent fat in an older population suggests that this technique is unacceptable in a research setting. (93)

#### **Appendix D – Survey of Canadian sports organizations**

In 1995, the Women's Issues in Sport Medicine committee of the Canadian Academy of Sport Medicine started studying whether body composition assessment may precipitate disordered eating in female athletes. We surveyed the national sports organizations in Canada and asked who was doing body composition assessments, how often, what technique, as well as who had stopped this practice and why.

The results were surprising in that over 2/3 of the teams actually replied and many had stopped asking for these tests on their athletes. For example, the physician for the Canadian Women's Basketball team felt that the testing was of no value to their training program and was causing undue anxiety. (Personal communication, D. Richards) Those teams who continued performing the tests had absolutely no consistency from one sport to the next, utilizing a variety of different skinfold sites and equations. These charts demonstrate inconsistencies among Canada's national sports teams.

*\*\*Note that the 2 pages of these notes are available only in hard copy and are not included in this MS Word file. However, the index on the cover page includes them as if the reader was looking at the hard copy.\*\* Therefore the page numbers are not correct after #15. For pages 16 on, add 2...page numbered 16 is really #18.*

## **Appendix E - Sport CARE's Athletes at Risk program**

The Sport Centre for Advanced Research and Education (Sport C.A.R.E.) located in Toronto at the Women's College Campus of the Sunnybrook & Women's College Health Sciences Centre has taken a leading role in developing prevention programs for athletes. Under the direction of Dr. Julia Alleyne (a WIISM member and the medical director of Sport C.A.R.E.) a program has been rolled out to address the concern of the athlete at risk. An abridged version of the program is shown below:

### **Athletes at Risk**

#### Risk Identification for Active Females

#### Program Definition

The Athletes at Risk program is a preventive educational program for female athletes in both recreational and competitive sport who are at risk for developing disorders such as disordered eating, ammenorrhea, female athlete triad, anxiety disorders, frequent muscular injuries, low self esteem , victims of sexual harassment and assault as well as dysfunctional relationships.

#### Objectives

- 1) To reduce the incidence of female athlete triad which is often the culmination of unrecognized risk factors that have developed into a disorder with physical, psychological and emotional consequences.
- 2) To reduce the severity of any of the individual disorders that are often more common in the female athlete.
- 3) To provide a safe haven for disclosure of emotional, physical and sexual abuse.
- 4) To encourage and promote a healthy lifestyle.
- 5) To provide education and support through an interactive format.
- 6) To target the educational information at multiple levels such as athletes, parents, coaches, teachers and health care professionals.
- 7) Off season, rehab, life span

#### Admission Criteria:

- a) Presently involved in a regular sporting activity whether competitive or recreational
- b) Preparing to return to a regular sporting activity
- c) Completion of pre-intake form for screening.
- d) Dancer's additional needs to be assessed
- e) Woman with Disabilities

#### Exclusion Criteria:

- a) Special Olympic level of sport

b) Medically Unstable regarding weight or health

Program Design:

**Component A**

- 5 educational sessions lasting 2 hours each and occurring one month apart.
- Offered to start in January and in September

**Session 1: Food as Fuel**

- Nutrition - Energy Management
  - Pre-competition
  - Competition
  - Post-competition

**Session 2: Understanding the Health Consequences**

- The Female Athlete Triad
- Disordered Eating- the slippery slope
- Amenorrhea and exercise intensity
- Osteoporosis- not just for the older woman

**Session 3: My Body, My Sport**

- Body image and my self esteem - Carla
- Body image and sport - Carla/Jocelyn
- Body image and culture/ sport culture/ society - Carla
- The truth about body composition -
- Body image and identity shifts (injury, development)
- Self Esteem strategies

**Session 4: Getting Strong, Getting Fit**

- Injury Prevention Principles for Strengthening and Flexibility
- Injury surveillance
- Performance enhancement and training methods

**Session 5: Life Skills/Wellness**

- Relationships with friends, family and coaches
  - Good and bad sexuality
  - Sexual harassment, abuse and assault
- Anxiety and stress management

## **Appendix F – Disordered eating in males – Weight Issues & Wrestling**

*A related problem of pathogenic eating behavior among male athletes (e.g. wrestlers trying to “make weight”) must also be addressed. CASM member Bob MacKenzie has contributed this article which is reprinted with permission from the British Columbia Medical Journal Vol. 41, no.3 (March 1999), pp 126-27.*

Wrestling is an activity, which is unique in B.C. School sports. It provides an opportunity for athletes of all ages and sizes to engage in a high-energy, contact/collision competition, with athletes of similar size and body type.

Coaches and athletes are justifiably proud of being an extension of a 5500-year history. The majority understands that most of the holds and throws used today were used in antiquity. They have also been involved in modification of those moves, and the establishment of rules, which reduce injury. The development of weight classes has been one of the major innovations. Today's High School tournaments allow boys to participate in 16 weight classes from 38kg. to 130kg. Girls have 14 classes, from 36 to 90kg. In spite of a relatively large number of narrowly defined weight classes, wrestlers still use unreasonable methods to modify their weights, and gain a competitive advantage. (108,113,128,130,137,143,145,146,149,150,157,162,171,174). Weight remains a focus of concern for coaches, athletes, parents, and now physicians. Pooling the participants according to their exact weights as occurred for example at the Kamloops novice/intermediate tournament, could eliminate this focus. There was no advantage to, nor therefore any need for, cutting weight. The wrestlers were all well hydrated and fed. It did not matter to them that they were not ranked in an "official" weight category. Virgil Moon, the chairman of the Oregon State Wrestling Association, has stated that wherever possible that is how they now run their high school meets in that state.(141)

There is no evidence that poor nutrition and hypohydration enhance physiologic performance, and there is adequate evidence to the contrary. (102,109,113,115,118,120,121,122,128,132,136,142,149,152,158,159,165,171,173,175,176,177) These are weight loss practices used by wrestlers to drop to a lower weight class. This has been a problem since the inception of weight classes, and will not stop without a rational challenge from a body of people dedicated to protecting school-aged children's health.

In 1967, the Muscatine County Medical Society in Iowa recommended the elimination of competitive wrestling in public schools. (146,168) The Society remarked on the health hazards associated with "making weight". Then, as now, the highest percentage of body weight lost to become certified, was among the youngest, lightest wrestlers. (108,130,135,162) Assessment of emotional stability during a wrestling season has shown the greatest declines in the 98-119 lb. weight classes. (162,168) As a result of this attack on the sport, Iowa was the first state to try to address the problem by creating

a "scientifically-generated formula for establishing weight levels." (175,176,177) The problem has persisted nonetheless, and has led to position statements by the American College of Sports Medicine (103), the American Medical Association (128,153,158), and various state high school athletic associations.(117) Sports medicine conferences, conducted in a variety of states, have repeatedly taken the stance that the practice is hazardous, and requires direction from the medical community.

Failure to adequately protect wrestlers from dangerous methods of weight loss was dramatically underlined by the deaths of three collegiate wrestlers in the U.S.A. Their stories have been told by the CDC, (149) which thereafter had some specific recommendations for the wrestling community. They have suggested that; (a) A health care professional should identify an appropriate competition weight, and specify rates and limits of allowable weight-loss for each wrestler. (b) Coaches and athletes should train in proper weight-control methods, and collaborate with a health care professional to develop and monitor a weight-control regimen. (c) Prohibit intentional dehydration for weight loss. (d) A practical test to assess hydration should be explored and employed. (e) Existing surveillance systems should be strengthened. Evaluate effectiveness in preventing athletic injuries, illness, and death. To overcome wrestlers' traditional use of dehydration, vigorous efforts will be necessary to ensure compliance with rules and guidelines.

The NCAA, as well as many state high-school wrestling associations, have stepped up their efforts to produce a "cook-book" approach to the establishment of a safe minimal wrestling weight. (111,117,124,125,144,148,151,160,161,163,164,170)

While these efforts are well intended, they miss the mark for a great number of B.C.'s participants. The formulae have been developed and standardized using white males. There is a large racial mix in all B.C.sports, which confounds the issue, (116) and women's wrestling is rapidly growing. Data regarding the effects on women of body fat depletion are available from the study of female gymnasts (105,106,107,110,133,134,147,169,172) but the variability of body water content, and the outcome of severe voluntary dehydration in females has not been studied. Even for the "standard" B.C. high-school male wrestler, there is uncertainty about long term effects on metabolism and growth in the prepubescent athlete. In fact, there is disagreement among various researchers as to the reliability and validity of the various formulae developed to determine body fat levels and minimal weight in the studied populations. (124,144,160)

There is already a trend in the U.S. wrestling community to try to circumvent the new NCAA rules. (145) While the intent of the rule changes is clearly to lessen harm to athletes, some coaches and wrestlers have looked upon them as a new challenge. They feel that a competitor must now maintain a constant state of underhydration and malnutrition so that there will be no risk of rising a weight class at any weigh-in. In many states, such as New Jersey, to do so would automatically relegate that wrestler to the higher weight class for the remainder of the season. Dr. R.A.Oppliger, who has studied the problem for years, and who was instrumental in the move to establish minimal wrestling weights, expresses the fear that athletes will arrive at the pre-season

evaluation already "making weight" so that baseline body fat and absolute weight will be the lowest possible.

Maturity evaluation to predict athletes' readiness to participate in contact/collision sports has not been used widely in B.C. High School sports. (129) There is a reliance on the axiom that a student in grade 11 or 12, will be mature. By and large, that method of discrimination will work for team sports, and is generally immaterial for individual non-contact sports. However, a high school wrestler weighing, for example, 45 kg., could be grade 8-12. That has injury implications for a Tanner stage 2 or 3 pitting strength against a stage 4 or 5. At least as significant though, are the possible effects of making weight on the pre-pubescent athlete's growth and development.

(103,110,115,120,122,133,134,136,147,152,153,158) The younger student, who may be having some degree of success at the lower weight class will be motivated to keep his/her weight at that successful weight class, and use unhealthy methods to forestall the inevitable growth spurt.

During the 1997-98 high school wrestling season, a study was started to gather information on the issue of weight-cutting in B.C. (135) A form was given by hand to almost every high school coach in the province. More were made available at the Age Class tournament in January of 1998, along with an explanation over the public address system. A later publication in "B.C. Wrestler", (the B.C. Wrestling Association's official magazine) appealed for compliance with the study. Coaches were asked to weigh their wrestlers prior to the zone qualifier, and 24 hours later. Then, at the provincial championship 2 weeks later, they were to record the weigh-in result, and whether the athlete qualified. Follow-up weights at 24, 48 and 72 hours were also requested. The only other data were age, sex, weight class, and placing in the qualifiers and championship. Of approximately 2500 student wrestlers, data were received on only 102. Even with such limited information, there was confirmation that weight cutting leads to success. For instance the 17-year-old winner of the 63-kg. weight class was 67 kg. by the second day. An approximately 6.0 % change. Caliper testing estimated his body fat at 8.5%. This was true also for the 16-year-old 4th place finisher, with B.F. of 6.8%. The 16 year old 3rd place finisher in 84 kg. regained 4 kg. for a percentage change of roughly 5%, with B.F. 15%. A 15 year old, who did not place, had 7.5% B.F.. He weighed in at 47.9kg., and rehydrated to 52 kg.. At slightly under 8% change in body weight, this was an example of previous observations that the greatest relative weight losses are in the smallest competitors. My personal observations have been of light to middleweight wrestlers dehydrating severely, and being hypotensive on the scales. In spite of this drastic effort they may not make the weight, or survive the first round. These athletes were lost to further weight study since they likely left the wrestling venue before the next requested weigh-in.

Traditionally, coaches have felt well qualified to evaluate the appropriate weight for their wrestlers. This was one of the many explanations given for the low level of response. At least one study has debunked that myth. (127) Also, many coaches are ex-wrestlers who practiced rapid weight cycling to maintain a position on a team, or to weigh in at tournaments. One can imagine that the first place winner in any weight class will have

an attentive audience if he/she gives one measure of success as the ability to "suck weight".

There is however, a shift occurring in the attitudes of coaches and wrestlers in B.C. It is articulated well by Justin Abdou, a wrestler and coach at S.F.U., who has experience and a winning record at the international level of competition. In an article for "B.C. Wrestler" he offered what I consider to be a reasonable opinion regarding the whole issue. He states, "First of all, I truly believe that rapid weight loss does not belong in age group wrestling. Young wrestlers who are still learning how to wrestle should not be dehydrating themselves to make a weight class, but rather, should focus their energy on developing their wrestling techniques, learning how to compete and enjoying the sport of wrestling." With that opinion as a starting point, a restructuring should occur, which removes the pressure to make weight from the immature wrestler, and modifies it for the senior.

Finally, there is a liability issue for coaches, provincial sport bodies, and school boards. Dr. W.O. Roberts, in the Oct/98 "Physician and Sportsmedicine", outlines a new requirement in the United States, to certify wrestlers' minimum weight. (151) There is, therefore, a new standard of care. As described in an article in the Fall '97 "B.C. Coach's Perspective" dealing with a rugby injury, (114) a coach owes an athlete a duty of care. If an injury occurs as the result of the coach's breaching the standard of care that the duty imposes, then there is negligence. The article further states, "What is absolutely clear for all coaches is the need to stay abreast of emerging trends, skills, and information in one's area of coaching expertise, and to make sure one's coaching technique, approach, and content remain current."

Physicians understand this principle well, as it relates to clinical practice. As advocates for their athlete patients they are in an excellent position to make certain that students and families understand the nature of, and the need for change in, the weight class issue. They can also help coaches understand new information, and the way in which that information changes their responsibility to the athlete.

## **Appendix G – A practical strategy for sport medicine physicians**

### **The role of the sports medicine physician:**

#### **□ *To encourage and coordinate teamwork:***

All athletes and coaches should have the opportunity to work with a team of qualified professionals, who can provide educational information, support and assistance and remedial programs. The team can include physicians, psychologists, dieticians, and athletic trainers and exercise physiologists. The athlete's health is the first priority of all sport personnel who should de-emphasize weight and thinness. This will be reflected in the athlete's thoughts, attitudes, discussions and behaviors. (14)

#### **□ *Provide information to coaches:***

There are many things athletic departments, coaches and other sport-related personnel can do to decrease the risk that eating disorders will develop within the sport environment. (14) Coaches should focus less on body weight and body composition, and more on information specifically related to sports, such as nutrition and psychology. Most enlightened coaches and instructors follow nutritional guidelines and emphasize better nutrition and healthy eating rather than weight standards. (99) Coaches and other sport personnel need basic information about eating disorders and can play an essential role in condoning unhelpful and unhealthy behaviors and supporting programs designed to assist in the secondary and primary prevention of eating disorders in athletes. (94)

Coaches are in a unique position in that they are trusted and respected by the athletes. (94,96) They can play an important role in changing unhealthy "subcultural" aspects of their sport. The attitudes and behaviors that have more to do with tradition, myth and subculture than with factual information relating to sport performance can be changed by a firm and gentle communication of which behaviors are unhelpful and unhealthy and therefore unacceptable. (14)

#### **□ *Provide all athletes access to qualified nutritionists:***

Athletes should be presented with what the body needs to be healthy and to perform at its best. A nutritionist is an integral part of the sports team and should be readily available to all athletes identified at risk for eating disorders, to coaches and to any athlete requesting nutritional counseling. (97,98) Ideally, every athlete should have at least one session each season with a nutritionist to obtain accurate and complete information about his or her nutritional needs. More realistically, a sports nutritionist can make a team presentation to provide accurate information on healthy eating behaviors for optimal performance and dispel myths revolving around eating and weight.

□ ***Provide knowledge about eating disorders:***

The team physician who is knowledgeable about eating disorders should talk to the teams once each season to inform athletes, trainers and coaches about the early warning signs of eating disorders and to convey information about the risks of having an eating disorder. The myth that amenorrhea is a normal part of being an athlete should be dispelled and clearly stated that amenorrhea can lead to skeletal system injuries and difficulties that may interfere with sport performance. (1,15,67,95-97,100) Written or audiovisual information should be readily available in an accessible location for the athlete's individual and private perusal. The message that is given should ensure that the focus is on the athlete's health rather than his or her weight.

□ ***Screen for eating disorders:***

The pre-participation physical evaluation should include a module to assess eating habits, weight changes, methods of weight control, excessive exercise and, for females, an evaluation of menstrual function. If an athlete with an eating disorder or considered at risk for an eating disorder is discovered, they are referred to the professionals familiar with the treatment of the disorder. The team includes a dietician, psychologist and physician familiar with the management of this difficult entity. (178)

□ ***Raise awareness of weight issues:***

Coaches and other sport personnel need to understand why weight is such a sensitive and personal issue for many women. Weighing athletes indiscriminately or group weigh-ins can cause psychological discomfort and can contribute to pathological means of weight control. (14) Derogatory comments or behaviors about weight should be eliminated. Athletes can perceive even innocuous comments as rude and embarrassing. The athletes most affected by these comments or behaviors are more likely to be the ones with the lowest self-esteem and predisposed to develop an eating disorder. (99)

□ ***Encourage physical and emotional well-being:***

Sport performance is affected by many factors. Physical factors play a significant role. The purported relationship between body fat and performance should not be emphasized; instead, athletes should be encouraged to work on factors within their control. The focus should be on physical conditioning and strength development. (14)

Improvement in an athlete's mental and emotional capacities can improve performance and in no way place the athlete at risk. Athletes should be encouraged to work on more psychological contributing factors, one's that they can control more than physical factors. (14,97,99) In this regard, Orlick reported that when interviewing some of the world's best athletes, coaches and scouts about the ingredients necessary to achieve at the highest level, he found disagreements on the physical attributes considered

necessary. However, he found almost total agreement on the psychological factors – commitment and self-control. (66)

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## **1999-2000 Women's Issues in Sport Medicine Committee**

**James D. Carson (Chair), Julia Alleyne (Board liaison), Eileen Bridges, Trevor Hall, Janice Harvey, Roger Hobden, Maureen Kennedy, Connie Lebrun (ACSM Liason), Margo Mountjoy.**

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