

Ontario Society for Health and Fitness

# Health and Fitness Bulletin:

Evidence-informed opinions, ideas and discussion

Just because you read something...

*“ Information is not knowledge ”*

*Albert Einstein*

As we come up on the first anniversary of this publication, I find I am constantly reminded of why OSHF and the members of the Editorial Board feel so strongly about providing this forum for front line fitness professionals to communicate.

It seems not a day goes by that we all won't read, see or hear an exchange of some form of health and fitness related information. And more often than not, it is just that— information. Without a solid educational background, practical experience and commitment to professional development, it can be near impossible to consume and interpret all that information and turn it into what really matters—knowledge.

In this issue of the OSHF Health and Fitness Bulletin, we are fortunate to read not one but two perspectives on the growing body of evidence surrounding sprint interval training and its application to improving health and fitness. A clinical case study gives us a glimpse into potential practical uses for surface electromyography that go beyond measurement and research. We also shine a spotlight on a university exercise physiology lab, and receive a few professional tips on public relations for health care professionals written exclusively for front line fitness professionals.

It is this sort of evidence-informed, peer-to-peer discussion that will help us drive up the quality of fitness and health related exercise discussion, and we are grateful to all the authors who took time to contribute their expertise.

As always, the OSHF H&FB encourages your feedback, commentary, rebuttal or reactions to the opinions, ideas and discussions presented in its articles. If you feel that your experience and expertise can further circulate knowledge about important health and fitness topics, this forum is ideal for doing so.

If you would like to submit an article or inquire about getting your work published and shared with the health and fitness community please see the information on “Submitting an article...” on Page 6.

Paul VanWiechen CSEP-CEP  
Editor, OSHF Health and Fitness Bulletin



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## About OSHF Health and Fitness Bulletin...

OSHF Health and Fitness Bulletin is published by the Ontario Society for Health and Fitness. It is intended to encourage timely and direct communication amongst front line fitness professionals. It contains evidence-informed articles authored by front line fitness professionals, allied health practitioners and community members that are geared towards the dissemination of information and ideas to support the daily practice of fitness professionals.

For information about submitting articles to be published in Exercise and Fitness Bulletin, please contact [hfb@oshf.ca](mailto:hfb@oshf.ca)

Any feedback or inquiries about articles appearing in this publication or the publication itself can be directed to the Editor at [hfb@oshf.ca](mailto:hfb@oshf.ca)

Two Viewpoints

**Sprint Interval Training: Potent and practical..**

**No time? No excuse. Low-volume high-intensity interval training is a practical and time efficient exercise strategy to improve physical fitness**

Current guidelines from leading public health agencies, including the Canadian Society for Exercise Physiology, recommend that adults accumulate at least 150 minutes of moderate- to vigorous-intensity aerobic physical activity per week to achieve health benefits. Despite overwhelming evidence linking sedentary behaviour to a number of chronic diseases and premature death, most Canadians fail to meet these minimum physical activity guidelines. Considering the most commonly cited barrier to regular exercise is “lack of time”, innovative exercise strategies that maintain effectiveness while reducing time commitment may represent an attractive exercise strategy for encouraging physical activity and promoting increased fitness among Canadians.

Low-volume high-intensity interval training (HIT) is a time efficient strategy to induce physiological adaptations normally associated with high-volume endurance training, at least over the short term (i.e., weeks to months). A common protocol employed in many HIT studies involves 4-6 x 30 second “all out” cycling efforts (repeated Wingate tests) interspersed with 4 minutes of recovery -- totalling only 2-3 minutes of maximal exercise.

Although six sessions of this type of training over 2 weeks can increase VO<sub>2</sub>max, skeletal muscle oxidative and glucose transport capacities (Gibala and McGee, 2008) as well as insulin sensitivity (Richards et al, 2010), this protocol requires a specialized cycle ergometer, a high degree of participant motivation and can induce feelings of nausea. In reality, it may not represent a practical model of exercise to promote to fitness professionals nor the general public.



Research from our laboratory however, has found that a modified HIT model can also rapidly improve skeletal muscle oxidative capacity and markers of health status in a range of subjects including previously sedentary adults (Hood et al., 2011) and people with type 2 diabetes (unpublished observations). This modified protocol involves 10 x 1 minute cycle sprints at ~90% maximal heart rate, interspersed with 1 minute of recovery, for a total of only 10 minutes of exercise within a 20 minute time commitment. While still a demanding form of exer-

cise, the intensity is much lower than that achieved during a Wingate test and in my personal experience, when pressed for time 10 minutes of intense exercise sure sounds more appealing than plugging away on the bike for upwards of 1 hour.

Despite the abundance of evidence linking low-volume HIT with improved cardiovascular and metabolic fitness, its effect on another key component of physical fitness, body composition, is largely unknown. While it's no surprise that short term HIT interventions lasting only 2 weeks yield no change in body composition, Trapp et al. (2008) showed that 15 weeks of low-volume HIT was superior to traditional endurance training for reducing fat mass in women and in particular intra-abdominal fat. The precise mechanisms linking HIT to superior fat loss is largely unknown, but increased fat oxidation during exercise or a possibly heightened “post exercise burn” could be involved.

While additional studies are needed to ascertain whether low-volume HIT can lead to all of the health enhancing benefits associated with endurance exercise, adding periods of “high” and “low” intensity to your exercise routine represents a practical, time efficient and potent strategy to improve many aspects of physical fitness.

About the author...

*Jenna Gillen, B.Sc. Kin is working towards her PhD under the supervision of Dr. Martin Gibala in the Kinesiology department at McMaster University.*

*As a member of the Exercise Metabolism Research Group, Jenna's research focuses on skeletal muscle metabolism and health related outcomes following high intensity interval training with nutritional manipulation in both healthy and clinical populations.*

**References:**

Gibala MJ., McGee S. (2008) Metabolic adaptations to short-term high-intensity interval training: A little pain for a lot of gain? *Exerc Sport Sci Rev*, 36(2): 58-63.

Hood MS., Little JP., Tarnopolsky MA., Myslik F., Gibala MJ (2011) Low-volume interval training improves muscle oxidative capacity in sedentary adults. *Med Sci Sports Exerc*, *in press*.

Richards JC., Johnson TK., Kuzma JN., Lonac MC., Schweder MM., Voyles WF., Bell C. (2010) Influence of short-term sprint interval training on insulin sensitivity and the thermogenic response to beta-adrenergic stimulation. *J Physiol*, 588 (15): 2961-2972.

Trapp EG, Chisholm DJ., Freund J., Boutcher SH. (2008) The effects of high-intensity intermittent exercise training on fat loss and fasting insulin levels of young women. *International Journal of Obesity*, 32: 1-8.

Two Viewpoints

## Sprint Interval Training: Not so fast...

**About the author...**

*Mark Young is an exercise and nutrition consultant based out of Hamilton.*

*He completed a degree in Kinesiology and a minor in Psychology from McMaster University, and later followed that with graduate research in both biomechanics and exercise physiology.*

*You can read more of his writing at [www.markyoungtrainingsystems.com](http://www.markyoungtrainingsystems.com)*

**References:**

Tremblay, A., et al. Impact of exercise intensity on body fatness and skeletal muscle metabolism. *Metabolism*. 1994 Jul;43(7):814-8.

Trapp, EG., et al. The effects of high-intensity intermittent exercise training on fat loss and fasting insulin levels of young women. *International Journal of Obesity* (2008) 32, 684-691.

Macpherson, RE., et al. Run Sprint Interval Training Improves Aerobic Performance but Not Max Cardiac Output. *Med Sci Sports Exerc*. 2010 May 13. (Published ahead of print)

If you've picked up a fitness magazine or just happened to have an internet connection in the past few years you've undoubtedly heard about the vast superiority of sprint interval training (SIT) over steady state exercise for fat loss. However, it may surprise you to learn that the scientific literature in this area is actually rather sparse.

Although a great deal of research has investigated the effects of SIT on performance, there have only been three studies to date where body composition was directly measured before and after a training program comparing SIT and steady state exercise.



In the first study, performed by Tremblay et al., the steady state exercise group only lost 1.1 pounds and the interval group lost a mere 0.2 pounds over the course of 15 weeks which is not really promising for either group in terms of total amount of weight lost. Body composition testing with calipers did find what appeared to be a greater amount of fat loss in the interval group, but closer examination reveals that this is not because they lost more fat, but because the steady state group actually gained some subcutaneous fat in the calves.

Whether this actually occurred or is simply attributable to an error in skinfold testing is subject to debate, but I am not sure that this study clearly demonstrates the superiority of either method. Further, it should be noted that in this study the interval group actually performed steady state exercise during the first few weeks and intervals of various lengths were added as the study progressed

In the second study, conducted by Trapp et al., the steady state group actually gained 0.7 pounds of fat while the interval group lost 5.5

pounds of fat over 15 weeks as measured by DEXA. However, the key difference between this study and the previous is that the interval group only performed intervals and that each interval consisted of 8 seconds of maximal effort followed by 12 seconds of easy pedalling for a total of 20 gruelling minutes. It was also found that leaner women within the interval group responded less favourably than those who had higher body fat levels.

In the final study, Macpherson et al. used a protocol that included intervals that were more like those used by the general population in that each interval was performed for 30 seconds and a rest of 4 minutes was taken after each. In total, a maximum of 6 in-

tervals were performed in each bout for a period of 6 weeks. In this study the interval group lost 3.7 pounds of fat and the steady state group lost 1.8 pounds of fat, but these differences were not statistically significant.

Interestingly, the fat loss in the interval group was superior for the men (lost 6.6 pounds) versus the women (gained 0.7 pounds). Since there were only 4 women in the interval group these results cannot yet be taken as gospel, but it could be that the type of interval work performed in the Trapp study may be more effective for fat loss in women.

In summary, the three studies on sprint interval training that have been completed to date fail to demonstrate the clear superiority of interval training for fat loss that has been presented in the mainstream media. More research is obviously needed to elucidate the most effective methods of such training for body composition change. If using intervals, it



appears that the method presented by Trapp et al., is currently most effective for fat loss if the client or patient can tolerate this method.

Facility Spotlight

## Nipissing University Exercise Physiology Laboratory



### Nipissing University Exercise Physiology Laboratory

Nipissing University School of Physical and Health Education  
100 College Drive, Box 5002  
North Bay, Ontario P1B8R1  
705-474-3461 x4449  
[graydonr@nipissingu.ca](mailto:graydonr@nipissingu.ca)



The Nipissing University Exercise Physiology Laboratory (NU-EPL) was established in 2009 subsequent to the creation of a new 4-year Bachelor of Physical and Health Education (BPHE) degree program at Nipissing University in the fall of 2007. The NU-EPL is a CSEP Accredited Fitness Appraisal Centre (AFAC) operating under the direction of Dr. Graydon Raymer. Dr. Raymer, who instructs the 3000- and 4000-level exercise physiology and clinical exercise physiology courses in Nipissing's BPHE program, is a CSEP-CEP, current member of the CSEP-CEP Technical Committee, the university representative on the OSHF Board of Directors, the head coach of the Nipissing Lakers Varsity Cross-Country Running Team, as well as coach and scientific advisor to many cyclists, runners, and cross-country skiers across the province.

The NU-EPL presently occupies ~100 square meters of laboratory space, and is equipped with a Medgraphics CPX Ultima breath-by-breath  $\text{VO}_2$  analyzer, a Compu-trainer Velotron cycle ergometer, and a Trackmaster treadmill. The lab also possesses many Polar HR monitors, skinfold callipers, scales and stadiometers, sphygmomanometers, stethoscopes, pulse oximeters, portable lactate analyzers, etc. Dr. Raymer's research equipment also includes SpiroTiger and Powerlung respiratory muscle training systems, a 16-channel PowerLab data acquisition system and 12-lead ECG, a Bioharness telemetry unit, and a recent \$80,000 Canadian Foundation for Innovation grant will soon provide Dr. Raymer and the NU-EPL with a near-infrared spectrometer unit for non-invasive measurement of muscle capillary oxygen consumption (i.e., muscle  $\text{VO}_2$ ).

The NU-EPL is a research laboratory, a teaching laboratory (students in the BPHE complete their exercise physiology labs here), and a fitness appraisal centre

open to the public. Dr. Raymer has tested many elite cyclists, runners, and cross-country skiers in addition to community members looking for general fitness appraisals. While Nipissing's BPHE program is still in the process of developing its future MSc program, Dr. Raymer has employed undergrad research assistants from within the school and even co-op students from the University of Waterloo. The overall goal of Dr. Raymer's current research program is to identify factors contributing to the improvement (or worsening) of ventilatory efficiency during exercise, which includes studying the interaction between the ventilatory cycle and the cardiac cycle, also called the respiratory sinus arrhythmia.

In early 2013, the NU-EPL will be moving from its current temporary location on campus to a new permanent home in Nipissing University's future Northeastern Ontario Regional Active Learning and Health Research Innovation Centre (currently under construction), a \$32M facility that will feature a 262 square metre exercise physiology laboratory complete with a biological sampling room, a body composition room, and an environmental chamber capable of simulating hot and cold environments for exercising individuals.

The NU-EPL welcomes individuals interested in building effective partnerships within the Northeastern Ontario region, or members of the health and fitness community simply interested in the range of services that an exercise physiology laboratory might offer. For more information, please contact Dr. Raymer at 705-474-3461 x4449 or [graydonr@nipissingu.ca](mailto:graydonr@nipissingu.ca).

Clinical Case Study

Surface Electromyography and Low Back Pain

Mr. P is a 49 year old male with a BMI of 30.1 who has been battling chronic, non-specific, mechanical low back pain issues for most of his adult life. X-rays and MRIs are unremarkable. He recently started working with a personal trainer in an effort to improve low back strength and core stability.

Current Exercise Program

Walk on treadmill 2 times per week, 20 to 30 minutes, heart rate 128 to 135 bpm (3.5 mph, 2 to 5% grade).

Resistance training 1 time per week with a trainer (CSEP-CPT), including the core routine described below, one or two exercises per muscle group, 2 sets of 10 to 15 repetitions.

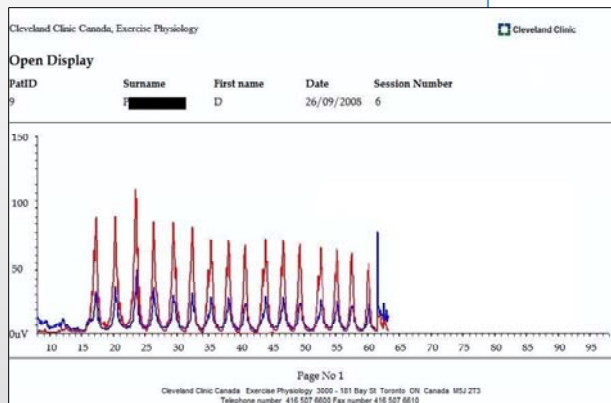
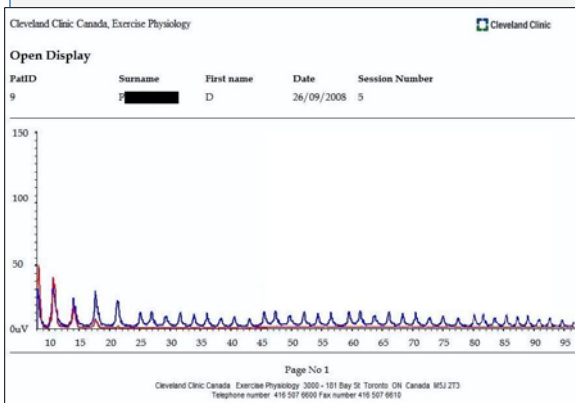
Occasional evening walks with wife, casual pace.

Clinical Assessment

Mr. P was seen for surface electromyography (sEMG) on the recommendation of his personal trainer. He had noted that while his strength and performance during exercise had improved, his low back pain had not.

His core routine was as follows, done once per week with his trainer.

- 1 set 25 crunches on floor
- 1 set 25 each side oblique crunches on floor
- 1 set 25 leg lifts
- 1 set 10 each side medicine ball rotations while balancing on Bosu
- 30 seconds hold plank position



In the above sEMG tracings, Mr. P is performing a simple crunch. The 'red' signals are coming from his rectus abdominus. The 'blue' signals are from the transverse abdominus. In the first tracing, after about the fourth crunch, the transverse abdominus is providing no stability to the spine. All of the torque being created by the rectus abdominus is transferred directly to the spine.

The second sEMG was done the same day after about 10 minutes of training to activate the transverse abdominals. To accomplish this, Mr. P practiced 'bracing for a punch' prior to any movement. He also used the sEMG to 'see' when he was successful. He felt no pain during these movements.

It is important to note that not only are the red signals remarkably higher than in the previous tracing, so are the blue. This would suggest he is getting better activation of his rectus abdominus by co-activating his transverse.

Interpretation

Mr. P was not engaging the appropriate muscles to stabilize his spine during abdominal exercises. As a result, the constant flexion and extension increased the strain on the spine and low back muscles. His strength and performance had reached a critical point where strength gains were being limited by pain, not effort.

Recommendations

- Engage the transverse abdominals by 'bracing for a punch' prior to any core exercise or weight lifting.
- The results of the sEMG were shared with Mr. P's trainer. We agreed to diversify his routine to include less flexion/extension and more stability and rotational work.
- Carry out the redesigned core program daily. Once per week is insufficient.
- Increase treadmill walking routine to 4 or more times per week. Weight management is unlikely to be achieved with one session per week and is a significant contributing factor to low back pain.

About the author...

*Paul VanWiechen CSEP-CEP is the Director of Exercise Physiology for the Canadian campus of the Cleveland Clinic. His practice focuses on integrating exercise assessment, counseling and prescription into primary and secondary preventive medicine programs. Mr. VanWiechen and his team routinely collaborate with physicians, specialists and allied health professionals on over 2000 clients per year in the areas of exercise and chronic disease management, athletic performance and healthy physical activity habits*



OSHF Health and Fitness Bulletin would like to thank Cleveland Clinic Canada for their contribution to this case study.

Practical Advice

## How to Effectively Communicate Your Message

In today's environment, there are many mixed messages being delivered from a number of fitness industry sources which can leave many people confused. While it can be challenging to make sure your message breaks through the clutter, it is also an opportunity for exercise professionals to set the record straight and educate others on the important issues at hand. The key to success is preparing in advance to address each opportunity.

Below are a few tips on how to effectively communicate your message and ensure it gets heard:



**Know your audience.** It is important to understand what kind of information your audience is looking for so that you can tailor your messages appropriately. For example, what you communicate to the average Canadian vs peers or other healthcare professionals will be different based on the audience you are addressing. Understanding who your audience is will help you in developing the appropriate key messages.

**Develop your key messages.** As with anything you do, plan ahead and think about what it is you are truly trying to get across to your audience. Think about what the three key pieces of information are that you want to get across. These three points

should sum up the essence of what you want to convey about the topic. Throughout your discussion, you should continue to come back to these three points and provide examples for each. This will not only help you stay focused but also reinforce your overall message.

**Be careful of jargon.** It's easy to get caught up in what you are explaining and forget that your audience might not necessarily understand the words you are using. When addressing an audience that is not necessarily as knowledgeable as you, it's important to stay away from acronyms or technical language that might not resonate with them so that you don't lose the overall message you are trying to deliver.

**Listen.** Often, when someone is asking a question, they are not always clear on what it is that they are trying to say. It's important to listen to the words he/she is saying to help you better understand what information they are really looking for. To better understand the need and to provide more clarity, ask probing and opened ended questions. Whenever possible, answer with one of your key messages.

**Practice.** It's important to review your three key points until you know them thoroughly. Try practicing with someone to help you become more comfortable with what you are saying.

While these tips are geared to help exercise professionals educate and communicate on the important issues for the industry, these techniques can also be useful when having an open dialogue with a patient.

About the author...

*Stacy O'Rourke is a Senior Consultant at NATIONAL PR, one of Canada's largest public relations firms with over 35 years of consulting experience.*

*Stacy works primarily with professionals in the health care sector helping them strategically and proactively create a positive media and industry presence.*

## Submitting an Article...

### We want to hear from YOU!

Health and Fitness Bulletin publishes original articles on topics of interest to front line fitness professionals. We invite submissions authored by exercise scientists, fitness professionals, allied health practitioners and community members.

Although it is a peer-moderated publication, it is not intended to be a scientific journal publishing original research findings. The purpose of peer-moderation is to ensure a high quality publication that sets the standard for dialogue in the fitness community.

Submissions will be published under one of the following topic categories:

- Systematic review of a topic
- Clinical exercise physiology
- High performance athletics
- Client/patient's perspective
- Open communication/hot topics
- Programming/administration
- Program/facility spotlight
- Product/book review
- Case study

All submissions must conform to the criteria established in the Submission Guidelines. Contact [hfb@oshf.ca](mailto:hfb@oshf.ca) for details.



Local: 613-234-3755 ext. 222  
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Fax: 613-234-3565

370-18 Louisa Street  
Ottawa, Ontario  
K1R 6Y6

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