

NAOI®
SKIN CARE INNOVATORS
FOUNDATION

THERAPEUTIC
MAGAZINE
ISSUE 1/2016



The Triathlon Issue

**MASSAGE
THERAPY**

Decrease pain and fatigue
after long distance
Ironman triathlon

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IRONMAN WALES

A challenging course that takes in views of everything from stunning beaches to Iron Age forts.

PHOTOCREDIT:
[HTTP://EU.IRONMAN.COM](http://eu.ironman.com)



PHOTOCREDIT:
DONALD MIRALLE©



EDITOR'S LETTER

Why launch the NAQI Magazine? This is probably a question many people will ask themselves. The novelty and strength of this NAQI® Magazine lies within the objective to link Physical Therapy with Skin Therapy and create a platform for open discussion amongst professionals. Each issue the NAQI® Magazine selects a specific sport or topic and creates a platform to engage in a Medical, Physical Therapy and Skin Care discussion.

After a short introduction of the theme, a sports medical scientific article follows describing training, trauma, rehabilitation or recovery process. This is followed by a Physical Treatment proposal, which is the starting point for open discussion amongst therapists and medical professionals. The final part consists of an article linking the theme to professional skin care and required skin condition.

The NAQI® Magazine was designed as platform for peer discussion, from all parts of the world with different views and opinions on Therapeutic Treatment.

The NAQI® Magazine editors consist of Tim Laagland, Physical Therapist, who will write the Physical Treatment proposal. The magazine board will review this article. The board consists of Greet Claes, Gerard Green, Paul Van Ioon and Joost Mentink. You can find more information on page 2.

The first issue is focuses on Triathlon, an intense and challenging sport. Last month the Journal of Physiotherapy (by Elsevier in open source) published an interesting article "Massage therapy decreases pain and perceived fatigue after long-distance Ironman triathlon". This article was the base for the Therapeutic Treatment proposal of Tim Laagland. Greet Claes offers her expertise on common skin injuries, which many triathletes face.

We hope you will enjoy reading the Magazine as much as we enjoyed making it.

Edgard Geyskens

EDITOR



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ALEX GRIMM©/GETTY IMAGES

NAVY SEALS

The idea for the Ironman began as challenge among a group of Navy SEALS who debated which sport was more physically demanding, running or swimming.

The first triathlon was organised in France during 1920-30 named as La course des Trois Sport. The competition was limited to 200m swimming, 10km cycling and 1200m running. The first modern swim/bike/run event to be called a "triathlon" was held at Mission Bay, San Diego, California in 1974. The most recognized branded Ultra distance is the Ironman Triathlon. An extreme challenge for the supremely fit, the Ironman Triathlon consists of a 3.9 kilometer swim, a 180-kilometer bike ride and a 42.1 kilometer run. It's been said that just finishing is a victory! The World Triathlon Corporation organizes Ironman Triathlon events held around the world throughout the year.

The cycling stage of the race covers 180km over lava flats on the big island of Hawaii, where mid-day temperature often reach over 43 degrees Celcius and cross-winds blow at 89km/h. The race is often challenging even to competitors with experience in other iron-distance events. Being a world champion race, only competitors that meet qualifying guidelines can enter.

The idea for the Ironman began in 1977 as a challenge among a group of Navy SEALS who debated which sport was more physically demanding, running or swimming. The first Ironman was born in Hawaii in Feb. 18, 1978, when California triathletes John and Judy Collins organized the first endurance triathlon.

Whoever finishes first we'll call the Ironman," Collins reportedly said, and the Ironman triathlon has been one of the world's most popular endurance events ever since [source: Ironman Triathlon World Championship]. Not only is the distance grueling, there's a time limit for each segment. Most Ironman events allow participants 17 hours to complete all three legs of the race. The event begins at 7 a.m. The swim must be complete in 2 hours and 20 minutes; the bike ride must be done by 5:30 p.m.; and the marathon must be finished by midnight.

Since the Olympic Games in Sydney 2000, triathlon became an Olympic game with 1,5km swimming, 40km cycling and 10km running.

A RANDOMISED TRIAL

Massage therapy decreases pain and perceived fatigue
after long-distance ironman triathlon

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ANDREW LOEHMAN©



PHOTOCREDIT:

U.S. NAVY PHOTO BY CHIEF JOURNALIST DEBORAH CARSON ©

QUESTION

Can massage therapy reduce pain and perceived fatigue in the quadriceps of athletes after a long-distance triathlon race (Ironman)? Design: Randomised, controlled trial with concealed allocation, intention-to-treat analysis and blinded outcome assessors. Participants: Seventy-four triathlon athletes who completed an entire Ironman triathlon race and whose main complaint was pain in the anterior portion of the thigh. Intervention: The experimental group received massage to the quadriceps, which was aimed at recovery after competition, and the control group rested in sitting. Outcome measures: The outcomes were pain and perceived fatigue, which were reported using a visual analogue scale, and pressure pain threshold at three points over the quadriceps muscle, which was assessed using digital pressure algometry. Results: The experimental group had significantly lower scores than the control group on the visual analogue scale for pain (MD -7 mm, 95% CI -13 to -1) and for perceived fatigue (MD -15 mm, 95% CI -21 to -9). There were no significant between-group differences for the pressure pain threshold at any of the assessment points. Conclusion: Massage therapy was more effective than no intervention on the post-race recovery from pain and perceived fatigue in long-distance triathlon athletes. Trial registration: Brazilian Registry of Clinical Trials, RBR-4n2sxr. [Nunes GS, Bender PU, de Menezes FS, Yamashitafuji I, Vargass VZ, Wageck B (2016) Massage therapy decreases pain and perceived fatigue after long-distance Ironman triathlon: a randomised trial. *Journal of Physiotherapy* 62: 83-87]

INTRODUCTION

Ironman is one of the main long-distance triathlon races in the world. About 40 Ironman events take place every year across the globe, with around 2000 athletes participating in each event.¹ In this competition, athletes have to cover a distance of 226 km, which consists of swimming 3.8 km, cycling 180 km and running 42.2 km.² It is a strenuous competition that requires high energy expenditure and generates high physical and metabolic stress.^{3,4} Because of this stress, Ironman athletes often experience various medical conditions such as dehydration, heat stroke, hyponatraemia, musculoskeletal injuries, hypothermia, skin injuries, fever, hypoglycaemia, diarrhoea and vomiting.⁴⁻⁷ However, the most common symptoms after a race are pain and muscle fatigue, which are probably caused by muscle damage that induces an inflammatory response and a reduction in energy reserves.^{4,8-10} The body parts most affected by pain and fatigue due to constant overload are the lower limbs, mainly around the knees.^{11,12}

Therapeutic interventions are used to try to minimise the severity of symptoms in triathletes after strenuous competition, such as massage, cryotherapy and stretching.¹³⁻¹⁵ Massage therapy is often used after competitions and is defined as a mechanical manipulation of human body tissue by means of manual compressions and rhythmic percussions.^{13,14} Different massage therapy techniques are expected to increase blood and lymphatic flow;¹⁴ theoretically, this might accelerate the elimination of catabolites, which possibly reduces the sensation of fatigue.¹⁴ Another expected effect of massage therapy is pain relief.¹⁴ The mechanical stimulus caused by manual contact on the skin may have a neurological effect, blocking the noxious stimuli based on the gate-control theory.¹⁴ Another possibility is a physiologic effect via the release of b-endorphins.¹⁴

Several clinical trials have demonstrated the beneficial effects of massage therapy in athletes after strenuous exercises.^{16,17} Ogai et al¹⁷ evaluated physically active university students who performed the same protocol through strenuous workout on a stationary bike in two sessions. In one of the sessions, they received massage to the lower limbs for 10 minutes in the middle of the protocol. After the massage protocol session, the participants showed a decrease in muscle stiffness and perceived fatigue, which was evaluated by the visual analogue scale (VAS).¹⁷ Mancinelli et al¹⁶ also verified the effects of massage in athletes. In this study, high school basketball and volleyball players were divided into two groups after the first training session of the season: one group rested while the other received massage to the quadriceps muscle on the peak day of delayed onset muscle soreness.¹⁶ The group that received massage showed a decrease in perceived pain and pressure pain threshold and improved vertical jump performance.¹⁶

Some systematic reviews have been performed to investigate the effects of massage therapy.^{13,18} These reviews have concluded that massage therapy can have benefits in a variety of musculoskeletal conditions,¹⁸ including soreness after strenuous exercise.¹³ However, among the included studies, there has been some lack of standardisation of the techniques applied during the massage therapy. Furthermore, the intense physical activities used in these studies were generally high-intensity exercise regimens designed to bring on rapid fatigue. The studies were also not conducted in real competition situations, and the massage intervention was not always administered immediately after the exercise. Therefore, questions remain regarding the effectiveness of massage after very prolonged, strenuous sporting competitions such as long-distance triathlon.¹³

Therefore, the research question for this randomised, controlled trial was:

Does massage reduce pain and fatigue in the quadriceps of athletes after a long-distance triathlon race (Ironman)?



PHOTOCREDIT:
IRONMAN FRANKFURT BY
HAMPERIUM ©

METHOD

DESIGN: This was a randomised clinical trial in which the participants were allocated to one of two groups: an experimental group or a control group. The experimental group received massage to the quadriceps, which was aimed at recovery after competition, and the control group rested in a sitting position. The randomisation was conducted using sealed and opaque envelopes to conceal each upcoming allocation during recruitment. A researcher who was not involved in the evaluations or interventions of this study prepared these envelopes. The study design is presented in Figure 1.

PARTICIPANTS, THERAPISTS AND CENTRE: Seventy-four triathlon athletes from Ironman Brazil took part in this study. To be eligible for inclusion in the study, athletes had to complete the entire Ironman triathlon race and report to the physiotherapy clinic with their main complaint being pain in the anterior portion of the thigh. The exclusion criteria were any medical conditions that were not compatible with the procedures of the study, such as: severe metabolic and respiratory disorders during the study procedures, cramps during the evaluations and/or interventions, presence of abrasions on the thigh, or any change in sensation of the thigh caused by analgesics or cryotherapy. The evaluations and interventions of this study were conducted in the physiotherapy clinic of the Ironman Brazil triathlon competition. This clinic was located near the finish line. First, the athletes were assessed to determine if they met the eligibility criteria, and data about their baseline characteristics were collected. The measurements were

taken from the most painful quadriceps, as reported using the VAS. If the participant reported the same level of pain in both thighs, the side to be treated was randomly selected by flipping a coin. After the first evaluation, the participants were allocated to a group and directed to the intervention site. After the interventions, the same blind researcher reassessed the participants and, if needed, they were directed back to the clinic to continue the treatment. To maintain the assessor blinding, the evaluation was conducted in a different place to where the massage intervention was conducted, the assessor was not informed of who was in which group and the foam used to reduce friction during the massage was also applied on the quadriceps of the control participants.

INTERVENTION: The experimental group received massage for 7 minutes from a therapist who was not involved in the measurements. The intervention consisted of the following procedures: 1 minute of superficial effleurage, in which the therapist slid both hands in the direction of the muscle fibres from distal to proximal with a gentle pressure on the thigh; 2 minutes of deep effleurage, in which the therapist performed the same movement but applied more pressure to the thigh; 2 minutes of petrissage, in which the therapist used the entire surface of the palm of the hands to compress and lift the tissue sequentially; 1 minute of tapotement, in which the therapist agitated the tissues of the thigh with cupped hands; and 1 minute of superficial effleurage to finish the intervention. A video demonstration of the techniques is presented in Appendix 1 (see eAddenda for Appendix 1).

Foam made from soap and water was used to reduce friction between the therapist's hands and the participant's skin. The control group rested in a sitting position for 7 minutes. This control was adopted because minimum manual contact from a sham technique could have similar effects to those of the experimental intervention. The participants allocated to the control group were not informed that they would not receive massage; they were told to expect an available therapist to perform the massage. At the end of this waiting period, the same foam used in the massage intervention was applied to the participants' leg in order to keep the evaluator blinded to group allocation. After the final measures, participants were led to the physiotherapy clinic to complete the treatment.

OUTCOME MEASURES:

Pain and perceived fatigue

The pain and perceived local fatigue in the quadriceps muscle were measured using the VAS. The scale consisted of a 100-mm line on which 0 mm indicated no pain or fatigue and 100 mm indicated the worst possible pain or extreme exhaustion. The participants were asked to score the intensity of pain and fatigue at that time on the horizontal 100-mm line.^{17,19} The levels of pain and fatigue were measured separately

in mm. The VAS has high reliability for acute pain measures, with an intraclass correlation coefficient (ICC) of 0.97,²⁰ and is also validated to measure fatigue in healthy subjects.²¹

Pressure pain threshold

To measure the pressure pain threshold, a digital pressure algometer, which was connected to a computer for data collection, was used. Algometry has been shown to be highly reliable (ICC = 0.91).²² The participant sat with the knee flexed at 90 deg and feet flat on the floor. Three points were measured at the quadriceps: the muscle bellies of the rectus femoris, vastus lateralis and vastus medialis. The algometer inductor was positioned perpendicularly to the skin at each point and gradual pressure was applied until the participant reported a change from the sensation of pressure to pain. At that point, the pressure was stopped immediately and the highest pressure that was recorded represented the pain threshold.^{16,22} Before the beginning of the evaluation, the subject was familiarised with the measurement by a demonstration of the pressure at each point to be measured. The measure in each point and mean among points were used for analysis. Pressure was measured in kgf/cm².

“
74 athletes
from
Ironman
Brazil took
part in this
study
”

DATA ANALYSIS

The sample size of this study was calculated based on statistical power of 80% and an alpha of 5%. The sample size calculation indicated that 36 participants in each group would be required to identify: a between-group difference in pain of 20 mm measured by the VAS, with a SD of 30 mm; 16 a between-group difference of 10 mm in the perceived fatigue measurement by the VAS, with a SD of 15 mm;¹⁷ and a between-group difference of 1.0 kgf/cm² in the pressure pain threshold measurement, with a SD of 1.5 kgf/cm² based on a pilot study.

To compare the effect of massage between the experimental and control groups, the independent t-test was used to identify differences. The difference from baseline was taken into account in the analysis. A level of significance of p < 0.05 was adopted for all tests and the data were analysed with an intention-to-treat approach. The 'last observation carried forward' approach was used for missing data. The effect size (Cohen's d) was calculated and classified as small (d = 0.2), moderate (d = 0.5), and large (d = 0.8).²³ The analyses and sample size calculation were performed using commercially available software^{b,c}.

RESULTS

FLOW OF PARTICIPANTS THROUGH THE STUDY

One participant did not finish the procedures due to nausea during the initial evaluation, necessitating medical care. Thus, 36 participants in the experimental group and 37 participants in the control group completed the procedures. The characteristics of participants are shown in Table 1 and in the first two columns of data in Table 2. Individual participant data are presented in Table 3 (see eAddenda for Table 3). The only complication reported by some participants during the competition was the occurrence of cramps.

COMPLIANCE WITH THE STUDY PROTOCOL

No ineligible participants were randomised. No assessors were unblinded during the study. No participants received the wrong intervention. All participants were analysed in the group to which they had been randomly allocated.

EFFECT OF THE MASSAGE INTERVENTION

The independent t-test showed statistically significant between-group differences after intervention for pain and perceived fatigue, which were evaluated using the VAS (Table 2). The experimental group had lower scores on the VAS for pain, by a mean of 7 mm (95% CI 1 to 13). The experimental group also had lower scores on the VAS for perceived fatigue, by a mean of 15 mm (95% CI 9 to 21). There were no significant between-group differences for the pressure pain threshold in any of the measured points. When the average of the three measured points was compared between groups, the difference was again non-significant (Table 2). The effect size was large for perceived fatigue, moderate for pain, and small for pain evaluated by algometer at all measured points (Table 2).

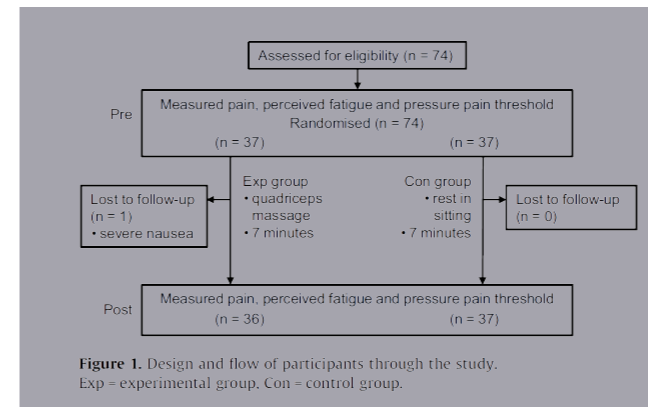


Figure 1. Design and flow of participants through the study. Exp = experimental group, Con = control group.

Table 1 Characteristics of participants.

Characteristic	Exp (n = 37)	Con (n = 37)
Age (yr), mean (SD)	37 (7)	39 (11)
Gender, n males (%)	34 (92)	36 (97)
Height (m), mean (SD)	1.77 (0.09)	1.77 (0.08)
Weight (kg), mean (SD)	75.5 (10.6)	77.2 (10.8)
Time to complete race (hh:mm), mean (SD)	11:31 (2:17)	12:25 (2:16)
Complications during race, n participants (%) cramps	13 (35)	11 (30)

Exp = experimental group, Con = control group.

Table 2 Mean (SD) of groups, mean (SD) difference within groups, and mean (95% CI) difference between groups.

Outcome	Groups				Difference within groups		Difference between groups	Effect size (Cohen's d)
	Pre		Post		Post minus Pre		Post minus Pre	
	Exp (n = 37)	Con (n = 37)	Exp (n = 36)	Con (n = 37)	Exp	Con	Exp minus Con	
Pain (mm)	58 (24)	62 (23)	48 (24)	59 (23)	-10 (12)	-3 (13)	-7 (-13 to -1)	0.6
Perceived fatigue (mm)	84 (18)	79 (23)	69 (24)	79 (19)	-15 (14)	0 (1)	-15 (-21 to -9)	1.5
PPT (kgf/cm ²)								
rectus femoris	6.0 (2.4)	6.1 (2.7)	5.6 (2.2)	5.5 (3.0)	-0.4 (1.7)	-0.6 (1.3)	0.1 (-0.6 to 0.8)	0.1
vastus lateralis	5.4 (1.7)	5.4 (2.1)	5.2 (1.8)	5.1 (2.2)	-0.1 (1.2)	-0.4 (1.1)	0.2 (-0.3 to 0.7)	0.3
vastus medialis	4.4 (1.4)	4.5 (1.4)	4.2 (1.5)	4.4 (1.7)	-0.2 (1.0)	0.0 (1.0)	-0.2 (-0.6 to 0.3)	0.2
quadriceps femoris	5.3 (1.7)	5.3 (2.0)	5.0 (1.7)	5.0 (2.2)	-0.3 (1.0)	-0.3 (0.8)	0.1 (-0.4 to 0.5)	0.0

Exp = experimental group, Con = control group, PPT = pressure pain threshold.

What is already known on this topic: Pain and fatigue are common after intense exercise. Massage is beneficial in this situation, but the evidence for its benefits comes from studies of controlled periods of intense exercise designed to cause rapid onset of fatigue.

What this study adds: Among people who had just competed in a 226-km Ironman event, a short period of massage over the quadriceps resulted in local reductions in both pain and perceived fatigue. The amount of pressure over the quadriceps required to elicit pain was not significantly reduced by the massage.

DISCUSSION

This study aimed to determine whether massage therapy could optimise the recovery of athletes after competing in a long-distance triathlon such as Ironman. Both pain and fatigue are very common conditions after these competitions.¹⁰ The onset of muscle pain and discomfort may result from the activity overload. This may lead to structural damage, which leads to an inflammatory response in the muscle tissue,^{4,10,24} and this inflammatory response stimulates the nerve endings (deep nociceptors), which results in painful stimuli.²⁵ The perception of fatigue may be related to the high energy demands of this kind of sport. The shortage of energy substrate, mainly muscle glycogen, may lead to metabolic acidosis (resulting from organic reactions to energy production)^{25,26} and increased production of free radicals that are generated by the oxidative damage in the body cells.³ Thus, the lack of nutrients for energy generation and the accumulation of catabolites may cause a decrease in capacity for strength and power generation in the energy transfer system and a disturbance in the transmission of nerve impulses.^{25,27}

Massage therapy as a technique for triathlete recovery after a long-distance race resulted in decreased pain and perceived fatigue when compared with triathletes who remained at rest in this study. When calculated in terms of a Cohen's *d*, the effect size could be categorised as large for perceived fatigue and moderate for pain. When considered in mm on the 0-to-100 mm VAS, the 7-mm effect on pain and the 15-mm effect on perceived fatigue would not be considered large or perhaps even moderate. However, it should be noted that the massage was only applied for 7 minutes. This raises two important issues. First, athletes may consider these relatively small improvements worthwhile given the small amount of time invested in the intervention. Second, although 7 minutes of massage was sufficient to demonstrate that massage improves pain and perceived fatigue in these long distance triathletes, massage of greater duration may be able to increase the magnitude of these effects.

Massage therapy was applied in this study in order to mitigate the main structural and physiological damage after long-distance triathlon events. Some studies suggest that the manual contact can cause physiological, neurological or psychological responses for the control of pain sensation.¹⁴ In the present study, the experimental group showed decreased perception of pain, but the pressure pain threshold remained unchanged. This suggests that massage results cannot be explained by neurological responses based on the gate control theory. Possible explanations may be related to physiological responses through the β -endorphin release or catabolite elimination or to psychological pathways where attention and manual contact can lead to a sense of well-being.¹⁴

The physiological responses obtained through massage are enhanced by the improvement observed in the experimental group regarding perceived fatigue. In physiological terms, fatigue relates to the decrease in normal function.²⁸ It has also been suggested that fatigue can have both central and peripheral sources,

with lack of energy substrate and metabolic waste concentration being the most probable causes.^{14,26,28} Thus, it can be assumed that the positive effects of massage therapy on perceived fatigue are related to greater localised blood circulation either by mechanical effect or temperature increase,^{14,29,30} which aid in the removal of metabolic waste.^{14,30}

As discussed above, systematic reviews have been performed to analyse the results of studies about the effects of massage therapy. Bervoets et al included studies that assessed the effects of massage therapy on participants with musculoskeletal disorders, and concluded that massage therapy as a stand-alone intervention reduces pain and improves function.¹⁸ Another systematic review by Best et al included only studies about sports massage therapy; it concluded that massage therapy could assist in muscle recovery and reduce delayed onset muscle soreness.¹³ Thus, the results of the present study are in agreement with the conclusions of those systematic reviews, especially with respect to the effect on pain, despite the large

variety of massage techniques applied in the analysed studies.

Despite the positive effects of massage on pain and fatigue in the present study, these findings should be analysed with caution. The positive effects were found only in subjective measures. Another consideration is that the time between evaluation and re-evaluation was very short, and this could also have had some influence on the results. Another issue was the lack of a sham technique as control. Although this did not control for the effects of contact with the therapist, this lack of control was judged to be a less important consideration than the potential for the minimal manual contact from a sham technique to have led to similar effects as massage. Despite this issue, the results still confirm the effect of the massage on well-being and relief of symptoms in the short term, even if it does not have a significant effect on structural and physiological aspects of postexercise soreness.

Based on the results of the present study, it can be concluded that the massage therapy techniques used were more effective in the recovery from pain and perceived fatigue than no intervention after a long-distance triathlon race. Further investigations are needed to verify the acute effects of massage therapy on metabolic stress and biochemical markers of structural damage in athletes after strenuous competitions and to identify the effects of massage therapy applied at the end of competitions on the recovery of long-term athletes.

IN SUMMARY

There is now direct evidence to support the use of massage for the recovery of triathletes after long-distance endurance races. Research on massage therapy applied at the end of such competitions is important because this technique is widely used in this context and there is the potential to identify effects of greater magnitude (eg, by increasing the dose of massage delivered). *Bibliography on p30-31.*





THERAPEUTIC TREATMENT PROPOSAL

How can you use massage therapy
for an athlete to recover better and faster after an Ironman?

Nunes et al. (2016)¹ investigated the effect of massage therapy directly after an Ironman. After twelve hours of strenuous competition, 36 athletes received seven minutes of massage therapy and 37 athletes received no massage therapy and sat in a chair for seven minutes. The result of this study stated that the group that received the seven minutes massage therapy experienced a moderate effect on pain and a large effect on perceived muscle fatigue as compared to the control group.

The difficulty of research on massage therapy is that there is a lot of difference in techniques, duration, massage appliance and timing of massage therapy. In this study, these items are described in great detail. For research purposes it is desirable to have a detailed protocol, however it can be limiting for practical use. Is it useful to give a massage treatment for only seven minutes after a twelve hour competition? How can we use this information to treat Ironman athletes better?

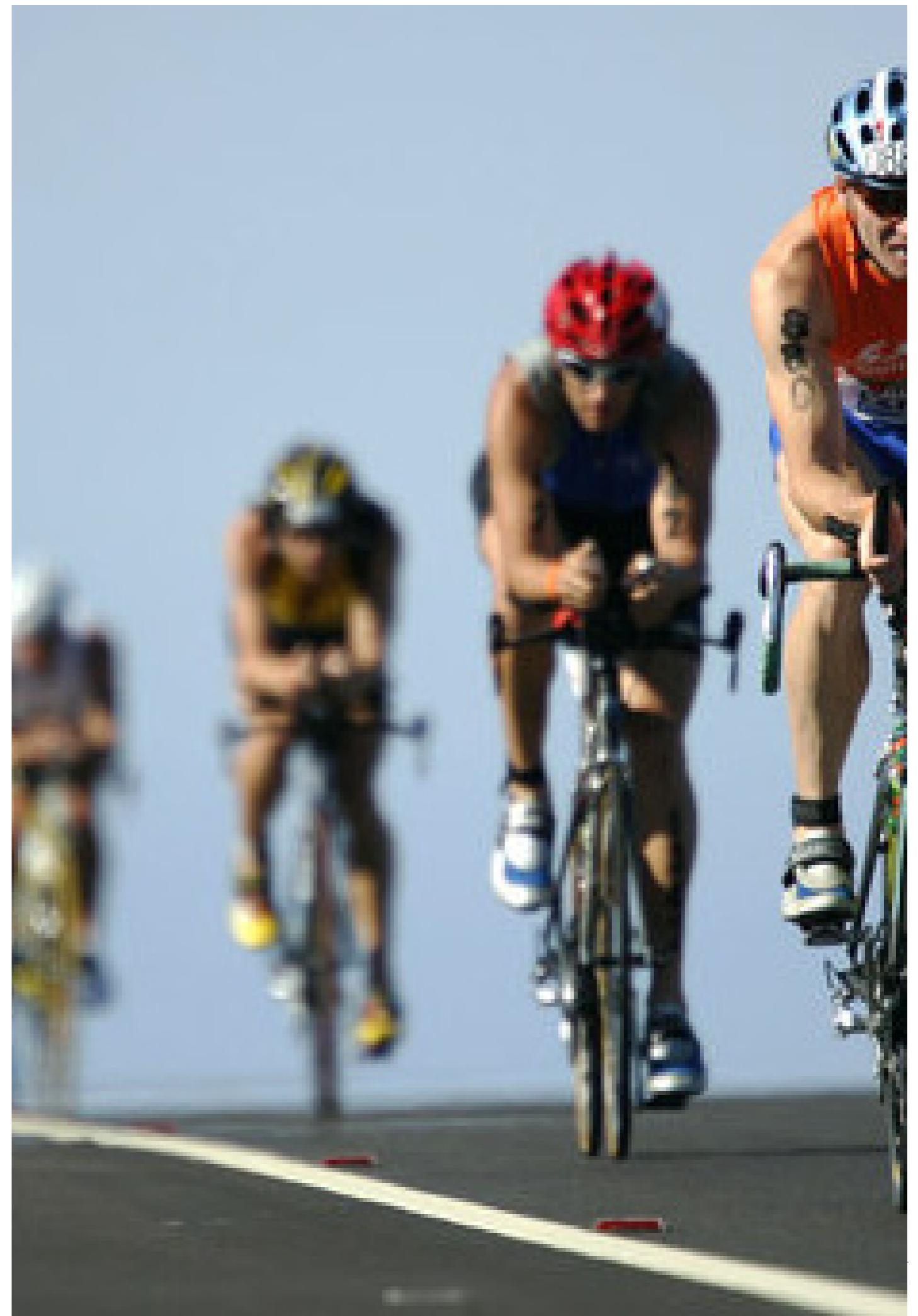
The goal of massage therapy in this research is to reduce pain and perceived muscle fatigue after an Ironman. The goal of a therapist is to treat athletes in a way that they will be able to perform at his best and recover faster and better after an Ironman. Massage therapy is a means to reach the goal.

Prior to the Ironman in warm temperatures as in Brasil, an athlete can prepare himself for the race with the NAQI Body Screen. This will minimize the friction in tender area's as the neck, armpits, nipples and perineum. Second, an athlete can use the NAQI Start Oil to prepare his body for the race. The NAQI Start Oil is a transparent film oil that will keep the body warm, but will not limit the skin's ability to lose heat through transpiration.

After an Ironman it takes up three weeks to recover for experienced athletes till three months for novice athletes. The first steps that have to be taken are hydration, filling up on protein and carbohydrates, cooling down and adjust your training. In the first couple of weeks, the muscles need to recover from the extreme stress it had to endure. In this research, only the quadriceps are investigated. In reality, all the muscles in the body – especially the muscles in the lower extremity as the hamstrings, calves and gluteal muscles - are affected. Also joint cartilage, tendons and skin have to recover. Therapeutic interventions to help the muscles recover are stretching, active recovery to increase blood flow and massage therapy. Massage therapy can decrease the tension of the muscle, increase blood flow and lymphatic flow, repair the skin and decrease pain and muscle fatigue. For these purposes, it is desirable to use massage therapy in training for and recovery after an Ironman.

Tim Laagland

MAGAZINE BOARD MEMBER



TREATMENT SCHEDULE (*)

Day	Massage Treatment	Proposal	Complementary Treatment	Proposal
0	Prior to event: Skin irritation preventor	NAQI Body Screen (prevents irritation, see p26) NAQI Start Oil (passive warming up, protection against temperature of the water)	Prepare body for race	Hydrate , warming up, light meal
0	After event, post race: Massage therapy	Per muscle group: 4 minutes of superficial effleurage 6 minutes of deep effleurage 2 minutes of tapotement 3 minutes of superficial effleurage	Rest	Cooling down , hydration, filling up on protein and carbohydrates. Stretch each muscle group. Apply NAQI Recovery Gel to your tired muscles.
0-2	Massage therapy	Per muscle group: 2 minutes of superficial effleurage 4 minutes of deep effleurage 4 minutes of petrissage 2 minutes of tapotement 3 minutes of superficial effleurage	Active recovery	Stretch each muscle group, 15-20 minute walk Apply NAQI Recovery Gel to your tired muscles twice per day.
2-4	Massage therapy	Idem	Active recovery	30 minute walking/cycling/swimming, dynamic stretch each muscle group Apply NAQI Recovery Gel to your tired muscles twice per day
4-6	Massage therapy	Idem	Active recovery & rest	2 hours easy cycling, dynamic stretch each muscle group
6-8	Massage therapy	Idem	Active recovery & rest	Don't start training, be active and take walks or surf, stretch each muscle
8-10	Massage therapy	Idem	Active recovery & rest	Idem
10-12	Massage therapy	Idem	Active recovery & rest	Idem
12-14	Massage therapy	Idem	Active recovery & rest	Idem

The editor thanks for the peer review by the board of the Magazine, Bert Haast, Andres Ruttens, Steve Vandebos.

(*) The first two weeks special attention is required because an Ironman triathlon induces muscle damage and a systemic inflammatory response. According Neuhaus, König, Wagner the pronounced initial systemic inflammatory response induced by an Iron triathlon declines rapidly. However, a low-grade systemic inflammation persisted until at least 5 days post-race, possibly reflecting incomplete muscle. (see European Journal of Applied Physiology, October 2008, vol 104, issue 3, pp417-426).

Ronald Gaastra, top coach of triathletes says: "Focus on recovery for the first 4 days. Find the right balance between nutrition, supplements, rest and physical therapy" (2) Steve Vandebos, MSc (Physical Education) Fitness Professional. Going from rest, light swims and rides to massage therapy and stretching. To reduce the impact on muscles and joints only go for very light runs or walks.

HOW

The goal of massage therapy is to decrease tension of the muscles, increase blood flow and lymphatic flow, to repair the skin and to reduce pain and muscle fatigue. In this research the massage therapy consisted of superficial and deep effleurages, petrissage and tapotement. I would recommend a massage treatment starting with mild techniques as superficial effleurages, then continuing with more intensive techniques as the deep effleurages, petrissages and tapotement. Always end with a light technique as the superficial effleurages. For the first treatment, directly after the Ironman, light techniques as effleurages are preferred for optimal recovery.

WHEN

The immediate effect of massage therapy after an Ironman is a moderate effect on pain and a large effect on muscle fatigue. But what is the effect on the long term? The recovery does not stop here, is it not a smart idea to continue the massage therapy throughout the weeks of recovery? And what should the frequency be? I would recommend treatment directly after an Ironman and every other day after up to two weeks after completing the Ironman. In this way, the body has the ability to recover from stimulus.

DURATION

The researches state that perhaps the effects on pain and muscle fatigue would be greater if the intervention lasted longer than the seven minutes. The duration of a massage depends on which muscles are treated (full-body or a single muscle group) and can last up to two hours for a full body massage. For a single muscle group, I would recommend a duration of fifteen minutes to reach the maximal effect. As stated earlier, it is logical to treat not only the quadriceps, but also other muscles in the lower extremity. As a result, the massage therapy will last longer than fifteen minutes.

APPLIANCE

In this research a mixture of soap and water is used as a massage appliance. In my experience this is not common, by not using specialized massage oil there is a great chance of skin irritation and damage by friction for both the athlete and the therapist. NAQI is a specialized company and has a lot of experience in developing different kinds of massage oils and lotions. For treating Ironman athletes, I would recommend to use the NAQI Massage Lotion Sport. This lotion has high sliding and spreading abilities and complementary hydrates the skin. For consumer use, the NAQI Cool Down spray can be used to refresh sore muscles and the NAQI Recovery Gel can be used to strengthen and hydrate the skin after the Ironman.

CONCLUSION

The treatment schedule gives an overview of the massage therapy treatment schedule, in combination with complementary treatment advice. To treat Ironman athletes with massage therapy, start treatment directly after the event with fifteen minutes massage per single muscle group. Continue treatment every other day for the following two weeks. Use a logical order of massage techniques and use NAQI Massage Lotion Sport for optimal effect. Prior to the event athletes can use NAQI Body Screen to prevent skin friction and NAQI Start Oil to prepare the body for the activity, and the athletes can use NAQI Cool Down spray and NAQI Recovery Gel after the Ironman.



SAVE YOUR SKIN: TRIATHLON & SKIN FRICTION

Sun, heat, water, wind, sand, dirt... the skin of a triathlete is exposed to all of these factors in extremes. Skin care is often one of the last things on the athlete's mind. Nevertheless, just like building up your endurance and muscles with a training schedule, you can build up the strength and health of your skin with a skincare schedule. Taking a few minutes out of your day to care for your skin can avoid discomfort and injuries during your sports activities. Irritated or damaged skin is extremely vulnerable for bacterial attack, therefore our motto: prevention is better than cure.

It's no surprise friction is an issue amongst triathletes, the most common ones being: blisters on feet, friction between wetsuit and the skin, saddle friction, runners nipples, friction between sleeveless shirt and armpits. Skin is in constant interaction with the environment and other materials. Skin friction depends on the characteristics of both the human skin and the contact material, as well as on the environment (temperature, humidity...) and the contact parameters (duration, velocity...). Giving your skin the tools to deal with the environment factors will decrease friction problems immensely.

Greet Claes

MAGAZINE BOARD MEMBER

BLISTERS ON FEET

Experienced athletes claim that the right combination of shoes and socks are crucial to reduce the risk of blisters. When shoes don't fit well, the friction between the feet and the socks will increase. Blisters occur when the friction force exceeds the strength of the skin, resulting in a separation of the internal skin layers. Getting a decent shoe fitting and applying anti-friction lubricant will reduce these friction problems. Socks should be made without seams, should give your feet the chance to breathe and that are ideally made from synthetic material or wool.

WETSUIT FRICTION

Your skin will be rubbing on your wetsuit in a few locations but the most common area of trouble is the neck. Just like shoes, your wetsuit should be fitted correctly for your neck-to-groin length and your body weight. A correctly fitted wetsuit won't save you from all friction problems though. An anti-friction lubricant will be necessary for the prolonged wetsuit time during a triathlon.

SADDLE FRICTION

We will spare you details and imagery of saddle friction problems during races. Well fitted, tight compression shorts, a professional bike fit and anti-friction lubricant are all necessary to help your skin get through the long ride. Wash your shorts after every ride and avoid wearing underwear under your bike shorts.

RUNNERS NIPPLES

A very common yet underestimated problem. Runners often tape off their nipples in the hopes of not falling victim to this injury. Sadly, too often this tape will fall off from sweating, create skin irritation or even become the friction problem in itself. Anti-friction lubricants are key in minimizing friction problems together with a well-fitted shirt.

FRICTION ON ARMPITS

You guessed it, wear a fitted shirt and apply anti-friction lubricant to minimize the chance of friction issues under your arms. But, when and how you shower also affects how your skin will deal with friction during a race. Wash your skin with a mild cleanser. Don't exaggerate when cleaning/rinsing as important substances such as lipids and natural moisturising factors will be removed from the skin and the effects of this washing can last for hours, making the skin more sensitive and vulnerable.

PRODUCT IN THE SPOTLIGHT: NAQI® BODY SCREEN



The importance of dermatological testing with an anti-friction cream is enormous as it's applied to skin most prone to irritation. Bodyscreen is dermatologically tested, here is a quick look into the testing details:

Experiments were carried out on 50 volunteers (27 normal healthy subjects, 6 eczema patients, 4 allergy patients, 13 subjects with sensitive skin) between ages of 18 to 72. All participants completed the study, leaving the product on their back for 48 hours. None of the subjects showed any reaction to the test product. On the basis of the test results and under the test conditions, the product Body Screen is to be classified as harmless as regards the possibility of skin irritation.

INGREDIENTS: Aqua, Butyrospermum Parkii, Cetearyl Ethylhexanoate, Sorbitan Stearate, Glycerin, PPG-15 Stearyl Ether, Cyclopentasiloxane, Cyclohexasiloxane, Dimethicone, Dimethylmethoxy Chromanol, Microcrystalline Cellulose, Bisabolol, Sucrose Cocoate, Cetearyl Alcohol, Panthenol, Allantoin, Hydroxyethyl Acrylate/ Sodium Acryloyl Dimethyl Taurate Copolymer, Trimethylsiloxysilicate, Sodium Benzoate, Potassium Sorbate, Xanthan Gum, Phenoxyethanol, Ethylhexylglycerin, Lactic Acid, Rosmarinus Officinalis Extract.

NAQI® BODY SCREEN INGREDIENT IN THE SPOTLIGHT:

SHEA BUTTER: Shea butter's skin care and healing properties were first harnessed thousands of years ago. The history of shea as a precious commodity can be traced back to Ancient Egypt, where shea butter was and continues to be used to protect the skin against the fierce sun and the hot dry winds of African deserts and savannah.

So why do we love Shea Butter? It absorbs rapidly into the skin, acts as a "refatting" agent, and has good water-binding properties. It's an excellent emollient for people who ask a lot of their skin. Ideal for athletes in our opinion. That's why it's one of the most important ingredients of NAQI® Body Screen.

DID YOU KNOW?

ANTI-FRICTION CREAM SHOULD NOT JUST BE LUBRICATION:

MANY ATHLETES APPLY A LAYER OF LUBRICATION (EG. VASELINE) TO AVOID FRICTION PROBLEMS. WHILE THIS LAYER WILL BE EFFECTIVE FOR A SHORT PERIOD, DURING LONGER SPORT ACTIVITIES THEY WILL MAKE YOUR SKIN WEAKER. THE LUBRICANT WILL BECOME A BARRIER FOR YOUR SKIN TO BREATHE, SWEAT WILL BE LOCKED BETWEEN YOUR SKIN & THE LUBRICANT, AND YOUR SKIN WILL BECOME MOIST AND EXTREMELY VULNERABLE. A DECENT ANTI-FRICTION CREAM WILL ALLOW YOUR SKIN TO BREATHE.

LUBRICANTS LIKE VASELINE CAN DEGRADE YOUR WETSUIT.

ANTI-FRICTION CREAM SHOULD NOURISH:

ANTI-FRICTION CREAM IS MOSTLY USED JUST BEFORE THE RACE WITH THE IDEA IT JUST PROTECTS THE SKIN FOR A SHORT PERIOD OF TIME. HOWEVER, A GOOD ANTI-FRICTION CREAM WILL ALSO NOURISH AND BY USING THIS PRODUCT A FEW WEEKS BEFORE THE RACE YOUR SKIN WILL BE STRONGER AND DECREASE THE RISK OF FRICTION PROBLEMS EVEN MORE.



FLANDERS BIKE VALLEY

The NAQI® Foundation is now a member of Flanders Bike Valley. Their innovative projects inspired us to collaborate in the future. You will read more of our adventures with them in coming issues.

Flanders' Bike Valley ("The Global Cycling Center") was established in 2013 as one of the first bottom-up clusters in Flanders. As an Open Innovation Center for the Cycling Industry the cluster was founded by 4 local SME's (bottom-up) which are lead plants in their sector, together with one knowledge institute: BioRacer (a cycling clothes manufacturer), Lazer Sport (helmets), Ridley Race Productions, Voxdale (a specialist in aerodynamics who engineered and designed for Indycar) and Flanders' Drive (a knowledge center for the Automotive Industry).

Flanders' Bike Valley focuses on 6 major topics: Mobility, Sports (involvement of Belgian Cycling Foundation and Belgian Olympic Committee), Safety and Healthcare, Science & Technology, Industry & Government and Tourism.

<http://www.flandersbikevalley.be>

ATHLETES IN THE FIELD

Every issue we share athletes' stories with our readers. People we admire for what they do and who's trainings, competitions and experiences can be followed on social media.

BECKY HAIR

CURRENTLY TRAINING FOR ELITE LEVEL TRIATHLON RACE

TWITTER @BECKYHAIRTRI

Becky has been competing in triathlons since 2014 and within a year she represented at the GB Age Group European Championships and had taken part in an Elite level race. She trains with the University of Birmingham team and with the Birmingham based BRAT club, coached by Jason Battle (@P_Coach_Me). Currently competing at Elite level, Becky is sharing her experience on twitter (@BeckyHairTri) for current and future events: world championship Age Group qualifying competitions to compete in Mexico, the Castle Triathlon Series in the UK/France, Liverpool & London Elite Triathlons. She will be racing against some of the biggest triathlon names in the UK and we are thrilled to be cheering her on from afar.

A typical day for Becky consists of early morning swimming, a full days work treating patients in the community, and then a lake swim or cycle ride in the evening! Aside from this hard work training and competing she works as a physiotherapist & sports masseuse fulltime and part time with the wonderful Gerard Greene (@GerardGreenephy) at his clinic in Harborne (www.harbornephysio.co.uk). We were honored to have Becky be part of the NAQI soft tissue course run by Mike Grice and with Patterson Medical which she loved: "This course has pushed me to new levels learning lots of great techniques and the NAQI products really make the difference with our patients! I use NAQI with all my clients now and am a total convert - it's great for the Ultra and Sport lotions. I look forward to working with NAQI and would love to pop over and visit the HQ in Belgium!"

We can't be anything but proud to hear these words from a respected therapist & athlete!



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A R A N O M I Z E D T R I A L P 1 0

Footnotes: *EMG System do Brasil, model EMG230C, São Paulo, Brazil. ^bSPSS Inc. Version 17.0, Chicago, IL, USA. ^cG*Power Version 3.1.9.2, Düsseldorf, Germany.

***Addenda:** Table 3 and Appendix 1 (video) can be found online at doi:10.1016/j.jphys.2016.02.009.

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S A V E Y O U R S K I N P 2 4

N.Vijgen. Skin friction: A novel approach to measuring in vivo human skin.

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